ARISTOTLE UNIVERSITY OF THESSALONIKI

SCHOOL OF PHARMACY

BULLETIN OF STUDIES

SCHOOL OF PHARMACY

ARISTOTLE UNIVERSITY OF THESSALONIKI

ACADEMIC YEAR 2018–2019

THESSALONIKI 2018

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THE ARISTOTLE UNIVERSITY OF THESSALONIKI AND THE SCHOOL OF PHARMACY

The Aristotle University of Thessaloniki was founded in 1925 on the initiative of Alexandros Papanastasiou and begun to operate with five faculties: Theology, Philosophy, Law and Economics, Physics and Mathematics, and Medicine. The Schools of Physics, Mathematics, Chemistry, Physiognosy (Biology - Geology) and, in 1955, the School of Pharmacy, were gradually added to the Faculty of Physics and Mathematics.

Initially, the newly established School of Pharmacy enrolled twenty students per year and the teaching staff was ten full professors and four assistant professors. The majority of the faculty members belonged to the Faculty of Physics and Mathematics (6) and the Faculty of Medicine (5). As it is obvious, the School of Pharmacy of Thessaloniki started its life somewhere between the Faculty of Physics and Mathematics and the Faculty of Medicine, a place that it has kept until the present day.

The School of Pharmacy was initially comprised of two Academic Chairs: a) the Chair of Pharmaceutical Chemistry with elements of Pharmacognosy, and b) the Chair of Pharmacotechniques and Pharmaceutical Technology, and by two Laboratories: a) the Laboratory of Pharmaceutical Chemistry with elements of Pharmacognosy and b) the Laboratory of Pharmacotechniques and of Control of Medicines. The pharmaceutical courses were initially taught by the late Konstantinos Makris, who taught Pharmacognosy, Pharmaceutical Chemistry and Pharmacotechniques. Around 1970, following Prof. Makris' retirement in 1968, the pharmaceutical courses were assumed by the late Professors Georgios Fokas (Pharmacognosy and Pharmaceutical Chemistry) and Nikolaos Ekonomou-Petrovitch (Pharmaceutical Technology - Prescription formulation techniques). Very soon, new courses were added and Pharmaceutical Chemistry was separated from Pharmacognosy. In 1985, the Department of Pharmacognosy-Pharmacology was created and in 1987 two new laboratories, those of Pharmacognostics and of Pharmacology were added.

Since its foundation and until 1989, the School of Pharmacy was housed on the 3rd floor of the Chemistry Building. In 1989 the School was transferred to its new facilities in the newly built Building of Pharmacy & Biology, where it is located until the present day.

Currently, the School of Pharmacy enrolls 110 to 150 students per year. Its faculty consists of five full professors, seven associate professors, three assistant professors and one lecturer. Faculty members from the Schools of Chemistry, Medicine, Veterinary Medicine, Mathematics, Physics and Biology teach the non-pharmaceutical courses.

Since the 2001-2002 academic year a Graduate Studies Program has been launched and operates in the School of Pharmacy, conferring both a Master's Degree in the Pharmaceutical Sciences and a Doctorate in Pharmacy.

STRUCTURE AND OPERATION OF THE SCHOOL OF PHARMACY

The School of Pharmacy is comprised of the following Departments:

1. Department of Pharmaceutical Chemistry with its "Laboratory of Pharmaceutical Chemistry".
2. Department of Pharmaceutical Technology with its Laboratories of i) Pharmacotechniques and Control of Medicines and ii) Pharmaceutical Analysis.
3. Department of Pharmacognosy - Pharmacology with its Laboratories of i) Pharmacognosy and ii) Pharmacology.

The administrative bodies of the School of Pharmacy are the General Assembly (GA), the Board of Administration and the Chairman. The supreme administrative body is the General Assembly.

The General Assembly is composed of all the members of the Faculty, one delegate of the Student Body, one delegate of graduate students, one delegate of the Regular Laboratory Instructors and one delegate of the Regular Laboratory Technicians.

The General Assembly is chaired by the Chairman of the School, who is elected (along with the Vice Chairman) for a two-year tenure by all the faculty members of the School.

ELECTED ADMINISTRATIVE BODY	
Chairwoman:	Hadjipavlou-Litina Dimitra
Vice Chairman:	Kachrimanis Kyriakos
Heads of the Departments:	
1) Pharmaceutical Chemistry	Demopoulos Vassilios
2) Pharmaceutical Technology	Kachrimanis Kyriakos
3) Pharmacognosy - Pharmacology	Lazari Diamanto

COMPOSITION OF THE GENERAL ASSEMBLY

FULL PROFESSORS:	Demopoulos Vassilios Panagiotidis Christos
	Rekka Eleni
	Sklaviadis Theodoros
	Hadjipavlou-Litida Dimitra
ASSOCIATE PROFESSORS:	Fatouros Dimitrios
	Kachrimanis Kyriakos
	Lazari Diamanto
	Markopoulou Catherini
	Nikolakakis Ioannis Papadopoulou Lefkothea
	Vizirianakis Ioannis

ASSISTANT PROFESSORS: Barmpalexis Panagiotis
Karioti Anastasia
Nikolaou Ioannis
Papagianopoulou Dionysia
Pampalakis Georgios
Pontiki Eleni
Xanthopoulos Konstantinos

LECTURERS: Panagopoulou-Kaplani Athanasia

REGULAR LABORATORY TECHNICIANS (RLT's):

RLT DELEGATES: Gabrieli Chrysi

RLT DELEGATES: Paspaltsis Ioannis

UNDERGRADUATE STUDENT DELEGATES: 1

GRADUATE STUDENT DELEGATES: 1

THE SCHOOL'S SECRETARIAT

Simeonidou Konstandia, Acting Secretary

Bikou Evaggelia Clerk (Undergraduate studies)

Mitrokanelos Konstantinos, Clerk (Undergraduate studies)

Petkaris Giorgos, Clerk (messenger)

Viarou Chrysanthi, Librarian

Hatzoglou Mairi, Clerk (Postgraduate studies)

EMERITUS PROFESSORS

Georgarakis Emmanouil † 2014

Geronikaki Athina

Kanellis Angelos

Kokkalou Eugene

Kountourelis Ioannis

Kourounakis Panagiotis

Malamataris Stavros

Niopas Ioannis

Tsiftsoglou Asterios

THE SCIENTIFIC & ACADEMIC DISCIPLINES OF THE DEPARTMENTS AND THE DEPARTMENTAL STAFF

a) Scientific Disciplines

The cognitive subjects of the three Departments of the School of Pharmacy, as defined by the Decision of the General Assembly and by the ministerial decree no. B1/676/24-12-86; and as published in the Government's Gazette no.27/1987 (issue no B1), are the following:

1. Department of Pharmaceutical Chemistry

The chemical and pharmacochemical study of substances of pharmaceutical and of broader biological interest.

The chemical and pharmacochemical study of chemical compounds (organic, inorganic, metallo-organic) of broader pharmaceutical-biological interest includes: Design, composition (isolation), separation-obtaining, properties, control (identification, purity, content) and structure of the compounds.

The chemical and pharmacochemical study (action, chance, interaction) of the biologically drastic agents.

The relation between molecular structure/action of biologically active agents. The quantitative relations of all the above, that is: structure, properties and behavior from a theoretical viewpoint.

The study of chemical principles and methods that subserve the development of pharmacochemistry.

Chemical aspect of immunology.

2. Department of Pharmaceutical Technology

The pharmaceutical practices and legislation (prescription execution and pharmacotechnical tasks at the Pharmacy and the Hospital).

The consideration of pharmaceutical agents and preparations and of their application and action systems (physical and physiochemical laws) from a physiopharmaceutical point of view.

The basic pharmacotechnical elaborations at semi-industrial and industrial scale of the raw material and pharmaceutical agents, as well as their design, technology and formatting into preparations and cosmetics.

The assessment of the quality of medicines, cosmetics and generally of natural products, of preparations and substances by applying control methods (physiochemical, technological, microbiological, in vivo, etc.).

The pharmaceutical technology of the preparations and the factors affecting their efficiency during their in vivo implementation.

The technological study of factors affecting the obtaining, treatment and control of natural products and of their components.

3. Department of Pharmacognosy-Pharmacology

a. Pharmacognosy

The chemistry of natural products (of vegetative, animal, mineral origin), that is, isolation of active components, identification, control and chemical study (General Pharmacognosy / Drug - chemistry).

The pharmaceutical study of medicines and aromatic plants (essential oils, alkaloids, etc.: analysis, standards and improvement methods). Description of medicines, classification, microscopic control, isolation, identification, control and biogenesis of their natural products. (Applied Pharmacognosy).

The implementation of physiochemical methods used in Pharmacognosy.

Biotechnology of Pharmaceutical Plants

b. Pharmacology

The pharmacological development of new medicines, the improvement of known pharmaceutical agents and the study of the structure and pharmacological action at biochemical, molecular level (in vitro), as well as in situ (isolated organs) and in vivo (guinea pigs). The pharmacodynamic study of the pharmacological actions, undesirable effects, and interactions between medicines.

The analysis of the action of chemotherapeutic agents for microbial infections, parasitic diseases, viruses and neoplasms.

The pharmacological analysis and clinical testing of medicines (absorption, distribution, elimination mechanisms of medicines), dosage determination, therapeutic protocols, medicine interactions.

The pharmacogenetic study of the idiosyncrasy, metabolism, addiction, psychic and natural dependence and resistance to medicines.

The immunopharmacological analysis of allergenic factors, pharmaceutical agents, mechanisms of immunosuppression by medicines and the pharmacological basis of hyperaesthesia phenomena.

The toxicological study of medicine undesirable effects mechanisms, of natural products, poisons, teratogens and mutagens in vitro or in vivo.

The study of the pharmacological action of micro-molecular factors (vaccines, sera, proteins, hormones, etc.) and of microorganisms' metabolism products, which are prepared with biotechnology methods.

Development of therapeutic reagents for neurodegenerative diseases.

b) Academic Disciplines

The academic disciplines of the School's Departments, that include the above mentioned scientific disciplines on a theoretical and on a practical level, consist of the following courses:

1) Department of Pharmaceutical Chemistry

- Inorganic Pharmaceutical Chemistry (Compulsary)
- Pharmaceutical Chemistry (Organometallic compounds and hormones) (Compulsary)
- Organic Pharmaceutical Chemistry (I to III) (Compulsary)
- Organic Pharmaceutical Chemistry (Elective)
- Radiopharmaceutical Chemistry (Compulsary)
- History and Objectives of Pharmacy (Elective)

2) Department of Pharmaceutical Technology

- Pharmaceutical Analysis (I and II) (Compalsary)
- General Pharmaceutical Technology (Compalsary)
- Prescription Techniques (Compulsary)
- Physical Pharmacy (Compulsary)
- Biopharmacy (Compulsary)
- Special Pharmaceutical Technology (I and II) (Compulsary)

- Drug Quality Control I (Compalsary)
- Cosmetics (Elective)
- Drug Quality Control II (Elective)
- Pharmaceutical Technology (Elective)
- Prescription Techniques (Elective)

3) Department of Pharmacognosy - Pharmacology

- Cell Biology (Compulsary)
- Molecular Biology (Elective)
- Pharmacognosy (I, II, III) (Compulsary)
- Pharmacology (I and II) (Compulsary)
- Toxicology (Compulsary)
- Chemistry of Natural Products (Elective)
- Clinical Pharmacokinetics (Compulsary)
- National and European Drug Legislation (Elective)
- Bionformatics (Elective)
- Pharmaceutical Biotechnology (Compulsary)
- Clinical Pharmacology and Therapeutics (Compulsary)
- Biotechonology of Pharmaceutical Plants (Elective)

c) Departmental Staff

Department of Pharmaceutical Chemistry

FACULTY MEMBERS:

1. DEMOPOULOS Vassilis	Professor, Degree in Pharmacy (U. Athens), Ph.D. (Iowa State University, USA)
2. HADJIPAVLOU-LITINA Dimitra	Professor, Degree in Pharmacy, (AUTH), Doctorate (AUTH)

4. REKKA Eleni	Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)
5. NIKOLAOU Ioannis	Assistant Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)
6. PAPAGIANNOPOULOU Dionysia	Asistant Porfessor, Degree in Pharmacy (U.Athens), Doctorate (U. Athens)
7. Pontiki Eleni	Assistant Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)

REGULAR LABORATORY TECHNICIANS (RLT's):

1. GAVALAS Antonios	Degree in Pharmacy (AUTH), Doctorate (AUTH)

Department of Pharmaceutical Technology

FACULTY MEMBERS:

1. KACHRIMANIS Kyriakos	Associate Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)
2.MARKOPOULOU Catherine	Associate Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)
3. NIKOLAKAKIS Ioannis	Associate Professor, Degree in Pharmacy (U. Athens), Ph.D. (University of London, UK)
4. FATOUROS Dimitrios	Associate Professor, Degree in Chemistry (University Patras), Doctorate (University of Patras)
5. Barmpalexis Panagiotis	Assistant Professor, Degree in Chemical Engineering (AUTH), Doctorate (AUTH)

5. PANAGOPOULOU Athanasia Lecturer, Degree in Pharmacy (AUTH), Doctorate (AUTH)

REGULAR LABORATORY INSTRUCTORS (RLI's):

Department of Pharmacognocy - Pharmacology

FACULTY MEMBERS:

1. PANAGIOTIDIS Christos Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)

2. SKLAVIADIS Theodoros Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)

3. VIZIRIANAKIS Ioannis Associate Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)

6. PAPADOPOULOU Lefkothea Associate Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)

7. LAZARI Diamanto Associate Professor, Degree in Pharmacy (U. Athens), Doctorate (U. Athens)

8. KARIOTI Anastasia Assistant Professor, Degree in Pharmacy (U.Athens), Doctorate (U.Athens)

9. PAMPALAKIS Georgios Assistant Professor, Degree in Chemisrty(Patra),Doctorate (Patra)

10. XANTHOPOULOS Kon/inos Assistant Professor, Degree in Pharmacy (AUTH), Doctorate (AUTH)

REGULAR LABORATORY INSTRUCTORS (RLT's):

1. GAVRIELI Chrysi Degree in Pharmacy (AUTH), Doctorate (AUTH)

REGULAR LABORATORY TECHNICIANS (RLT's)

1. Viarou Chrisanthi Librarian

2. Paspaltsis Ioannis Degree in Biology (Bremen, Germany), Postgraduate Degree(AUTH)

UNDERGRADUATE STUDIES

UNDERGRADUATE STUDIES AT THE SCHOOL OF PHARMACY

In 1990-91 the School of Pharmacy adopted a new, semester-based, curriculum. Furthermore, in a 1992 meeting, the General Assembly of the School determined the Departments that are responsible for the teaching of those courses which belong to the scientific disciplines of other schools.

Starting from the academic year (2004-2005), the School introduced the concept of Academic Advising for undergraduate students. Every student entering the School of Pharmacy shall be assigned by the School to a faculty member who will serve as the student's advisor for the duration of the student's undergraduate studies in this school. The Academic Advisor will regularly be updated on the academic progress of the assigned students and will offer them guidance on academic matters. This initiative is realized through a wider Undergraduate Studies Reformation Program undertaken by the School of Pharmacy since April 2003, which is funded by a competitive grant (EPEAEK II) of the Ministry of Education.

The program is five years course including 8 semesters with classes and practicals and two semesters of practical training.

Basic notions and definitions

Each academic year is divided into the fall semester and the spring semester. The courses of the curriculum are divided into required courses and electives and are allocated to eight (8) semesters. Courses of the 1st, 3rd, 5th and 7th semesters of the indicative curriculum are taught during the fall semester. Courses of the 2nd, 4th, 6th and 8th semesters of the respective curriculum are taught during the spring semester

The training of the students of the School of Pharmacy is achieved through lectures, tutorials and laboratory exercises.

1.Required courses

The required courses are those which are compulsory for all the students of the School of Pharmacy to take and to be successfully examined in.

Attendance of the lectures of the courses constitutes a purely academic obligation of the student, that is to say it is not compulsory and there is no system of absence registration. Nevertheless, the regular attendance of the lectures is absolutely advisable for the correct theoretical training of the student. Only this direct contact with the teacher can lead to the accurate knowledge of the subject matter of each course.

Examinations are conducted by the teacher (or the teachers) at the end of the semester on specified material. The examinations can be written or oral. Courses are graded on a scale from zero to ten (0-10), without use of fractional parts and with five being the standard passing grade.

2. Electives

The electives are the courses a student can choose from a list in order to achieve the necessary number of courses and the minimum number of credit hours, which are required for the degree in Pharmacy. The student is free to select these courses according to his/her personal interests.

Elective course examinations, grading and credit hour numbers follow the same rules as the required courses (see part a, above). In case of failure, the student can re-enroll to the elective course and to attend it in a future semester or to enroll to another elective course instead.

2b.Dissertation

The Thesis is optional and is equivalent to two elective courses.

3.Laboratory Exercises

Many of the required or elective courses are accompanied by training sessions for the students in premises specially equipped with instruments and devices (Laboratories). The content of these laboratory exercises is related to the content of the course itself or to a relevant course of a previous semester.

The practice of the students into laboratories is compulsory, and for practical reasons (limited number of places in comparison to the total number of students that have to practice) the participation to the laboratory sessions takes place on a specific period of time.

The obligations of the student in the laboratory end when he/she has successfully completed all the exercises expected by the curriculum of each laboratory. In case of absence or failure, the exercises are performed or repeated after consultation with the laboratory's manager, during a future laboratory period or during the same period, provided that this is possible.

During the laboratory exercises the students are graded. Each laboratory, according to its particularities, determines the way of calculation of the respective grade in practical exercises.

In general, the grade in practice is determined on the basis of one or more of the following criteria:

1. The performance, the active participation and the dexterity of the student, the successful execution of exercises, as well as the quality and completeness of the laboratory reports.
2. The result of the improvised written or oral examinations on subjects that usually concern the exercise of the day or the content of the already performed exercises.
3. The result of the practical written or oral examinations, on a pre-determined subject matter, in which the student participates only after the successful accomplishment of all the anticipated laboratory exercises.

4. Tutorials

The tutorial exercises or tutorial courses, are not self-contained courses; rather, they constitute an integral part of many required and elective courses. The tutorials can be taking place within the context of the laboratory exercises (laboratory tutorial courses) during hours determined by each

laboratory, according to its particularities. The attendance of the lecture tutorial courses is particularly useful but it is still just an academic obligation of each student. On the contrary, the attendance of the laboratory tutorial courses is compulsory because it is directly related to subjects of practical manipulations and laboratory safety.

5. Courses and Lectures evaluation

At the end of each semester and before the start of the examination period, students have the right and obligation to evaluate courses and the lectures, in an attempt to improve the quality of their studies. More information is available on the website of the Unit of Quality Assurance (MODIP-AUTH http://qa.auth.gr) and the website of the Department.

CURRICULUM

SEMESTER 1

REQUIRED COURSES

CODE	TITLE	L	P	T	ECTS	TYPE
NP-01	GENERAL AND INORGANIC CHEMISTRY	3	2	-	7	COMPULSARY
NP-02	ANALYTICAL CHEMISTRY	3	3	-	6.5	COMPULSARY
1	GENERAL MATHEMATICS	3	-	-	7	COMPULSARY
2	GENERAL PHSICS	3	-	-	7	COMPULSARY
NP-06	ENGLISH A (1/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-07	FRENCH A (1/4)	2	-	-	0.5	FOREIGN LANGUAGE

NP-08	GERMAN A (1/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-09	GREEK A (1/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-10	ITALIAN A (1/4)	2	-	-	0.5	FOREIGN LANGUAGE

The students must choose one elective from the following:

CODE	TITLE	L	P	T	ECTS	TYPE
NP-03	HISTORY AND OBJECTIVES OF PHARMACY	2	-	-	2	ELECTIVE
NP-04	OPERATING PRINCIPLES AND APPLICATIONS OF COMPUTERS AND INTERNET	2	-	-	2	ELECTIVE

Total CR of 1st semester: 30 ECTS

SEMESTER II

REQUIRED COURSES

Code	ΤΙΤΛΟΣ	L	P	T	ECTS	TYPE
NP-26	MICROBOLOGY/IMMUNOLOGY	2	2	-	3.5	COMPULSARY
NP-27	PHYSICAL CHEMISTRY	3	2	-	6	COMPULSARY
7	BOTANIC	2	2	-	4	COMPULSARY
8	GENERAL ORGANIC	3	2	-	8	COMPULSARY

	CHEMISTRY					
9	CELL BIOLOGY	3	2	-	6	COMPULSARY
NP-11	ENGLISH B (2/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-12	FRENCH B (2/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-13	GERMAN B (2/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-14	GREEK B (2/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-15	ITALIAN B (2/4)	2	-	-	0.5	FOREIGN LANGUAGE

The students must choose one elective from the following:

CODE	TITLE	L	P	T	ECTS	TYPE
NP-29	ENZYMOLOGY	2	2	-	2	ΕΠΙΛΟΓΗΣ
NP-28	HYGIENE/EPIDIMIOLOGY	2	2	-	2	ELECTIVE

Total CR of 2nd semester: 30 ECTS

SEMESTER III

REQUIRED COURSES

CODE	TITLE	L	P	T	ECTS	TYPE
NP 30	PHYSIOLOGY I	2	2	-	4	COMPULSARY

20	INORGONIC PHARMACEUTICAL CHEMISTRY	2	2	-	6	COMPULSARY
21	BIOCHEMISTRY I	2	2	-	3.5	COMPULSARY
22	SPECIFIC ORGANIC CHEMISTRY	3	2	-	7	COMPULSARY
23	PHARMACEUTICAL ANALYSIS I	2	2	-	7	COMPULSARY
NP-16	ENGLISH C (3/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-17	FRENCH C (3/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-18	GERMAN C (3/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-19	GREEK C (3/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-20	ITALIAN C (3/4)	2	-	-	0.5	FOREIGN LANGUAGE

The students must choose one elective from the following:

CODE	TITLE	L	P	T	ECTS	TYPE
29	ANATOMY	2	2	-	2	ELECTIVE
84	MOLECULAR BIOLOGY	2	2	-	2	ELECTIVE

Total CR of 3rd semester: 30 ECTS

SEMESTER IV

REQUIRED COURSES

CODE	TITLE	L	P	T	ECTS	TYPE
NP-31	PHYSIOLOGY II/ HUMAN PATHOPHYSIOLOGY	3	2	-	4	COMPULSARY
31	BIOCHEMISTRY II	3	-	-	3.5	COMPULSARY
33	PHARMACEUTICAL ANALYSIS	2	2	-	7	COMPULSARY
34	PHARMACEUTICAL CHEMISTRY (HORMONES, ORGANOMETALICS)	3	2	-	7	COMPULSARY
46	GENERAL PHARMACEUTICAL TECHNOLOGY	3	2	-	6	COMPULSARY
NP-21	ENGLISH D (4/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-22	FRENCH D (4/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-23	GERMAN D (4/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-24	GREEK D (4/4)	2	-	-	0.5	FOREIGN LANGUAGE
NP-25	ITALIAN D (4/4)	2	-	-	0.5	FOREIGN LANGUAGE

The students must choose one elective from the following:

CODE	TITLE	L	P	T	ECTS	TYPE
NP-32	IMMUNOBIOLOGY/	2	2	-	2	ELECTIVE

	IMMUNOCHEMISTRY					
80	CLINICAL CHEMISTRY	2	2	-	2	ELECTIVE

Total CR of 4th semester: 30 ECTS

SEMESTER V

REQUIRED COURSES

CODE	TITLE	L	P	T	ECTS	TYPE
NP-33	PHARMACOGNOCY I	3	2	-	6.5	COMPULSARY
32	DISPENSING	2	2	-	6.5	COMPULSARY
48	ORGANIC PHARMACEUTICAL CHEMISTRY I	3	2	-	6.5	COMPULSARY
49	PHARMACOLOGY I	3	2	1	6.5	COMPULSARY
50	PHYSICAL PHARMACY	2	-	4	4	COMPULSARY

Total CR of 5th semester: 30 ECTS

SEMESTER VI

REQUIRED COURSES

CODE	TITLE	L	P	T	ECTS	TYPE

NP-34	PHARMACOGNOSY II	3	2	-	5.5	COMPULSARY
51	BIOPHARMACEUTICS	2	2	-	4	COMPULSARY
52	SPECIFIC PHARMACEUTICAL TECHNOLOGY I	3	2	1	5.5	COMPULSARY
54	ORGANIC PHARMACEUTICAL CHEMISTRY II	3	2	-	5.5	COMPULSARY
55	PHARMACOLOGY II	3	2	1	5.5	COMPULSARY

The students must choose one elective from the following:

Κωδικός	**ΤΙΤΛΟΣ**	**Θ**	**Ε**	**Φ**	**ECTS**	**ΤΥΠΟΣ**
NP-47	BIOINFORMATICS	2	2	-	4	ELECTIVE
NP-48	EMERGENCY TREATMENT	2	2	-	4	ELECTIVE
NP-41	NATIONAL AND EUROPEAN DRUG LEGISLATION	2	2	-	4	ELECTIVE

Total CR of 6th semester: 30 ECTS

SEMESTER VII

REQUIRED COURSES

CODE	**TITLE**	**L**	**P**	**T**	**ECTS**	**TYPE**
NP-35	PHARMACEUTICAL BIOTECHNOLOGY	3	2	-	4	COMPULSARY

NP-36	PHARMACOGNOSY III	3	2	-	7	COMPULSARY
66	SPECIFIC PHARMACEUTICAL TECHNOLOGY II	3	2	-	6	COMPULSARY
70	ORGANIC PHARMACEUTICAL CHEMISTRY III	3	2	-	8	COMPULSARY
71	TOXICOLOGY	3	2	-	5	COMPULSARY

Total CR of 7th semester: 30 ECTS

SEMESTER VIII

REQUIRED COURSES

CODE	TITLE	L	P	T	ECTS	TYPE
NP-37	CLINICAL PHARMACOLOGY AND THERAPEUTICS	3	2	-	5	COMPULSARY
NP-38	ORGANIC AND RADIOPHARMACEUTICAL CHEMISTRY	2	2	-	4	COMPULSARY
69	DRUG QUALITY CONTROL I	2	2	-	4	COMPULSARY
79	CLINICAL PHARMACOKINETICS	3	2	-	5	COMPULSARY

The students must choose a) three elective courses or b) one elective course and dissertation which is equivalent with two elective courses (8 ECTS) from the following:

CODE	TITLE	L	P	T	ECTS	TYPE

NP-39	NON PRESCRIPTION DRUGS	2	2	-	4	ELECTIVE
NP-40	COSMETICS	2	2	-	4	ELECTIVE
NP-42	DRUG QUALITY CONTROL II	2	2	-	4	ELECTIVE
NP-43	BIOTECHNOLOGY OF PHARMACEUTICAL PLANTS	2	2	-	4	ELECTIVE
NP-44	CHEMISTRY OF NATURAL PRODUCTS	2	2	-	4	ELECTIVE
NP-45	PHARMACEUTICAL TECHNOLOGY	2	2	-	4	ELECTIVE
NP-46	ORGANIC PHARMACEUTICAL CHEMISTRY	2	2	-	4	ELECTIVE
DE2	DISSERATION 2/2				4	ELECTIVE
DE1	DISSERTATION 1/2				4	ELECTIVE

Total CR of 8th semester: 30 ECTS

SEMESTER IX

Required Practical Training of 9th Semester

CODE	**TITLE**	**L**	**P**	**T**	**ECTS**
PA-1	PRACTICAL TRAINING	-	-	-	30

Total CR of 9th semester: 30 ECTS

SEMESTER X

Required Practical Training of 10th Semester

CODE	TITLE	L	P	T	ECTS
PA-2	PRACTICAL TRAINING	-	-	-	30

Total CR of 10th semester: 30 ECTS

L: Lecture, **P:**Practicals, **T:**Tutorials, **ECTS :** European Credit Transfer System

DETERMINATION of ECTS credits IN PHARMACY SYLLABUS

The program of study Pharmacy is harmonized, as regards the credits ECTS, according to the requirements of the Ministry of Education, Lifelong Learning and Religious Affairs and the European Union.

System ECTS: The ECTS is a student-centered system for accumulation and transfer of credits, based on the transparency of learning outcomes and learning processes. It aims to facilitate planning, delivery, evaluation, recognition and validation of qualifications and units of learning as well as student mobility. ECTS credits are a numerical value (between 1 and 60) allocated to each course to express the workload students need to achieve the expected learning outcomes. Learning outcomes describe what is expected to know the student to understand and be able to do after successful completion of the learning process. They are related to level descriptors in national and European qualifications frameworks. Workload indicates the time students typically need to complete all learning activities (such as lectures, seminars, work, internships, study and examinations) required to achieve the expected learning outcomes. ECTS credits reflect the amount of work required by each course in relation to the total required amount of work to complete a full year of formal learning full time - academic year - (ie lectures, internships, seminars, tutorials, workshops, study in library and at home, examinations or other assessment activities). Under the system ECTS, 60 ECTS credits represent the workload of an academic year of study and 30 ECTS credits represent the workload of an academic semester. ECTS credits are guaranteed for each course, whether compulsory or optional. Also ECTS credits are guaranteed for theses, internships and studies if they are part of the Department's curriculum.

ECTS credits are awarded only when the course has been completed and all required examinations have been successfully. In most cases, student workload ranges from 1500-1800 hours for an academic year, whereby one credit corresponds to 25-30 hours of work. To obtain Pharmacy degree (PD / 110/1993) a total of at least 300 credits ECTS are required. The students, besides the minimum required courses, representing 300 ECTS credits and which is necessary to a degree, they can if they wish to choose and extra optional courses. In accordance with the relevant pharmaceutical legislation (EU Directives 85/432 and 85/433 Decision Ministry of Health A4 / 5226 / 06.11.1987 and Presidential Decree 212/2003 (Official Gazette A 172)) students, the 9th and 10th semester will do internships at least 30 hours a week for a total of 4 quarters (one year) distributed as following:

a)Six (6) months in a pharmacy open to the public.

b)Three (3) months in hospital pharmacy, under the supervision of this pharmaceutical department.

c)Three (3) months in a pharmacy open to the public or a hospital pharmacy, as above, at the choice of the student.

The practice exercise is carried after the completion of university studies eight (8) semesters and proven in accordance with Articles 9 and 10 of Law. 206/1947. More specifc for traineeship certificates of pharmacists in hospital pharmacies, the certificate is issued by the Director of the hospital pharmacist and is the genuine of the signature of the Administrative Director of the hospital and no affidavit which is required.

Integration of courses taught by the faculty of other AUTh Schools and Departments

The General Assembly (GA 135/16-9-92) has determined the Departments of the School of Pharmacy which are to be responsible for the teaching of the courses that belong to the scientific disciplines of other schools and departments of the University, as follows:

Course	Department
General Mathematics	Pharmaceutical Technology
General Physics	Pharmaceutical Technology
General and Inorganic Chemistry	Pharmaceutical Chemistry

Analytical Chemistry	Pharmaceutical Technology
Computing - Internet	Pharmaceutical Technology
Botany	Pharmacognosy – Pharmacology
General Organic Chemistry	Pharmaceutical Chemistry
Microbiology - Virology	Pharmacognosy – Pharmacology
Biochemistry I, II	Pharmacognosy – Pharmacology
Organic Chemistry	Pharmaceutical Chemistry
Physical Chemistry	Pharmaceutical Technology
Anatomy	Pharmacognosy – Pharmacology
Physiology	Pharmacognosy – Pharmacology
Enzymology	Pharmacognosy – Pharmacology
Hygiene	Pharmacognosy – Pharmacology
Emergency Medical Treatment	Pharmacognosy – Pharmacology
Clinical Chemistry	Pharmacognosy – Pharmacology

SEMESTER DISTRIBUTION OF COURSES

SEMESTER I

ANALYTICAL CHEMISTRY

Code number: NP-02
Cycle: UNDERGRADUATE
Semester: 1rst
Course type

x	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 6,5
Lectures (hours/week): 3
Tutorial (hours/week): 0
Laboratory work (hours/week): 3

Course coordinator: Zachariadis Georgios, professor
Tutor (s):

1) Zachariadis Georgios, Professor

Room 600, 6th floor New Bulding, department of Chemistry

Contact hours: every day 11-12

e-mail:zacharia@chem.auth.gr

2) Anthemidis A., Professor

Room 600, 6th floor New Bulding, department of Chemistry

Contact hours: every day 11-12

e-mail:anthemid@chem.auth.gr)

3) Girousi Stella, Professor

Room, 5th floor New Bulding, department of Chemistry

Contact hours: every day 11-12

e-mail : girousi@chem.auth.gr

4) Tzanavaras P. Assistant Professor

Assisting personnel: -

Aims of the course:

The comprehension from the side of students, of the basic principles of Analytic Chemistry and what are the available methods of classic and modern chemical analysis, which are applied in pharmaceutical analysis. Comprehension of basic analytical procedures like for instance sampling, chemical analysis, titrations, expression of accuracy and precision, statistical analysis of data..

Skills: To become familiar with basic analytical chemistry procedures and especially of titration and wet chemical analysis.

Teaching methods: Teaching in the classroom and laboratory exercises.

Contents of the course:

Solutions. Solubility.

Acid base equilibria

Hydrolysis and Buffer solutions

Heterogeneous chemical equilinrium.

Methods of chemical analysis. Analytical chemistry literature.

Concentration. Units.

Descriptive statistics. Problem solving

Statistical analysis of analytical data

Reagents and materials. Sampling procedures

Principles of wet digestion, dry ashing and fusion techniques in chemical analysis

Basic principles of titration procedures.

Acid base titrations. Indicators.

Acid base titration applications in pharmaceutical analysis. Problem solving.

Complexometric and precipitation titration applications. Problem solving.

Redox and potentiometric titration applications. Problem solving.

Proposed literature:

1. Εισαγωγή στην Ποσοτική Χημική Ανάλυση των Α. Βουλγαρόπουλου, Γ. Ζαχαριάδη και Ι. Στράτη, ΕΚΔΟΣΕΙΣ ΖΗΤΗ, ISBN 960-431-516-1

2. Εργαστηριακές Μέθοδοι Ποσοτικής των Ι. Στράτη, Γ. Ζαχαριάδη και Α. Βουλγαρόπουλου ΕΚΔΟΣΕΙΣ ΖΗΤΗ, ISBN 960-431-586-2

3. Analytical Chemistry, Gary Christian, 2003, 6th edition, John Wiley, USA.

4. Quantitative Analytical Chemistry, Daniel Harris, 5th Edition, W. Freeman, USA

5. Fundamentals of Analytical Chemistry, D.Skoog, D. West, F. Hollas, S. Crouch, Ed. Brooks Cole, USA

Educational activities: Lectures and experimental exercises.

Evaluation process and methods: Intermediary evaluation of progress (A) or examination in the end of the semester (B). Written examinations in 5 subjects which are constituted from 2 sub-subjects. All the questions are equivalent and each one receive 1 or 2 units, 10 in total. In case where a subject is not answered by no student, then this subject is withdrawn and the final degree is calculated based on the rest. All students who attend the lectures and complete the laboratory exercises may take part in the examinations.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Powerpoint presentations are used during teaching in the classroom. The presentations are frequently available through the website.

Teaching:

A. Lectures

Lecture	Title	Lecturer
1-2	Solutions. Solubility.	G. Zachariadis A. Anthemidis S. Girousi
3-4	Acid base equilibria	G. Zachariadis A. Anthemidis S. Girousi
5-6	Hydrolysis and buffer solutions	G. Zachariadis A. Anthemidis S. Girousi
7-8	Heterogeneous chemical equilinrium.	G. Zachariadis A. Anthemidis S. Girousi
9-10	Methods of chemical analysis. Analytical chemistry literature. Concentration. Units.	G. Zachariadis A. Anthemidis S. Girousi
11-12	Descriptive statistics. Problem solving	G. Zachariadis A. Anthemidis S. Girousi
13-14	Statistical analysis of analytical data	G. Zachariadis A. Anthemidis S. Girousi
15-16	Reagents and materials. Sampling procedures	G. Zachariadis A. Anthemidis

		S. Girousi
17-18	Principles of wet digestion, dry ashing and fusion techniques in chemical analysis	G. Zachariadis A. Anthemidis S. Girousi
19-20	Basic principles of titration procedures. Acid base titrations. Indicators.	G. Zachariadis A. Anthemidis S. Girousi
21-22	Acid base titration applications in pharmaceutical analysis. Problem solving.	G. Zachariadis A. Anthemidis S. Girousi
23-24	Complexometric and precipitation titration applications. Problem solving.	G. Zachariadis A. Anthemidis S. Girousi
25-26	Redox and potentiometric titration applications. Problem solving.	G. Zachariadis A. Anthemidis S. Girousi

B. Laboratory work

Lab.	**Title**	**Tutor**
1	Laboratory regulations – Laboratory Safety -	G. Zachariadis A. Anthemidis S. Girousi
2	Cations reactions	G. Zachariadis A. Anthemidis S. Girousi
3	Cations separation and detection	G. Zachariadis

		A. Anthemidis S. Girousi
4	Examinations	G. Zachariadis A. Anthemidis S. Girousi
5	Acid base titrations III	G. Zachariadis A. Anthemidis S. Girousi
6	Acid base titrations II	G. Zachariadis A. Anthemidis S. Girousi
7	Acid base titrations III	G. Zachariadis A. Anthemidis S. Girousi
8	Precipitation titrations	G. Zachariadis A. Anthemidis S. Girousi
9	Complexometric titrations	G. Zachariadis A. Anthemidis S. Girousi
10	Redox titrations Manganimetry	G. Zachariadis A. Anthemidis

		S. Girousi
11	Redox Titrations Iodometry	G. Zachariadis A. Anthemidis S. Girousi
12	Examinations	G. Zachariadis A. Anthemidis S. Girousi

GENERAL MATHEMATICS

Code number: 1
Cycle: 1st / Undergraduate
Semester: 1st
Course type: Compulsory (Core)

X	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 7
Lectures (hours/week): 3
Tutorial (hours/week):
Laboratory work (hours/week): -
Course coordinator: Mpratsas Charalambos, RLT'S
Tutor (s): Mpratsas Charalambos, RLT'S

Assisting personnel: -

Aims of the course: Obtaining and understanding the basic knowledge of Mathematics on the following topics: i) Linear Algebra (Theory of Matrices and systems of linear equations). ii) Analytic Geometry in the plane (straight line, conics, transformations) and in the three - dimensional space (straight line, plane, sphere). iii) Differentiation and integration of functions. iv) Ordinary differential equations of first order.

Skills: The students familiarise themselves with the mathematical concepts and methods of the above topics and obtain the ability to use them, as a

tool for understanding better subjects on their scientific area. Moreover, they develop the critical way of thinking and apply it in practice.

Teaching methods: Attending lectures, tutorial.

Contents of the course: Linear Algebra: Matrices - Determinants – Systems of linear equations.

Analytic Geometry in the plane: The straight line - The circle – The parabola - The ellipse - The hyperbola - The general equation of second degree - Translation of axes - Rotation of axes.

Analytic Geometry in the three - dimensional space: Equations of a line - The plane - The sphere.

Calculus: Derivative and differential of a function of one variable or two variables (Partial derivatives). Integration of functions

Ordinary differential equations of first order.

Proposed literature: 1) D. Demetropoulou-Psomopoulou. Elements of General Mathematics, 2nd edition, Ziti Pelagia & Sia Publications, Thessaloniki 1992.

2) P. Moisiadis. Higher Mathematics, 6th edition, A. and P. Christothoulidou Publications, Thessaloniki 2000.

3) T. Kiventithis. Higher Mathematics (volume I), 1st edition, Ziti Pelagia & Sia Publications, Thessaloniki 2005.

Lecture	**Title**	**Tutor**
1 - 2	Matrices – special matrices – actions – properties of matrices	Mpratsas C
3 - 4	Elementary transformations of a matrix – equivalent matrices – rank of a matrix	Mpratsas C
5 - 6	Determinants – inverse matrix	Mpratsas C
7 - 8	Systems of linear equations	Mpratsas C
9 - 10	Exercises on the previous chapter *	Mpratsas C

11 - 12	Analytic Geometry in the plane: The straight line - The circle – The parabola - The ellipse - The hyperbola - The general equation of second degree - Translation of axes - Rotation of axes.	Mpratsas C
13	Exercises on the previous chapter *	Mpratsas C
14	Functions of one variable – Inverse functions - The Derivative - Formulas and methods of differentiation	Mpratsas C
15 - 16	Differential of a function- Implicit differentiation - Higher order derivatives – Functions of two variables - Partial derivatives – The total differential	Mpratsas C
17 - 18	Exercises on the previous chapter *	Mpratsas C
19	The integral - Formulas and methods of integration	Mpratsas C
20-21	Ordinary differential equations of first order	Mpratsas C
22-23	Exercises on the two previous chapters *	Mpratsas C
24-25	Analytic Geometry in the three - dimensional space: Equations of a line - The plane - The sphere.	Mpratsas C
26	Exercises on the previous chapter *	Mpratsas C

Educational activities: Lectures and tutorial

Evaluation process and methods: Written exam at the end of semester (2,5 h).

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures: -

Teaching:

Lectures and Tutorial*

INTRODUCTORY PHYSICS

Course code: 2
Course level: Undergraduate
Semester: 1st semester

X	Background/General knowledge
	Scientific area (pharmacy)

ECTS (European Credit Transfer and Accumulation System): 7
Theory (hours/week): 3
Recitations (hours/week): -
Laboratory practice (hours/week): -
Coordinator: Professor Eleni C. Paloura

Lecturers	Contact information
Dr. Eleni C. Paloura, Professor	Office location: School of Science, 2nd Floor, Department of Solid State Physics Student hours: Monday to Friday 12^{00}-13^{00} e-mail: paloura@auth.gr Website: http://users.auth.gr/~paloura
Dr. Maria Katsikini, Associate. Professor	Office location: School of Science 2nd Floor, Department of Solid State Physics Student hours: Monday to Friday 12^{00}-13^{00} e-mail: katsiki@auth.gr Website: http://users.auth.gr/katsiki

Teaching assistants: -

Learning outcomes: At the end of the course the students will have attained a working knowledge of fundamental principles of Classical and Modern Physics, their applications towards understanding functions of the human body and operation principles of certain diagnostic techniques. In addition to that, the students will have developed problem solving skills. The lecture contents are the following:

- Nature of fundamental forces and application of laws of classical mechanics in the study of equilibrium of various parts of the human body as well as of the estimation the applied tension and compression.
- Properties of liquids and fundamental laws that govern their equilibrium and motion.
- Various cases of motion, e.g. oscillations.
- Waves in elastic media and sound waves, specific cases of electromagnetic waves e.g. light and X-rays.
- Properties and applications of ultrasonic waves, X-rays, laser light and optical fibers for diagnostic and therapeutical purposes.
- The concepts of work and energy, temperature and heat, energy interchange related with metabolism and energy balance in the human body.
- Fundamental concepts of bioelectricity and more specifically propagation of electrical signals in cells (mainly nervous cells) as well as fundamentals of diagnostic techniques based on bioelectricity (e.g. electro-cardiography, -myography, -encephalography).
- The concept of scaling in physics and its application in living organisms.
- Experimental data evaluation and assessment and measurement errors.

Skills: Basic knowledge of physics and applications in the human body as well in diagnostic methods.

Teaching methods: Lectures and problem solving sessions

Course description:

1. Introduction to the graphical representation of data, errors, error propagation and fitting.

Common types or experimental errors, error propagation, precision and accuracy, significant digits, histograms, Gaussian distribution, standard deviation and standard error. Data plots in linear, log-log and semi-log scales. Least square fitting.

2. The problem of scaling in living organisms

Definition and applications of scaling. Volume- and surface-dependent quantities and examples on the use of scaling: cell division, diving duration, heart rate etc

3. Equilibrium of rigid bodies: forces and torques

Force as a vector quantity, equilibrium of point masses, Newton's laws, inertia, mass and weight. Nature of fundamental forces (contact forces and distant actions). Gravitational, muscular and frictional forces. Backbone loads. Pulleys and strings. Torque and equilibrium of rigid bodies, center of mass, stability of equilibrium, levers, skeletal muscles, equilibrium of parts of the human body.

4. Work- Energy-metabolism

Definitions of work, energy and mechanical energy. Isolated system. Principles of Thermodynamics. The human body as a heat engine and its energy needs, metabolism.

5. Fluid mechanics

Properties of fluids, definition of force and pressure. Pascal's principle, buoyant force and Archimedes's principle, manometers, buoyant floating, adhesive and cohesive forces, surface tension, capillaries, surfactants. Fluid motion, Bernoulli's equation, continuity equation, Poiseuille's law, viscosity, viscous and turbulent flow. Blood circulation in the human body, arteriosclerosis, measurement of blood pressure. Ventouri's tube, Torricelli's theorem.

6. Oscillations and waves

Definition of oscillations and harmonic oscillations. Spring-mass system and simple (mathematical) pendulum: differential equation of motion, equations of displacement, velocity and acceleration and principle of conservation of energy. Physical pendulum, moment of inertia, walking legs as physical pendulum. Definition of wave (mechanical, electromagnetic), transverse and longitudinal, harmonic traveling and standing waves. Fundamental wave equation. Standing waves on a taut string.

7. Sound waves

Definition of sounds, ultrasounds and infrasounds. Sound propagation in elastic media. Intensity and audibility, pitch, loudness and timbre, effect of

noise on the human physiology. Applications of ultrasounds, echo, reverberation and echo. Beats, Doppler effect and its applications.

8. Geometrical Optics- Optical devices – Laser

Nature of light. Light sources. Definition of geometrical optics, formation of umbra and penumbra. Laws of reflection and image formation from plane and curved mirrors. Laws of refraction, dispersion, total reflection, optical fibers, prisms, lenses. Image formation from converging and diverging lenses. Equation of lenses. Description of the human eye and image formation in retina, eye adaptation, refractive anomalies of the eye and correction using lenses. Angular magnitude and magnification, simple and compound microscope. Working principle, properties and applications of laser.

9. Temperature and Heat

Definitions of internal energy, temperature and heat. Temperature scales. Principles of operation and applications of different thermometers. Thermal expansion of solids and liquids, phase changes. Heat transfer mechanisms. Black body radiation, the laws of Stefan-Boltzmann and Wien and their applications. Green house effect. .

10. X-rays

Mechanism for X-ray emission and X-ray properties. Operation principle of the Coolidge tube. Moseley's law. Bremsstrahlung and characteristic X-ray line spectra. Interaction of X-rays with matter, absorption of X-rays. X-ray detectors. X-ray applications in medical diagnosis. Units of ionizing radiation. Novel sources of X-ray production (synchrotron sources).

11. Bioelectricity

Electrical signals in the human body and their measurement. Nervous system, neurons, synapses. Electric potential and polarization of cell membrane, Nernst potential. Action potential and signal propagation along neurons. Working principle of electro-, myo- and -encephalography

Recommended textbooks

1α. «Physics with applications in Biology" (in Greek) K. Kambas et al, Giahoudi Publications, Thessaloniki 1988

2. «Physics in Biology», P. Davidovits (translated in Greek), Parisianos Pub;lications, Athens 2011 .

3α. «University Physics" Vol.1, Young Hugh D. (translated in Greek), Papazisi Publications, Athens 1995

3β. «University Physics" Vol.2, Young Hugh D. (translated in Greek), Papazisi Publications, Athens 1995

Teaching and learning methods: Lecture attendance and problem solving sessions.

Assessment methods: Assessment is through a written final examination at the end of the semester. The students are usually asked to answer 4 questions that include both theory and problems. The 4 individual questions are equivalent in terms of the credit points. The examination is typically 60-90 min long. The examination schedule is issued by the School of Pharmacy.

Use of ICTs: The lectures and the problem solving sessions are based on the use of ICTs (Powerpoint). Copies of the lecture notes, the homework sets and all related announcements can be found in the WebPages of the Lecturers.

Teaching: The teaching of the course is based on lectures and problem solving sessions (Room A11 in the School of Science). The teaching schedule includes two lectures per week and each lecture is 2-hrs long. ICTs are extensively used. Copies of the lecture notes can be found in the WebPages of the Lecturers (free access).

Calendar		
Lecture	**Title**	**Lecturer**
1	Introduction. Scaling in Physics.	M. Katsikini
2	Introduction to error analysis and graphical presentation of data, homework solutions.	E. C. Paloura
3	Newton's Laws for motion, equilibrium of point masses.	M. Katsikini
4	Types of forces (distant action and contact forces, gravitational, frictional and muscular forces).	M. Katsikini
5	Torque, center of mass, equilibrium of rigid bodies, the human body and its parts.	M. Katsikini
6	Problem solving (forces and torques)	M. Katsikini

7	Fluid mechanics I: definitions and characteristic properties of fluids, force, pressure, Pascal's principle and its applications.	E. C. Paloura
8	Fluid mechanics II: Archimedes principle, surface tension, adhesion and cohesion forces, capillary effects, surfactants.	E. C. Paloura
9	Fluid mechanics III: Fluid motion, viscosity, Bernoulli equation, laws of Poisseuille and Torricelli, Venturi tube, blood circulation, homework solutions.	E. C. Paloura
10	Work, energy, heat, principles of thermodynamics.	M. Katsikini
11	Energy needs of the human body, metabolism, homework solutions.	M. Katsikini
12	Heat I: Types of thermometers, thermometric scales and their applications, effects that accompany the temperature variations (contraction, expansion, phase transition), heat capacity and specific heat.	E. C. Paloura
13	Heat II: Mechanisms of heat propagation and applications, black body radiation and applications, homework solutions.	E. C. Paloura
14	Oscillations, simple and compound pendulum, walking legs as physical pendulum, normal walking rate.	M. Katsikini
15	Waves in elastic media, problem solution (oscillations, waves)	M. Katsikini
16	Sound waves I: definitions, frequency response of the human ear, mechanism and speed of sound propagation, intensity of sound.	E. C. Paloura
17	Sound waves II: audibility, sound intensity, properties and applications of ultrasound, concepts of acoustics.	E. C. Paloura
18	Sound waves III: beats, Doppler effect and	E. C. Paloura

	applications, homework solutions.	
19	Optics I: nature of light**,** reflection and mirrors	M. Katsikini
20	Optics II: refraction of light, prisms, lenses and image formation	M. Katsikini
21	Optics III: Optical devices, human eye, use of lenses for the correction of refractive anomalies of the eye, simple and compound microscope.	M. Katsikini
22	Laser light and its applications, homework solutions.	M. Katsikini
23	X-rays I: Production of X-rays, Coolidge tube, continuous and characteristic line spectrum, Moseley's law.	E. C. Paloura
24	X-rays II: Mechanisms of X-ray interaction with matter. Absorption and protection from X-rays.	E. C. Paloura
25	X-rays III: X-ray detectors and applications, measurement units and impact of ionizing radiation, novel sources for X-ray generation. Homework solutions.	E. C. Paloura
26	Bioelectricity.	M. Katsikini

ENGLISH LANGUAGE A

Code number: NP-06
Cycle: undergraduate
Semester: 1st
Course type

X	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 0,5
Lectures (hours/week): 2
Course coordinator: Kontouli Kleopatra, EEP
Tutor (s): Kontouli Kleopatra, EEP

Assisting personnel:

Aims of the course: The course aims to familiarize students with the special language and terminology of Pharmacy Science as it is employed in authentic texts of different genres. It also targets to develop students' reading skills to facilitate the comprehension of the relevant texts.

Skills: Students will develop the ability to grasp the basic idea (skimming), locate particular information (scanning), recognize common prefixes

and guess the meaning of unfamiliar words from the context.

Teaching methods: Interactive teaching

Contents of the course:

A. Pre-reading activities

Questions to predict the content of the text and activate existing knowledge.

B. Activities following skimming or scanning

General questions, questions for locating specific information, filling diagrams with the main titles of the text, checking the answers of the pre-

reading questions.

C. Detailed-reading questions

True-False questions, matching side-titles with paragraphs, filling tables

and diagrams.

D. Vocabulary learning activities

Guessing the meaning of unknown words from context, blank filling,

matching terms with definitions, understanding the meaning of prefixes and

unknown words, synonyms, antonyms.

Proposed literature:

Ziaka, I. 2010. *English for Pharmaceutical Studies*, vol. I . Thessaloniki: University Studio Press.

Educational activities: Attendance of lectures

Evaluation process and methods: One final exam at the end of the semester

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Power point presentations with interactive activities.

Supplementary teaching material is hosted on the Blackboard Platform

e-courses, with open access.

Teaching:

A.Lectures.

Lecture	Title	Tutor
1	What is "pharmaceutics"?	Kontouli Kleopatra
2	Oral solids, Tablets	Kontouli Kleopatra
3	Oral liquids	Kontouli Kleopatra
4	Suspensions	Kontouli Kleopatra
5	Emulsions, Emulsion Theory	Kontouli Kleopatra
6	Why and where do drugs work?	Kontouli Kleopatra
7	The receptor role	Kontouli Kleopatra
9	Influenza (Seasonal)	Kontouli Kleopatra

10	Safety of pandemic (H1N10) 2009 vaccines	Kontouli Kleopatra
11	Access to medicines	Kontouli Kleopatra
12	Healthy lifestyle habits among Greek university students	Kontouli Kleopatra
13	The bacterial cell, Mechanisms of bacterial action	Kontouli Kleopatra

HISTORY AND OBJECTIVES OF PHARMACY

Code number: NP-03
Cycle: Undergraduate
Semester: 1rst semester
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 2
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week):
Course coordinator: Dimitra Hadjipavlou-Litina, Professor
Tutor (s):
Dimitra Hadjipavlou-Litina, Professor

Room 408/B & 410, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: e-mail (hadjipav@pharm.auth.gr)

Eleni Rekka, professor

Room 409, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: 2310-997614, e-mail (rekka@pharm.auth.gr)

Diamanto Lazari, assistant professor

Room 317, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: 2310-997617, e-mail (dlazari@pharm.auth.gr

Assisting personnel:

Aims of the course: This course is addressed to 1rst semester young pharmacy students to be acquaintanced with the Pharmaceutical Science, its scope and subjects. The course is not only introductory for the Pharmaceutical Sciences but it might be helpful to the students to explore the historical evolution, the potential and the perspectives of their Scientific field.During the course the following are presented and explained in summary:

The Curriculum in the School of Pharmacy, the profession of the pharmacist and the specialities.

Drugs- diseases - safe use of medicaments.

Food-health- in correlation to the drugs, similarities, differences.

Need for new drugs, routes for drugs' invention.

The role of the pharmacist (in consideration to all the above mentioned) , ethics in Pharmacy.

Skills:

By the end of this course, the students should be able to know and understand:

The subjects of their Science

The History and the evolution of the Drugs/Pharmacy

The drug development and the appropriate methods used within

The correlation between food and drugs under physiological or pathological conditions

The scientific and professional perspectives of pharmacists in a community

Teaching methods: Lectures

Contents of the course:

Tutors:

1) Dimitra Hadjipavlou-Litina

Introduction

Ancient Eastern civilizations

Pharmaceutical Sciences in Mediteranianduring the Historical periods:

- Pro-Ippocratic period
- Ippocratic period (5th century –Alexander the Great)
- 1-3 rd centuries B.C.

Byzantine period-Middle Ages

Arabs

European period

Alchemists-Alchemy (-chemistry)

Universities (Education)

Pharmaceutical Sciences during 12-17th centuries

2) Eleni A. Rekka

Elements of food, nutrition, in relation to health and drugs. Achievements of Pharmaceutical Sciences. Development of new drugs, methods, purpose. Perspectives of progress in Pharmaceutical Sciences. Organisation and studies at the School of Pharmacy, A.U.T. Pharmaceutical Chemistry: subject, aims, contribution to pharmaceutical education. Professional occupation of pharmacists. Branches in Pharmacy. Elements of Pharmaceutical Deontology.

3) Diamanto Lazari

Pharmacy in the 18th century. Important representatives of this era. Scientific period (from 19th century to present). Homeopathy and Homeopathic Medicines. Greek Pharmacopoeia. National Organization for Medicines (ΕΟΦ). Organisation of studies at School of Pharmacy of Aristotle University of Thessaloniki. Presentation of Scientific Subjects of Departments of Pharmacognosy-Pharmacology and Pharmaceutical Technology.

Proposed literature:

D. Hadjipavlou-Litina

1. History of Pharmacy, G. Fokas
2. American Institute of the History of Pharmacy
3. History of Pharmacy: A Guide and a Survey, E Kremers, G Urdang - 1940 - JB Lippincott Company

E. Rekka

1. S. Anderson, "Making medicines: A brief history of Pharmacy and Pharmaceuticals", Pharmaceutical Press, 2005

D. Lazari

1. www.efe.org.gr
2. www.eof.gr

Educational activities: Lectures, discussion with the students in every lecture.

Evaluation process and methods: Examination is performed at the end of the semester. To compute the final grade, the grade which is given by each tutor (3.33) is added

The duration of the examination is 2 hours for the three tutors.

The examination at the end of the semester is performed at dates, time and place arranged by the department.

Use of TIC / Electronic distribution of the lectures

Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy.

Teaching: Teaching of this course is accomplished through lectures

Lecture	**Title**	**Tutor**
1	Introduction Ancient Eastern civilizations	D. Hadjipavlou-Litina
2	Historical periods of Pharmaceutical Sciences in	D. Hadjipavlou-

	Mediteranian	Litina
3	Byzantine period, Middle Ages, Arabs, European period, Alchemists, Alchemistry	D. Hadjipavlou-Litina
4	The universities period of pharmaceutical Education, Pharmaceutical Sciences during the 12th -17th centuries	D. Hadjipavlou-Litina
5	HEALTH, FOOD, DRUGS: Evolution from the appearance of humans until today. Relation of food with drugs.	E. Rekka
6	MEDICINES, PHARMACY: Definition, contents. BRANCHES OF PHARMACEUTICAL SCIENCES - Pharmaceutical/Medicinal Chemistry	E. Rekka
7	METHODS OF DRUG DISCOVERY AND DEVELOPMENT: Description, Targets, Significance and usefulness of drugs, Proper use of medicines. The offer of drugs to mankind.	E. Rekka
8	Professional occupation of pharmacists. Branches in Pharmacy. Elements of Pharmaceutical Deontology.	E. Rekka
9-10	Pharmacy in the 18th century. Scientific period (from 19th century to present).	D. Lazari
11	Greek Pharmacopoeia. National Organization for Medicines (ΕΟΦ).	D. Lazari
12	Organisation of studies at School of Pharmacy of Aristotle University of Thessaloniki. Presentation of Departments of Pharmacognosy-Pharmacology and Pharmaceutical Technology.	D. Lazari
13	Future trends in pharmaceutical science-professional outlets in Greece	D. Hadjipavlou-Litina E. Rekka

		D. Lazari

A) **Lectures**. Lectures (13 of 2 hours each) are given in the lecture room D12 (main building of the School of Natural Sciences)

B) Laboratory work: Not exist

BASIC PRINCIPLES AND APPLICATIONS OF COMPUTERING/INTERNET

Code number: NP-04

Cycle: Undergraduate

Semester: 1rst semester

Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 2

Lectures (hours/week): 2

Tutorial (hours/week): -

Laboratory work (hours/week):

Course coordinator:

Aims of the course: To introduce basis principles of PC and internet with applications to pharmaceutics

Skills: Learning of the basic structure and operation of the PC. • Learning of computer applications related to the text writing, calculation sheets, lecture presentation. Computer applications related to the design of chemical and biochemical structures. • Learning the Internet

Teaching methods: Lectures

Contents of the course: Structure and function of PC, PC applications for writing text, spreadsheet, presentation of lectures and design of chemical and biochemical structures. Internet usage.

Educational activities: Lectures, discussion with the students in every lecture.

Evaluation process and methods: Examination at the end of the semester. To compute the final grade, the grade which is given by each tutor (3.33) is added

The duration of the examination is 2 hours.

The examination at the end of the semester is performed at dates, time and place arranged by the department.

Use of TIC / Electronic distribution of the lectures

Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy.

Teaching: Teaching of this course is accomplished through lectures

Lectures. Lectures (13 of 2 hours each)

B) Laboratory work: 2 hours

SEMESTER II

MICROBIOLOGY-VIROLOGY

Lesson code: NP26
Lesson level: undergraduate level
Studies semester: second
Lesson type:

X	General-background knowledge
	Scientific area (pharmaceutical)

Educational credits: 3,5
Lectures (hours): 2/week
Practical sessions (hours): 2/week in separate groups
Lesson coordinator: Papa-Konidari Anna, professor
Tutors:

1) Papa-Konidari Anna, professor, tel.: 2310 999151

2) Exintari Maria, associate professor, tel.: 2310 999031

3) Vyzantiadis Timoleon-Achilleas, associate professor, tel.: 2310 999027

4) Gioula Georgia, associate professor, tel.: 2310 999121

5) Skoura Lemonia, associate professor, tel.: 2310 999156

6) Melidou Aggeliki, assistant professor, tel.: 2310 999103

7) Chatzidimitriou Dimitrios, assistant professor, tel.: 2310 999093

8) Kachrimanidou Melania, assistant professor, tel.: 2310 999061

9)Protonotariou Euthimia assistant professor , tel.: 2310- 9994658

Assisting personnel (technical and laboratory):

Maria Zaikou-Tsakiropoulou, tel.: 2310 999114

Sofia Kotsinou, tel.: 2310 999091

Place: The 1ST Department of Microbiology is located at the ground floor and the third floor of the Medical School building, in the main University Campus. All tutors and assisting personnel are present in their work places on a daily schedule.

Educational targets: The targets of the lesson are to obtain a general approach and understanding on the fields of microbiology and immunology, as well as the learning of some of the more important bacteria, viruses and fungi that are responsible for infections in humans. Also, to learn about the diseases that these pathogens are able to cause, the available specific laboratory diagnosis and the necessary therapeutic approach.

Educational skills: The familiarization with the concepts of the microbial invasion, the host defense, the laboratory diagnosis and the prevention and treatment of the infections.

Educational methods: Amphitheatre lectures and practical laboratory sessions.

Lesson syllabus: General microbial (bacteria, viruses, fungi, parasites) characteristics. Microbial physiological and chemical properties. Natural and chemical factors that act against microbes, antibiotics, antiviral and antifungal drugs. Basic concepts of immunology, relations between microbial and host organism. Ways of eliminating germs and how to be protected from them. Basic knowledge on. pathogenesis, clinical

manifestation, laboratory diagnosis, prevention and treatment of specific pathogenic microbes.

Educational (student) activities: Attendance of lectures in the amphitheatre and practical sessions.

Evaluation methods and procedure: Written exams based on essay questions at the end of the semester. Only the students that have followed all compulsory (each session is of 2 hours) practical sessions have the right to participate. Exams are organized according to the schedule and in places announced by the Department.

Use of computerized-electronic means: All lessons are done by the use of an electronic presentation format (PowerPoint).

Tutorial (Lectures/Practical sessions): The teaching comprises lectures and practical/laboratory sessions.

a) Lectures: One hour lectures are given twice a week, usually at the "Megalo Amphitheatro" of the Medical School and are indicatively as following:

1. Bacterial characteristics
2. General viral characteristics
3. Fungal characteristics-opportunistic mycoses
4. General parasitic characteristics
5. Host protective answers
6. Cellular immunity
7. Humoral immunity
8. Immunological disturbances
9. Natural flora
10. Pathogenetic mechanisms of microbial infections
11. Sterilization, disinfection, antisepsis
12. Antimicrobial drugs, sensitivity testing
13. Vaccines
14. Tetanus *Enterobacteriaceae*
15. *Staphylococcus-Streptococcus*

16. Gram (-) cocci
17. *Herpesviridae* group
18. *Retroviridae*
19. Hepatitis
20. Measles-Mumps-Rubella
21. *Influenza* virus
22. *Mycobacteria*
23. *Corynobacterium*, *Bordetella*
24. Superficial mycoses
25. Laboratory diagnosis of microbial infections. Questions-Explanations,

b) Practical-laboratory sessions: Students attend in groups, once a week, in the same group, the same hour, for two weeks, with compulsory presence. The courses take part at the practical session room of the 1st Department of Microbiology.

Tutor: T. A. Vyzantiadis

References

1. P.R. Murrey, K.S. Rosenthal and M.A. Pfaller, Medical Microbiology, Scientific Editions Parisianou S. A., Athens, 8th edition 2016.
2. J. K. Papapanagiotou, V. Kiriazopoulou-Dalaina, Introduction in Medical Microbiology, Virology and Immunology, University Studio Press, Thessaloniki 2005.
3. J. K. Papapanagiotou, V. Kiriazopoulou-Dalaina, Medical Microbiology & Virology, University Studio Press, Thessaloniki 2004.
4. All the topics, as they are presented at the relevant lectures and practical courses.
5. Relevant books and scientific journals that can be found in the Department. Reference sources from the University and Hospital Libraries or the Internet.

PHYSICAL CHEMISTRY

Code number: NP27
Cycle: Undergraduate
Semester: 2nd
Course type

x	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 6
Lectures (hours/week): 3
Tutorial (hours/week):
Laboratory work (hours/week): 2
Course coordinator: Antonis Avranas (Assoc. Prof.)

Tutor (s):

1) Achilleas Papoutsis, Professor

Laboratory of Physical Chemistry

Department of Chemistry

Tel: 2310997755, e-mail: achille@chem.auth.gr

2) Antonis Avranas, Professor

Laboratory of Physical Chemistry

Department of Chemistry

Tel: 2310997686, e-mail: avranas@chem.auth.gr

3) Sotiris Sotiropoulos, Professor

Laboratory of Physical Chemistry

Department of Chemistry

Tel: 2310997742, e-mail: eczss@chem.auth.gr

4) Dimitris Tsiplakides - Assosiate Professor

Laboratory of Physical Chemistry

Department of Chemistry

Tel: 2310997766, e-mail: dtsiplak@chem.auth.gr

5) Dimitrios Gabriel, Assistant Professor

Assisting personnel: -

Aims of the course: a. Laboratory work. The students are familiarized with physicochemical measurements, e.g., titrations, acid-basic titrations, polarimetry, spectrophotometry, phase separation. They also learn to make plots and to present as reports their results.

b. Lectures. The students have to understand basic thermodynamics and use this knowledge to solve physicochemical problems.

The familiarization of the students with physicochemical phenomena, related to Pharmaceutical sciences (e.g., phase diagrams, distribution, extraction, ionic equilibrium, surface and interfacial phenomena, colloid systems, emulsions etc.)

The understanding of the basic concepts of rates of chemical reactions and of the rate laws, in order to be able to follow courses on pharmacokinetics.

To be able to solve simple physicochemical problems.

Skills: Familiarization with simple concepts of a part of physical chemistry, which is necessary for the students of pharmacy.

Teaching methods:

Lectures, (including solving problems as tutorials) and laboratory work.

Contents of the course:

Chemical thermodynamics What is thermodynamics. Definitions and basic concepts of thermodynamics. Thermodynamic system. Thermodynamic state. Equation of state of the ideal gases. Extensive and Intensive properties. Thermodynamic equilibrium. Theoretical base of thermodynamics. Temperature and zero law of thermodynamics. Internal energy, what is work, what is heat. The first law of thermodynamics. Enthalpy. Heat capacity. Molar heat capacity. Molar heat capacity of solids. Application of the first law in the ideal gases. Imperfect gases (real gases)- a new equation of state (Van der Waals equation). Relation of critical constants of gases and the constants of Van der Waals equation. The law of corresponding states. Evaporation and heat of evaporation. Trouton's rule. Thermochemistry. The heat in the chemical reactions. Second law of thermodynamics. Entropy. Evaluating the Entropy. Gibbs function (free energy). Standard state. Chemical potential. Criteria of equilibrium and of spontaneous changes.

Phase equilibrium. The thermodynamic criterion of phase equilibrium, Gibbs phase rule and application in one-component system, The phase diagram of water, Phase diagrams, The liquid-vapor boundary in one-component system, Clausius-Clapeyron equation.

Chemical Equilibrium. Expressions of chemical (thermodynamic) equilibrium constant in i. Gas phase reactions, ii. Reactions in liquid mixtures or solutions iii. Reactions involving components in condensed or immiscible phases. Effect of temperature on equilibrium constant. Determination of reaction ΔH, ΔG, ΔS at constant temperature from the corresponding standard enthalpies and free energies of formation.

Reactions in Biological Systems and Bioenergetics. ATP as chemical energy carrier, Structure and properties of ATP, Standard energy of ATP hydrolysis, The role of ATP-ADP system, Reactions in biological system, Hydrolysis of peptide bond, Group transfer reactions, Enzymatic coupling of reactions, Synthesis and combustion of glucose.

Physical chemistry of mixtures. Gas-liquid solutions, Ideal-dilute solutions of miscible liquids, Deviations from Raoult's law, Mixtures of immiscible liquids, Distribution of a component between two immiscible liquids, Solute Extraction from a solution, Colligative properties.

Surface chemistry. Air/gas interface, Adsorption isotherms, Solid/liquid, Air/liquid, and Liquid/liquid interfaces, Surface and interfacial tension, Surface tension of solutions, Monomolecular films, Chromatography, Ion exchange.

Colloids. Introduction, Preparation purification and properties of colloids, 1. Kinetic properties of colloids, Diffusion, Sedimentation, Osmotic pressure, Donnan equilibrium, 2. Optical properties of colloids, Microscopic observation, 3. Electric properties of colloids, Isoelectric point, Stability of colloid systems, Emulsions.

Electrochemistry. **A.** Introduction, Electric conduction, Conductivity of electrolyte solutions, Applications of conductivity measurements, 1. Determination of solubility of (insoluble) salts, 2. Determination of pk of weak electrolytes – 3. Conductivity titrations.

B. Electrolytic dissociation, Arrhenius theory and deficiencies of the Arrhenius theory, Van't Hoff coefficient, dissociation, Ostwald dilution law, Activity and activity coefficient of ions, Ionic strength and Bjerrum coefficient, Debye Hückel limiting law.

C. Ionic equilibrium, Dissociation of water, Ionic equilibrium in acid and base solutions. Dissociation constant of acids and bases, Weak acid and base solutions, Indicators, Buffer solutions.

D. Galvanic cells, Electrode potential, Ag/AgCl electrode and calomel electrode.

The rate of chemical reactions. Introduction, Reaction rates, Rate laws and rate constants, Reaction order, Molarity of a reaction, Half-life of a reaction and time constants, Zero, first and second order of reactions, The temperature dependence of the rate law, Activated complex.

Proposed literature:

1. "Σημειώσεις Φυσικοχημείας για τους φοιτητές του Φαρμακευτικού Τμήματος", Α. Αβρανάς, Ι. Ζιώγας, Α. Παπουτσής, Σ. Σωτηρόπουλος (2005).
2. "Φυσικοχημεία" Τόμοι Ι, ΙΙ, ΙΙΙ, Atkins Πανεπιστημιακές εκδόσεις Κρήτης (2005).
3. "Atkin's Physical Chemistry", P. Atkins, J. de Paula, Oxford University Press (2006)
4. "Φυσικοχημεία" Γεωργίου Καραϊσκάκη Εκδ. Τραυλός & ΣΙΑ ΟΕ.
5. "Πειραματική Φυσική-Χημεία", Ι.Α.Μουμτζής, Εκδ. Ζήτη, Θεσσαλονίκη (2004).
6. "Φυσική Χημεία Ομογενών και Ετερογενών Συστημάτων", Δ.Α. Γιαννακουδάκης, Θεσσαλονίκη (1985-1986).
7. "Ηλεκτροχημεία", Ι.Α. Μουμτζής, Δ.Π. Σαζού, Θεσσαλονίκη (1992).

Educational activities: Attendance of lectures and laboratory work.

Evaluation process and methods:

A. Laboratory work. After every laboratory work, the students give to the tutor a report. It contains a short theoretical part of the experiment and the experimental results with tables and/or figures. The marks of all reports are taken into consideration for the final written exams.

B. Lectures. Written exams at the end of the semester. The exams include theory and problems and exercises. The students that took part in the eight experiments, have given their reports, which had been accepted by the tutor, are able to participate in the exams. The examination time is 3 hours.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

The lectures are made using PowerPoint and/or transparences.

The book "Σημειώσεις Φυσικοχημείας για τους φοιτητές του Φαρμακευτικού Τμήματος" ("Notes of Physical Chemistry for the students of Pharmacy"), A. Avranas, I. Ziogas, A. Papoutsis, S. Sotiropoulos (2005), that contains theory and experiments, can be found in the website of the department of chemistry www.chem.auth.gr, laboratory of Physical chemistry (A. Avranas). At the same address, there is also additional information (S. Sotiropoulos, D. Tsiplakides).

Teaching: Teaching consists of 36 lectures and 8 experiments in the lab.

A). Lectures. 3 times a week

Lecture	**Title**	**Tutor**
1-2	Introduction to basic concepts of thermodynamics	Papoutsis
3	Thermodynamic system, Equation of state of the ideal gases.	Papoutsis
4	Thermodynamic equilibrium	Papoutsis
5	Temperature, Zero law of thermodynamics	Papoutsis
6	Internal energy,Work, Heat	Papoutsis
7	The first law of thermodynamics	Papoutsis
9	Applications of the first law of thermodynamics in the ideal gases	Papoutsis
10	Real gases, a new equation of state	Papoutsis
11	Thermo chemistry, Applications (problems)	Papoutsis
12	Second law of thermodynamics, Entropy, Evaluating the entropy changes	Sotiropoulos
13	Thermodynamic properties, Criteria of equilibrium at various conditions	Sotiropoulos
14	Phase equilibrium, Gibbs phase rule, Clapeyron and Clausius-Clapeyron equations	Sotiropoulos
15	Chemical equilibrium, Effect of the temperature	Sotiropoulos

	on equilibrium constant	
16	Methodology of finding thermodynamic data of reaction for various cases using bibliographic data of standard quantities	Sotiropoulos
17	Thermodynamic study of biochemical reactions	Sotiropoulos
18	Examples of exercises of phase and chemical equilibrium	Sotiropoulos
19-24	Physical chemistry of mixtures	Tsiplakides
25-26	Rate of chemical reactions, Zero-first and second order	Avranas
27	The temperature dependence of the rate law	Avranas
28	Rate of chemical reactions, Solved problems	Avranas
29-31	Surface Chemistry	Avranas
32-34	Colloids	Avranas
35-36	Electrochemistry, Applications	Avranas

B). **Laboratory work**

Laboratory	**Title**	**Tutor**
1	Acid-base titrations, Determination of the pK_a of a weak acid	All tutors
2	Conductivity, Determination of the critical micelle concentration of a surfactant	All tutors
3	Spectrophotometry, Rate of oxidation of KI from H_2O_2	All tutors
4	Polarimetry	All tutors
5	Solubility, ΔH of the solubility of $NaHCO_3$ in water	All tutors

6	Ternary systems, Preparing a ternary diagram	All tutors
7	Colloids, Evaluation of isoelectric point of albumin, Preparation flocculation and protection from flocculation of the hydrophobic colloid $Fe(OH)_3$	All tutors
8	Distribution, Determination of the distribution coefficient of I_2 between organic phase-water	All tutors

BOTANY

Code of the course: 7
Level of studies: Undergraduate
Semester: 2nd
Type of the course: Basic knowledge
ECTS: 4
Oral courses: 2 h per week
Practicals: 2 h per week
Coordinator of the course: Kokkini Stella, Professor

Teaching staff:

Stella Kokkini, Professor

Room 8.23, 8th floor Building of Biology/Pharmacy School

Student interview: Wednesday and Friday 12.00 – 14.00

e-mail: kokkini@bio.auth.gr

Michael Moustakas, Professor

Room 9.18, 9th floor Building of Biology/Pharmacy School

Student interview: Every day 12.00-14.00

e-mail: moustak@bio.auth.gr

Regina Karousou, Assistant Professor

Room 8.13, 8th floor Building of Biology/Pharmacy School

Student interview: Every day 11.00-12.00

e-mail: karousou@bio.auth.gr

Paraskevi Malea, Associate Professor

Room 9.15, 9th floor Building of Biology/Pharmacy School

Student interview: Every day 9.00-12.00

e-mail: malea@bio.auth.gr

Effie Hanlidou, Assistant Professor

Room 8.13, 8th floor Building of Biology/Pharmacy School

Student interview: Tuesday 15.00-17.00, Thursday 11.00-13.00

e-mail: chanlidu@bio.auth.gr

Chrisoula Pirini, RLT'S

Room 8.15, 8th floor Building of Biology/Pharmacy School

Student interview : Monday 10.00-14.00

e-mail : chpirini@bio.auth.gr

Eudoxia Tsakiri, RLT'S

Room 8.15, 8th floor Building of Biology/Pharmacy School

Student interview: Monday 10.00-14.00

Επικοινωνία: Με e-mail (tsakiri@bio.auth.gr)

Cognitive:Acquaintance of students with basic knowledge of plant biology: morphology, anatomy and basic function (cellular and subcellular) of plants. Main principles of plant classification. Understanding and use of scientific names. Distinction of the natural groups of medicinal plants (plants with biologically active agents), based on their morphological and chemical diagnostic features.

Skills: Use of the light microscope for observing and identifying plant cells, tissues and organs. Acquisition of skills in hand-preparing microscopic slides of plant material and interpretation of the observed image. Use of stereoscope for observation of macroscopic features that distinguish the major families of medicinal plants. Collection, taxonomic identification and preservation of plant specimens.

Teaching Methods: Teaching includes hall lectures, laboratory work and fieldwork, in small groups of students.

Course Contents:

Part A: Introduction to Plant Biology. Origin, evolution and chemical composition of plants and the uses of plants by people (nutrition, energy, medicine). The typical plant cell. Subcellular organelles and structures with emphasis on cell wall, vacuoles and plastids. The plant tissues: meristems, epidermis, periderm, parenchyma, supporting, vascular tissues and special emphasis on secretory tissues. Organization of the plant body. The stem: morphology, primary and secondary structure, modifications. The leaf: morphology, structure, growth and modifications. The root: morphology, primary and secondary structure, modifications. The flower: morphology, development, structure, pollination and fertilization. The fruit: types, development, structure. The seed: morphology, structure, formation of the embryo and endosperm, seed dispersal and germination.

Part B: Historical overview of the use of medicinal plants in relation to their classification. Basic principles of scientific nomenclature and classification of plants. The "box-within-a box 'method of classification. The species as a basic taxonomic unit. The distinction of plants into Divisions. The three Subdivions of Spermatophyta. The classes and subclasses of Magnoliophytina (Angiosperms). Diagnostic morphological features of the main families of medicinal plants. Representative species of medicinal plants, their biologically active ingredients and pharmaceutical uses.

Recommended Bibliography:

Part A.

1. Morphology and Plant Anatomy
Edition: 015/1994
Author: Stylianos G. Delivopoulos
ISBN: 960-317-015-1
Copyright: A. Simoni
2. Botany. Morphology and Anatomy of Plants
Edition: 2011
Author: Artemios Bosabalidis
ISBN: 978-960-12-2047-5
Copyright: University Studio Press

Part B.

1. Systematic Botany: Phylogenetic-Phenetic Approach to Classification of Plant Organisms
Edition: 1/2004
Authors:BABALONAS D., S. KOKKINI
ISBN: 960-86090-3-8
Copyright: Charalampos NIK. AIVAZIS

Learning Activities: Attending lectures, lab and field practice. Creation of a personal collection of dried plant specimens.

Assessment Methods:

Part A. Written examination (80%), laboratory exams (20%). Written exams are based on both multiple choice questions and critical thinking questions.

Part B. Five questions, graded according to their difficulty. The form of questions in PART B is found on the website of the Department of Pharmacy. Oral exams, based on the dried plant specimen collection created by each student (10% of final grade). They are conducted within the examination periods, before the written exams. The exact date and time are announced on the website of the Department of Pharmacy.

α) Lectures: 26 lectures (13 weeks X 2 hours) in classroom I1 by the use of data projector.

1-2	Introduction to plant biology. The typical plant cell.	P.Malea
3-4	Characteristics of the plant cell with empasis on vacuoles, cell walls and plastids.	P.Malea
5-6	Meristems and tissues. Dermal and Ground tissues.	P. Malea
7-8	Supporting and vascular tissues.	P. Malea
9-10	The plant organs. The stem: morphology, primary and secondary structure, modifications.	P. Malea

11-12	The leaf: morphology, structure, growth and modifications. The root: morphology, primary and secondary structure, modifications.	P.Malea
13 **14**	The flower: morphology, development, structure, pollination and fertilization. The fruit: types, development, structure. The seed: morphology, structure, formation of the embryo and endosperm, seed dispersal and germination. The medicinal plants (herbal medicines) and their therapeutic properties: From the tradition to the science	P. Malea S. Kokkini
15-16	The scientific basis of Systematic Botany - Taxonomic hierarchy - Taxonomic nomenclature	S. Kokkini
17-18	Division Spermatophyta-Families of the Subdivision Coniferophytina and Magnoliophytina. I. Class Magnoliatae, subclasses Magnoliidae-Hamamelididae	E. Hanlidou
19-20	Class Magnoliatae – Families of the Subclass Rosidae	R. Karousou
21	Class Magnoliatae – Families of the Subclass Dilleniidae and Caryophyllidae	E. Hanlidou
22	Class Magnoliatae – Families of the Subclass Asteridae	R. Karousou
23-24	II. Class Liliatae – Families of the Subclass Liliidae	E. Hanlidou

25-26	An overall view of the main families of medicinal plants of the Greek flora. Questions for the written exams of the course.	S. Kokkini

b) Laboratory exercises: Laboratory exercises in small groups, once a week for each group, in rooms M3 and M4 on the 5th floor Building of Biology/Pharmacy School. Use of light microscopes and stereoscopes. Students are required to attend all laboratory exercises (two hours/week).

Lab exercise	**Title**	**Lecturers**
1	Introduction. Use of light microscope. Form and size of plant cells. Nucleus, plastids and vacuoles.	Pirini, Tsakiri
2	Starch grains, protein grains and crystals. Cell wall.	Pirini, Tsakiri
3	Epidermis, stomata, trichomes. Periderm.	Pirini, Tsakiri
4	Parenchyma, collenchyma, sclerenchyma. Vascular tissue, cambium. Secretory tissue.	Pirini, Tsakiri
5	The stem: morphology, primary and secondary structure.	Pirini, Tsakiri
6	The leaf: morphology and structure. The root: morphology, primary and secondary structure.	Pirini, Tsakiri
7	Instructions for collecting plants and **c**reate a personal collection of dried plant specimens.	Pirini, Tsakiri

8	How to identify families of Spermatophyta: Rosaceae, Fabaceae,Geraniaceae, Apiaceae, Brassicaceae, Malvaceae	Pirini, Tsakiri
9	How to identify families of Spermatophyta: Solanaceae, Oleaceae, Lamiaceae, Cichoriaceae, Asteraceae, Poaceae	Pirini, Tsakiri
10	Collection of plants (field work)	Pirini, Tsakiri
11	Oral presentation of each student collection of plants	Pirini, Tsakiri

GENERAL ORGANIC CHEMISTRY

Code number: 8
Cycle : Undergraduate
Semester : 2
Course Type

X	Background / General Knowledge
	Scientific area: Pharmacy

Credit units (ECTS): 8
Lectures (hours per week): 3
Tutorial (hours): -
Laboratory (hours per week): 2
Course coordinator: Konstantinos Litinas, Professor
Tutor (s):
1) Konstantinos Litinas,
Office 317, 1st floor, Old Chemistry Building.

Time for collaboration with students: everyday

E-mail:klitinas@chem.auth.gr

2) Elisavet Malamidou-Xenikaki, Professor.

Office 302, 1st floor, Old Chemistry Building.

Time for students: everyday

E-mail:malamido@chem.auth.gr

3) Evaggelia Varella, Associate Professor

Time of collaboartion: everyday

e-mail: varella@chem.auth.gr

4) S. Orthoudi RLT'S

5) E. Eugenidou RLT'S

Assistant personnel:

Aims of the course: The study of the basic principles of modern Organic Chemistry and the understanding of their importance/significance on the structure and reactivity of molecules as well as their interaction. Therefore the course covers the general principles of Organic Chemistry coupled with the spectroscopic methods and the chemistry of alkanes, alkenes, alkynes, alkyl halides and aromatic compounds. In the Laboratory the tutoring covers experiments of principal laboratory techniques and simple organic reactions.

Skills: Familiarization with the basic principles of Organic Chemistry and application of experimental procedures in the laboratory.

Teaching methods: Lectures, tutoring and laboratory exercises and practices.

Contents of the course: Study and investigation of the basic principles of Organic Chemistry including spectroscopic methods. Study of some classes of organic compounds. The aforementioned subjects can be classified in the following chapters:

Structure and bonding

Bonding and molecular properties.

The nature of organic compounds: alkanes and cycloalkanes

Stereochemistry of alkanes and cycloalkanes

Overview of organic reactions (review)

Alkenes: structure and reactivity

Alkenes: reactivity and synthesis

Alkynes

Stereochemistry

Alkyl halides. Reactions: nucleophillic substitutions and eliminations

Structure elucidation: mass spectrometry and infrared spectroscopy

Structure elucidation: nuclear magnetic resonance spectroscopy

Conjugated dienes and ultraviolet spectroscopy

Benzene and aromaticity

Chemistry of benzene: aromatic electrophillic substitution

Organic reactions: a brief review

Suggested Literature:

- «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ ΤΟΜΟΣ Ι», J. McMurry, Πανεπιστημιακές Εκδόσεις Κρήτης, Ηράκλειο Κρήτης, 2007.

- «ΜΑΘΗΜΑΤΑ ΟΡΓΑΝΙΚΗΣ ΧΗΜΕΙΑΣ ΜΕΡΟΣ ΠΡΩΤΟ», Δ. Ν. Νικολαΐδης, Εκδόσεις Ζήτη, Θεσσαλονίκη 1987.

- «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ», Ν. Ε. Αλεξάνδρου-Α. Γ. Βάρβογλη, Εκδόσεις Ζήτη, Θεσσαλονίκη, 1986.

- «ORGANIC CHEMISTRY, Fourth Edition», T. W. Graham Solomons, John Wiley & Sons, New York, 1988.

- «ORGANIC CHEMISTRY, STRUCTURE AND FUNCTION, Sixth Edition», K. P. C. Vollhardt, W. H. Freeman and Company, New York, 2010.

- «ORGANIC CHEMISTRY", H. Beyer and W. Walter, Translator and Editor D. Lloyd, Albion Chemical Science Series, Chichester, England, 1997.

- «ADVANCED ORGANIC CHEMISTRY, Reactions, Mechanisms, and Structure, Fourth Edition», J. March, Wiley-Interscience Publication, John Wiley & Sons Inc., New York, 1992.

Educational activities: Lectures, laboratory exercises, discussion with the students in every lecture.

Evaluation process: Written examination at the end of the semester covering the knowledge of the students and their ability of critically evaluating different problems of Organic Chemistry. All examined subjects are graded equally. The duration of the examinations is 3 hours.Additional,

tests at the end of the Laboratory session (prerequisites for the completion of the lab and the acquisition of the corresponding mark/seal/stamp).

Use of ΤΠΕ / electronic distribution of the lectures: Lectures and tutorials are based on Power point presentation or overhead transparent-film presentation.

The lectures are available online on the corresponding tutors' site at www.chem.auth.gr.

Teaching (lectures, tutorials, supervisions)

Teaching of this course is accomplished through lectures and supervisions. Teaching in the Laboratory is accomplished through lectures.

α) Lectures . The lectures (4 hours per week) are taking place in lecture room A on the ground level, of the Old Chemistry Building.

The lectures are available online on the corresponding tutors' site at www.chem.auth.gr

Lecture	Title	Tutor
1-2	Structure and bonding in organic compounds	All tutors
3-5	Bonding and properties of the molecules. Inductive and Resonance effects	All tutors
6-9	Alkanes and Cycloalkanes. Nomenclature of organic compounds. Intermolecular forces	All tutors
10-11	Stereochemistry of alkanes and cycloalkanes	All tutors
12	Organic reactions (general review)	All tutors
13-14	Alkenes (structure and reactivity)	All tutors
15-18	Alkenes (synthesis and reactions)	All tutors
19-22	Alkynes (derivatives from acetylene)	All tutors

21-23	Stereochemistry: Enantiomers, optical activity, *R,S*-isomers, diastereoisomers, meso compounds, Fieser projections, racemic isomers, asymmetric synthesis.	All tutors
24-27	Haloalkanes: Naming, structure, preparations, radical halogenations, Grignard reagents, reactions with organometalic compounds. S_N1, S_N2, E1, E2 reactions.	All tutors
28	Mass spectrometry: General, interpretation of mass spectra, fragmentation patterns.	All tutors
29-31	IR spectroscopy: General,interpretation of IR spectra, spectra of organic compounds.	All tutors
32-35	NMR spectroscopy: ^{1}H NMR spectroscopy, chemical shift, spin-spin coupling, ^{13}C NMR spectroscopy, use of NMR in resolution of molecular structure (analysis).	All tutors
36-37	Conjugated dienes: Preparations, stability, electrophilic additions, polymers, Diels-Alder reaction. UV spectroscopy.	All tutors
38-40	Aromatic compounds: Naming,structure and stability of benzene, Hückel's rule, aromatic ions, hetecyclic and polycyclic aromatic compounds, aromatic electrophilic substitution, oxidation and reduction of aromatic compounds, synthesis of substituted benzenes.	All tutors

b) Laboratory

LAB	**Title**	**Tutors**
1 (4 hours)	Safety rules in Chemical Laboratory	All tutors

2 (4 hours)	Distillation of water. Measurement of boiling point.	All tutors
3 (4 hours)	Hydrolysis of methyl benzoate. Recrystallisation of benzoic acid. Measurement of melting point.	All tutors
4 (4 hours)	Esterification of benzoic acid. Fractional distillation of product ester.	All tutors
5 (4 hours)	Nitration of methyl benzoate.	All tutors
6 (8 hours)	Caffeine extraction from tee lieves.	All tutors
7 (4 hours)	Chromatography (Column and TLC)	All tutors
8 (2 hours)	Test (written)	All tutors

CELL BIOLOGY

Code number: 9
Cycle: Undergraduate
Semester: 2nd semester
Course type

X	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 6
Lectures (hours/week): 3
Tutorial (hours/week): 2
Laboratory work (hours/week): -
Course coordinator: Christos Panagiotidis, Professor
Tutor (s):

Christos Panagiotidis, Professor

Office : Room 315, 3rd floor Biology /Pharmacy Building

Student hours : 11-12 a.m. weekdays

Communication: by Email (pchristo@pharm.auth.gr)

Assisting personnel: -

Aims of the course: To help the students understand the basic principles of cell biology, the importance of the cell structure to its functions and the roles of both the subcellular organelles and the major biological macromolecules. To achieve these goals, the course presents various areas of cell biology, i.e. starting with the presentation of the chemistry of the cells and the biosynthesis of its macromolecules (DNA, RNA, proteins etc) and continuing into the structure of the membranous cell organelles, the pathways of intracellular transport, energy production and cell communication. Special emphasis will be given in aspects that are useful to pharmacy students, e.g. the cellular and molecular basis of disease and drug effects on the cell structure and function.

Skills: Familiarization with key concepts of cell biology.

Teaching methods: Course lectures and tutorials.

Contents of the course:

Introduction to the Cell: Life and its study. Introduction to the cell and its components. Cell theory. Observing cells under a microscope. Similarities and differences between cells.

The chemical composition of the cells: Chemical bonds. Characteristics and the role of water. The molecules of the cell. Structures of simple sugars, polysaccharides, fatty acids/fats/lipids, nucleic acids and proteins. Enzymes, enzymatic reactions, allosteric motor proteins and protein machines.

Biological membranes, Intracellular compartments and transport: The lipid bilayer, membrane proteins (categories of membrane proteins, modes of attachment to the membranes, functions, the role of the cell cortex). Membranes carbohydrates and the importance of glycocalyx. Membrane organelles-structure and biological roles. Mechanisms of protein sorting and import to organelles (co- & post-translational translocation, the role and significance of signal sequences). The role of molecular chaperones in the protein transport across membranes, as well as on protein quality control. Vesicular transport (cargo selection, vesicle budding, targeting and docking of transport vesicles). Secretory pathway and the role of the Golgi apparatus. Endocytosis, phagocytosis and structure and functions of lysosomes.

Cytoskeleton: The role(s) of cytoskeleton. Intermediate filaments. Microtubules and biological importance of their dynamic instability. The microtubules as highways for the transport of vesicles and other cell components. Microtubule motor proteins and their importance. Structure and function of actin in cell structure and movement. Attachment to motor proteins and myosins.

Mitochondria and Chloroplasts, the energy centers of the eukaryotic cells: Biological oxidations and energy production. The mitochondrion and its morphology. Degradation and oxidation of macromolecules. Respiratory chain and chemiosmotic conversion of oxidation energy to ATP. Chloroplasts and plastid morphology. Biological significance of the chloroplasts-Photosynthesis. Mitochondrial and plastid biogenesis and genome.

Protein synthesis, folding, modifications and degradation: The genetic code; codons, anticodons & transport RNAs; Reading frames in translation; Ribosome, the place of mRNA decoding; The process of translation and its regulation; Post-translational protein modifications, protein folding and degradation. The roles of molecular chaperones in protein folding, transport and sorting. Protein degradation.

Organization, storage and reproduction of the genetic information: The genetic information resides in DNA; DNA and genetic code; DNA structure and organization. Eukaryotic chromatin structure: euchromatin, heterochromatin and their significance. Nucleosomes (structure and importance); Higher levels of chromatin organization-chromosomes; DNA replication: mechanism and enzymes involved in the process; The problem of replication at the ends and the role of telomerase. DNA damage, mutations and DNA repair mechanisms.

Transmission of the Genetic Information: The process of transcription, RNA polymerases and their functions; promoters and transcription initiation, general and regulatory transcription factors; the roles of chromatin and of the histone modifications on transcription; the role of DNA methylation and chromatin structure in heritable gene silencing; Post-transcriptional maturation of eukaryotic RNAs (cap addition, splicing and 3′ end maturation).

Cell cycle and Cell Death: The stages of the cell cycle; Cell cycle regulation (the importance of checkpoints, cyclins and cyclin-dependent kinases); Stages of mitosis; The role of cytoskeleton in mitosis; Meiosis and sexual reproduction; Programmed cell death and its biological significance; Structural and functional of the cells undergoing programmed cell death;

death signals; the roles and regulation of caspase activity; the role of mitochondria; anti-apoptotic factors.

Multicellular Organization and Cancer: Extracellular matrix and connective tissue; epithelium and intercellular junctions; Tissue maintenance and renewal-Deregulation in Cancer; Molecular roles oncogenes anti-oncogenes.

Proposed literature:

1. Alberts B.,Bray D.,Hopkin K.,Johnson A.,Lewis J.,Raff M.,Roberts K.,Walter P. "Essential Cell Biology", 2nd edition, 2006 (Greek translation, Publisher: Iatrikes Ekdoseis P.C. Pashalidis).
2. V. Marmaras & M. Lambropoulou-Marmara, "Biologia Kyttarou (Cell Biology)", Edition: 5/2005, Publisher: TYPORAMA.
3. Geoffrey M. Cooper & Robert E. Hausman "Cell: A Molecular Approach", 5th edition 2011, Publisher: Akadimaikes Ekdoseis I. Basdra & Co.

Educational activities: Attendance of course lectures and tutorials.

Evaluation process and methods: Intermediate exams (A) or final exams at semester end (B).

The exam structure is similar both in A & B and it consists of 20 questions where the students are asked to define whether the question is correct or wrong (0.1 point per correct answer, -0.1 point per mistaken answer) and to justify their answer (0.4 points per question). All questions are equivalent (0.5 points). Questions that have not been answered correctly by any students are withdrawn and final grade is calculated based on the grades from the remaining questions.

The examination time in 1 hour

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

ICTs are used both in the lectures and the tutorials of the course (PowerPoint and video presentations, interactive tutorials using computer simulations, etc.).The course lectures, announcements, exam results etc. are regularly posted in the webpage of the course coordinator.

Teaching:

Teaching takes place with course lectures and tutorials.

A) **Lectures**.

Lecture	**Title**	**Tutor**
1	Introduction to the cell and its constituents	C. Panagiotidis
2	The chemical composition of the cells	C. Panagiotidis
3	Protein structure and function(s)	C. Panagiotidis
4-6	Biological membranes, Intracellular compartments and protein sorting	C. Panagiotidis
7-8	Vesicular transport, secretion, endocytosis, lysosomes and autophagy	C. Panagiotidis
9-10	Mitochondria and Chroloplasts – The energy centers of the eukaryotic cells	C. Panagiotidis
11-12	Protein synthesis, folding, modifications and degradation	C. Panagiotidis
13-14	Cytoskeleton	C. Panagiotidis
15	Structure and organization of the genetic material	C. Panagiotidis
16	DNA replication and DNA repair	C. Panagiotidis
17	The process of transcription and its regulation	C. Panagiotidis
18-20	Cell division and Programmed Cell Death	C. Panagiotidis
21	Meiosis and sexual reproduction	C.

		Panagiotidis
22-23	Multicellular organization and cancer	C. Panagiotidis
24-26	Review lectures	C. Panagiotidis

B) **Tutorials**

Tutorial	**Title**	**Tutor**
1	The chemistry of the cells – Properties and activities of enzymes – Enzyme inhibitors and pharmaceutical applications (Interactive).	C. Panagiotidis
2	The flow of genetic information and the enzymes involved in these processes (Interactive)	C. Panagiotidis
3	The cell in motion 1 – Cell division The cell in motion 2 – Chemotaxis, cell signalling, cell death and phagocytosis	C. Panagiotidis

ENGLISH LANGUAGE B

Code number: NP-11
Cycle: undergraduate
Semester: 2nd
Course type

X	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 0,5
Lectures (hours/week): 2
Course coordinator: Kontouli Kleopatra, EEP
Tutor (s): Kontouli Kleopatra, EEP

Aims of the course: Improvement of reading strategies, enrichment of vocabulary, understanding relations between the parts of a text through lexical cohesion devices.
Skills: Understanding coherence and cohesion of the text and providing guided definitions of terms.

Teaching methods: Interactive teaching

Contents of the course:

A. Pre-reading activities

Questions to predict the content of the text and activate existing knowledge.

B. Activities following skimming or scanning

General questions, questions for locating specific information, filling diagrams with the main titles of the text, checking the answers of the pre-eading questions.

C. Detailed-reading questions

True-False questions, matching side-titles with paragraphs, filling tables and diagrams.

D. Vocabulary learning activities

Guessing the meaning of unknown words from context, blank filling, matching terms with definitions, understanding the meaning of prefixes and unknown words, synonyms, antonyms, providing guided definitions of terms

Proposed literature: Ziaka, I. 2010. *English for Pharmaceutical Studies*, vol. I . Thessaloniki: University Studio Press.

Educational activities: Attendance of lectures

Evaluation process and methods: One final exam at the end of the semester

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Power point presentations with interactive activities.

Supplementary teaching material is hosted on the Blackboard Platform e-courses, with open access.

Teaching:

A) **Lectures**.

Lecture	**Title**	**Tutor**
1	Drug resistance	Kontouli Kleopatra
2	Acid-Base Chemistry	Kontouli Kleopatra
3	General Principles of Catalysis	Kontouli Kleopatra
4	Primary and Secondary Metabolism	Kontouli Kleopatra
5	Toxicity	Kontouli Kleopatra
6	Pharmacogenetics	Kontouli Kleopatra
7	Toxicokinetic considerations	Kontouli Kleopatra
8	Methods to reduce or Prevent Absorption	Kontouli Kleopatra

9	Sibutramine	Kontouli Kleopatra
10	Prescribing information	Kontouli Kleopatra
11	Preparation of plant material	Kontouli Kleopatra
12	Drugs derived from plants	Kontouli Kleopatra
13	Nomenclature	Kontouli Kleopatra

ENZYMOLOGY

Code number: NP29
Cycle: Undergraduate
Semester: 2nd semester
Course type

x	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 2
Lectures (hours/week): 2
Laboratory work (hours/week): 2
Course coordinator: Anastasia Pantazaki, Associate Professor
Tutor (s): Anastasia Pantazaki, Associate Professor(Coordinator)

Office 511, 4th floor building Chemical

Cooperation with students: daily 11-12 a.m.

Contact: by email (natasa@chem.auth.gr)

Rigini Papi (Laboratory, RLT'S)

Assisting personnel:

Aims of the course: The understanding of the basic principles of Enzymology and of the importance of the structure and function of enzymes and through these knowledge the understanding of Biochemistry.

Skills: Familiarity with basic concepts of Enzymology

Teaching methods: Lectures at auditorium & laboratory/ exercises.

Contents of the course:

-History-the structure of enzymes

-Criteria for enzymatic reactions – determination of enzymes

-Choice of determination methods for enzyme-enzyme source Extraction of enzyme- Methods for enzyme purification.

-Designation and classification of enzymes.

-Mechanisms of enzyme reactions. REDOX-transfer reaction Reactions-hydrolysis Groups of reactions -Breaking ties with non-hydrolytic removal teams-isomerism-Synthetic Reactions.

-How enzymes work

-Impact of the concentration of the substrate-Michaelis Menten Equation

-The meaning of the constants Km and Vmax – Graphical determination of Km and Vmax-Influence of pH-temperature effects-Effects of concentration of the enzyme-Enzyme reactions with more than one substrates

-The active Centre-polar links-hydrogen-hydrophobic-links homeopolic links

-Competitive Blockers inhibition-non-competitive suspension-mixed suspension-Competitive inhibition-graphical representation of the kind of suspension-" " – suicide Inhibitors Actuators

Models-Model-Adair-MWC to KNF model-the General model-Negative synergy and reactivity of half-centers where isomerism enzyme-biological significance of the allosteric phenomena.

-Stereo-selectivity of enzymes

-Limited proteolysis zymogen- Phosphorylation and dephosphorylation of enzymes – Other two-way homeopolic amendments to the structure of the enzyme except phosphorylation.

-Regulation of biosynthesis of enzymes in bacteria-regulation of biosynthesis enzymes in animal cells-biosynthesis of enzymes from Setting of substrates and metabolites-biosynthesis of enzymes regulate hormones.

-Enzymes in clinical chemistry

-Biotechnological applications of enzymes

Proposed literature:

1a. Enzymologia: I.c. Georgatsos-Mp Gioupsanis-D.A. Kyriakidis

(Versions: Ziti), Thessaloniki, 2001.

1B. Laboratory Exercises: Enzymologia (versions: Ziti), Thessaloniki.

2. Enzymologia: i. Klonis (Agricultural University of Athens-Everything/Versions: Crete, Athens: ΄Embryo, 2007.

Educational activities: Monitoring of lectures and laboratory/exercises

Evaluation process and methods: Written examination at the end of the semester.The assessment process is based on 8 questions where students are invited to respond. Open questions are equivalent. The examination time is 2.5 hours.

A) examinations at the end of the semeste, dates and places are announced by the Department.

The lectures and tutorials of this course are using ICT (Powerpoint presentation, frontistiriakes exercises, etc.).

The course lectures, announcements, rankings, etc. posted on the Bulletin Board of the laboratory of Biochemistry

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Teaching: The teaching of the course are lectures and laboratory exercises and supplementary lessons

A) **Lectures**. The lectures (1 hour) take place twice a week in the laboratory of Biochemistry Library, electronic media are used in the presentation of the lectures.

Lecture	Title	Tutor
1	History-name and classification of enzymes	R. Papi
2	The structure of enzymes-find the aminoic sequence of enzymes	R. Papi
3-4	Enzymatic reactions – Criteria of quantification Methods of enzymatic reactions	R. Papi
5-6	Election method to determine the action of the enzyme-enzyme-source Extraction of enzyme-enzyme purification Methods-cleaning-automatic electrophoresis Protocol Species	R. Papi
7-8	Protein-Purification of recombinant protein-Enzyme mechanics	R. Papi
9-10	Enzyme reaction-Mechanisms of enzyme reactions. REDOX-transfer reaction Reactions-hydrolysis Reactions teams-Breaking ties with non-hydrolytic removal teams-isomerism-Synthetic Reactions.	R. Papi
11-12	Nucleic acids metabolism Enzymes-Specific nucleases-Ligases- Helicases- Topoïsomerases-DNA-Polymerases telomerases Multiple forms of enzymes-Isoenzymes	A. Pantazaki
13-14	Kinetic enzymatic action-reaction of the concentration of the substrate-Michaelis-Menten Equation, the meaning of the constants Km and Vmax – Graphical determination of Km and Vmax-Influence of pH-temperature effects-Effects of concentration of the enzyme-Enzyme reactions with more than one substrates a. Pantazaki	A. Pantazaki

15-16	Active Centre. Polar links-hydrogen-Hydrophobic-links Homeopolic links Competitive-blockers inhibition-non-competitive suspension-suspension Joint suspension-Competitive-graphical representation of the kind of suspension-suicide Inhibitors Actuators	A. Pantazaki
17-18	17-18 To model phenomena-Allosteric Hill-model Adair-model MWC model-To-model KNF-General-Negative synergy and reactivity of half-centers Where isomerism enzyme-biological significance of allosteric phenomenal	A. Pantazaki
19-20	Stereo-selectivity enzymes-how enzymes operate	A. Pantazaki
21-22	Limited proteolysis zymogen- Phosphorylation and dephosphorylation enzymes – Other two-way homeoopolic amendments to the structure of the enzyme except phosphorylation	A. Pantazaki
23-24	Biosynthesis enzymes in Setting of bacteria-enzyme biosynthesis setting, in animal cells-biosynthesis enzymes from Setting of substrates and metabolites-biosynthesis enzymes regulate hormones.	R. Papi
25-26	Enzymes in clinical chemistry Biotechnological applications of enzymes	A. Pantazaki

B) **Laboratory work**

Students are required to attend three supplementary lessons (1 hour).

Laboratory	Title	Tutor
1	Ways of solution the cells. brief introduction to the s. cerevisiae. Source selection criteria .Enzymic extraction buffer Properties. Protein extraction principles. Inbertasis cleaning process based on solubility at pH, ethanol, alatia.	Papi
2	The principle of the test method and Bradford Nelson. The importance of successive dilutions. .	Papi
3	The application of DEAE chromatography for purification of inbertasis	A. Pantazaki
4	The kinetic and the purification Protocol of inbertasis	A. Pantazaki

SEMESTER III

PHYSIOLOGY I

Code number: NP30
Cycle: Undergraduate
Semester: 3rd
Course type

x	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2

Course coordinator: Almpani M. Professor
malmpani@auth.gr. + T: 2310999326.
Tutor (s):

1) Almpani M. (Professor)
2) Koutsonikolas D. (Associate Professor)
3) Kritis A. (Associate Professor)
4) Spandou E. (Associate Professor)
5) Symeonidou K. (Associate Professor)
6) Kapoukranidou D. (Associate Professor)
7) Kosmidi E. (Assistant professor)
8) Chatzisotiriou A. (Assistant professor)

Assisting personnel:

Aims of the course: Knowledge of the physiological function of the circulatory, respiratory and urinary system of the human body

Skills:

Teaching methods: All of the mechanisms of these systems in conjunction with basic anatomical concepts associated with the above functions. Laboratory exercises: their content refers to key sections of the above-mentioned systems. Use of Video projection and simulation programs to PCs. more detailed analysis on the targets of the course reported on the websites: http://www.experimentalphysiology.gr and http://physiology.med.auth.gr. At the end of the exercises examinations are carried.

Contents of the course: Cell and fluid homeostasis. Membrane transfer. Physiology of nerve and muscle stimulators. Heart and circulation, heart electro-physiology. Flow, pressure and resistance, the heart as a pump. The distal movement. Pneumonic ventilation, perfusion and diffusion of gases. Mechanics of breathing. Glomelular filtration and kidney clearance. Renal transport Mechanisms of concetrating and diluting of urine. Setting the volume and osmolarity of extracellular fluids. Setting the acid-base balance by the kidneys

Proposed literature:

Educational activities: Lesson from the amphitheatre: learning the functioning of these systems in conjunction with basic anatomical concepts associated with the above functions. Laboratory exercises: the familiarization of students in methodology on issues contained in the material of the theoretical lesson.

Evaluation process and methods:

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Teaching: The teaching of the course are lectures and exercises.

A) **Lectures**.

INORGANIC PHARMACEUTICAL CHEMISTRY

Code number: 20
Cycle: Undergraduate
Semester: 3rd
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 6
Lectures (hours/week): 2
Tutorial (hours): -
Laboratory work (hours): 2

Course Coordinator: Dimitra Hadjipavlou-Litina

Tutors:

Dimitra Hadjipavlou-Litina, Professor
Room 408/B & 410, 4th floor Biology/Pharmacy building.
Collaboration with students: Every day 11-12.
Communication: e-mail (hadjipav@pharm.auth.gr)

Eleni Pontiki, assistant professor
Room 410, 4th floor Biology/Pharmacy building.
Collaboration with students: Every day 11-12.
Communication: e-mail (epontiki@pharm.auth.gr)

Assisting personnel:
Dr. Antony Gavalas, RLT'S

Aims of the course: Understanding by the students of inorganic drug, including chemical properties and biological role as well as of elements (metals and metalloids) involved in its structure and synthesis. Aims comprise knowledge and skill (capacity) of synthesis, qualitative control, characterization, quantitative control of pharmaceutical preparations which contain inorganic drugs, their mechanism of action at the molecular level as well as their use and side effects.

Scills: Familiarity with basic knowledge: a) biological activity of metals-metalloids b) biological activity of inorganic compounds of pharmaceutical interest, c) their interaction with biological targets and d) their characterization –qualitative/quantitative control.

Teaching methods:

Lectures and Laboratory work.

Contents of the course:

Inspection of elements in respect with Chemistry-Pharmacological/Toxicological activity, biological activity of metals-metalloids, inorganic compounds of pharmaceutical interest: synthesis/origin, quality/quantity control, properties, uses, side effects and their chemical explanation. The given knowledge contains inorganic drugs that are still in used. From a historical point of view a synopsis of inorganic drugs that have been withdrawn is presented. The drugs are listed as antipsychotics, antiseptics, antacids etc.

Proposed Literature:

1. Remingtons:Pharmaceutical Sciences 14 Ed.Mac.Publishing Co., Easton, 1970.
2. Roger's Inorganic Pharmaceutical Chemistry, 8th ed., by T.O.Soine and C.O.Wilson, Lea and Felinger, Filadelfia, 1967.
3. Bio-inorganic Chemistry R.W.Hay, editor Ellis Horwood (in Greek language by Ε. Μάνεση-Ζούπα & Δ. Ράπτη). Editor Papazisis, 1992
4. Bioinorganic Chemistry: Inorganic Elements in the Chemistry and Life. An Introduction and Guide. W. Kaim & B. Schwderski. Editor Wiley, 1994
5. National Formulary, National Drug Organization 2007

Educational activities:

Lectures and laboratory work.

Evaluation process and methods: Exams in the end of semester.

The students can undertake research proposals which will be evaluated and offer to the final grade. Examination is based on some questions which should be answered according to the obtained knowledge during semester as well as to the ability to combine knowledge with information and the critical thought of the students. An arithmetic exercise is given which is granted with 1 grade.
Exams in the end of semester take place on date and hours as well as in auditoriums announced by the Department.

Duration of exams is 3 h.

During laboratory practice students present the composition of their results. At the end of laboratory practice students have a written examination. Success in laboratory practice (average of notebook should be 5 at least) is obliged for the participation in exams in the end of semester. The laboratory practice mark represents the 10% of the final mark.

Use of TIC / Electronic distribution of the lectures:

Tutor:
Dimitra Hadjipavlou-Litina, professor

Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy users.auth.gr/hadjipav.

Pontiki Eleni, assistant professor

Teaching:

a) Lectures. The lectures take place 1 hour twice per week Auditorium D12, in the building of the School of Natural Sciences.

Lecture	Title	Tutor
1	Introduction to Inorganic pharmaceutical Chemistry	D.Hadjipavlou-Litina
2-5	Principles Quality and quantity control	D.Hadjipavlou-Litina
6	antacids	E.Pontiki
7	Compounds of magnesium	E.Pontiki
8	Compounds of calcium	E.Pontiki
9-11	Disinfectants	E.Pontiki
12	Diagnostics	D.Hadjipavlou-Litina
13	Borium and compounds	D.Hadjipavlou-Litina

14-15	Purgatives	E.Pontiki
16	Antipsychotics	E.Pontiki
17-19	Sulfur. Halogens, fluoride	E.Pontiki
19	Electrolytes	E.Pontiki
20-21	Antiseptics	E.Pontiki
18-19	Tungsten, Thallium, Cadmium, Cobalt	D.Hadjipavlou-Litina
23-24	Selenium,Vanadium,Nickel,Platinum	D.Hadjipavlou-Litina
25-26	Copper, Mercury, Zinc	D.Hadjipavlou-Litina

B) Laboratory

Laboratory	Title	Tutor
1-3	Preparation of boric acid and calcium phosphoricum bibasicum. Praparation of original solutions	Hadjipavlou-Litina, Pontiki Gavalas
4-5	Quantitative determination of borax and boric acid	Hadjipavlou-Litina, Pontiki Gavalas
6-8	Quantitative determination of tincture iodine (I_2 + KI)	Hadjipavlou-Litina, Pontiki Gavalas
9	Quantitative determination of ferrum sulfuricum and potassium permanganicum	Hadjipavlou-Litina, Pontiki Gavalas
10	Quantitative determination of cuprum sulfuricum	Hadjipavlou-Litina, Pontiki Gavalas
11	Quantitative determination of magnesium sulfuricum	Hadjipavlou-Litina, Gavalas
12	Quantitative determination of $KMnO_4$ by chromatometric method	Hadjipavlou-Litina, Pontiki Gavalas
13	Quantitative determination of sodium sulfuricum	Hadjipavlou-Litina, Pontiki Gavalas

BIOCHEMISTRY I

Course code number: 21
Curriculum: Undergraduate
Semester: 3rd

Course Type
Background/General knowledge
X Scientific area (pharmacy)
Credit Units (ECTS): 3.5
Lectures (hours/week): 2
Tutorials (hours/week): -
Laboratory work (hours/week): 3

Aims of the course:

The understanding on the part of students, the structure of biological macromolecules, such as proteins, nucleic acids, carbohydrates and lipids. It also analyses the structure, classification, operating mechanism and specificity of enzymes, as well as the principles of biological oxidation that lead to production and save energy for living organisms.
During the courses are given useful examples for students of pharmacy on the effect of drugs that target specific bio-molecules.

Skills:

Familiarity with basic concepts of Biochemistry

Teaching methods:

Lectures, laboratory exercises

Contents of the course:
Introduction. Amino Acids. Structure and biological function of proteins. Catalytic proteins. Enzymes. Biologically important carbohydrate. Biologically important lipids. Nucleic acids structure. Biological oxidations.

Course coordinator: Theodoros Sklaviadis, Professor

Tutors: Theodoros Sklaviadis, Professor

Giannakouros Thomas, Associate Professor

Office 501, Chemical building 4th floor

Cooperation with students: daily 11-12 a.m.

Contact: by email (giannako@chem.auth.gr)

Nikolakaki Eleni, Associate Professor

Office 505, 4th floor building Chemical

Cooperation with students: daily 11-12 a.m.

Contact: by email (nikol@chem.auth.gr)

Pantazaki A. Associate Professor

Arzoglou P. Associate Professor

Konstantinos Xanthopoulos, Assistant Professor

Assisting personnel: Papi Rigini RLT'S

Proposed literature:

1. Introduction to Biochemistry:J.C. Georgatsos (versions: Giachoydi) 6th Edition, Thessaloniki, 2005).

2. Biochemistry, volume i: Berg Tymoczko L.J., M.J., Stryer l. (A. Aletras, I.D. Balkana Drainas, H. Kouvelas, G.K. Papadopoulos, M. Franc-Lazaridi versions Uc), 2005.

3. Basic Biochemistry: K.a. Dimopoulos, p. Andonopoulou-Wilson (versions: Co-edition with P. Andonopoulou-Wilson-Provider-Publisher KONSTANTINOS A. DEMOPOULOS) 2nd edition, Athens 2009.

Educational activities:
Monitoring of lectures and laboratory exercises

Evaluation process and methods:
Written exams at the end of the semester, both in theoretical lessons and laboratories. The examinations take place at the end of the semester.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

The lectures of the course presented using slides.
Announcements, rankings, etc. posted on the Bulletin Board of the laboratory of biochemistry.

Teaching:
(Lectures/Workshops/Tutorials)
The teaching of the course are lectures and laboratory exercises.

A) **Lecture**
B) The lectures (1 hour) take place twice a week

Lecture	Title	Tutor
1	Introduction to Biochemistry	E. Nikolakaki
2	Amino Acids	E. Nikolakaki
3	Properties of amino acids	E. Nikolakaki
4	Peptide bond in primary protein structure	E. Nikolakaki
5	Examples of formulae peptides	E. Nikolakaki
6	Higher protein configurations.	E. Nikolakaki
7	Fidelity-modulation Properties of proteins	E. Nikolakaki
8	Structural, functional, regulatory proteins	E. Nikolakaki
9	Defence mobility proteins	E. Nikolakaki
10	Storage, infectious protein-Denaturing proteins	E. Nikolakaki
11	Enzymes generally – Rank-Name	T. Sklaviadis
12	Cytochromes- Co-enzymes	T. Sklaviadis
13	Kinetic enzymatic reactions	T. Sklaviadis
14	Setting the action of enzymes	T. Sklaviadis
15	Inhibitors-Actuators- Stereoselectivity	T. Sklaviadis

16	Allosteric phenomenon-Isoenzymes	T. Sklaviadis
17	General biological oxidation	T. Giannakouros
18	Krebs Cycle-Cycle glyoxylic acid	T. Giannakouros
19	Respiratory chain	T. Giannakouros
20	Oxidative phosphorylation	T. Giannakouros
21	Generally on carbohydrates-Starch-Glycogen-Glycoproteins	T. Giannakouros
22	Generally on lipids, triglycerides-fatty acid-Phospholipid-Derived isoprene Membranes-Lipoproteins	T. Giannakouros
23	Structure of nucleic acids	T. Giannakouros

24	Properties of nucleic acids	T. Giannakouros

B) **Laboratory work**

Laboratory	Title	Tutor
1	Isolation,study and properties of osin	T. Giannakouros, Rigini Papi, postgraduate students
2	Kinetic enzymatic reactions	T. Giannakouros, Rigini Papi, postgraduate students
3	REDOX enzymes	E. Nikolakaki, K. Xanthopoulos, Rigini Papi, postgraduate students
4	Gene expression regulation in Escherichia coli (BL21)	E. Nikolakaki, K. Xanthopoulos, Rigini Papi, postgraduate students

SPECIFIC ORGANIC CHEMISTRY

Code number: 22
Cycle: Undergraduate
Semester: 3th
Course Type

X	Background / General Knowledge
	Scientific area: Pharmacy

Credit units (ECTS): 7
Lectures (hours per week): 3
Tutorial (hours): 2
Laboratory (hours per week):
Course coordinator: John K. Gallos

Διδάσκων: John K. Gallos
Office 301, 1st floor old chemistry building
Office hours: Monday to Friday 12.00-13.30
E-mail: igallos@chem.auth.gr

Assistant personnel: -

Aims of the course: Students should become familiar with the basic principles of modern organic chemistry and understand their value in the function and reactivity of biomolecules as well as their interaction with small molecules. To this end, the chemistry and properties of the basic classes of organic compounds and biomolecules will be examined and discussed and moreover, students will be introduced to the principles of organic spectroscopy.

Skills: Familiarization with the basic principles of Organic Chemistry.

Teaching methods: Lectures, tutoring and laboratory exercises and practices.

Contents of the course:
Interpretation of the fundamental properties of the major classes of organic compounds and organic spectroscopy, a subject divided in the following chapters:
Infrared Spectroscopy and Mass Spectrometry
NMR Spectroscopy
Conjugated Systems and Pericyclic Reactions
Aromatic Compounds
Aromatic Substitution Reactions
Aldehydes and Ketones
Carboxylic Acids and their Derivatives

Chemistry of *α*-Carbon: Enols and Enolates
Amines
Carbohydrates
Amino acids, Peptides and Proteins
Lipids

Suggested Literature:

1. David Klein, «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ», Τόμος Β΄, Εκδόσεις Utopia
2. John McMurry, «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ», Πανεπιστημιακές Εκδόσεις Κρήτης
3. K. Peter C. Volhardt, Neil E. Schore, «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ», Εκδόσεις Κυριακίδη

Educational activities:
Lectures, laboratory exercises, discussion with the students in every lecture.

Evaluation process:
(A) Optional intermediate tests, and
(B) Written examination at the end of the semester covering the knowledge of the students and their ability of critically evaluating different problems of Organic Chemistry. All examined subjects are graded equally. The duration of the examinations is 3 hours.

Use of ΤΠΕ / electronic distribution of the lectures
Lectures and tutorials are based on Power point presentation. The lectures are available online on the corresponding tutors' site at www.chem.auth.gr.

Teaching (lectures, tutorials, supervisions)
Teaching of this course is accomplished through lectures and supervisions. Teaching in the Laboratory is accomplished through lectures.

A) Lectures.

The lectures (5 hours per week) are taking place in lecture room A on the ground level, of the Old Chemistry Building. The lectures are available online on the corresponding tutors' site at www.chem.auth.gr.

Διάλεξη	Τίτλος	Διδάσκων
1-5	Infrared Spectroscopy and Mass Spectrometry	Ι. Γάλλος
6-10	NMR Spectroscopy	Ι. Γάλλος
11-15	Conjugated Systems and Pericyclic	Ι. Γάλλος

	Reactions	
16-20	Aromatic Compounds	Ι. Γάλλος
21-25	Aromatic Substitution Reactions	Ι. Γάλλος
26-30	Aldehydes and Ketones	Ι. Γάλλος
31-35	Carboxylic Acids and their Derivatives	Ι. Γάλλος
36-40	Chemistry of *α*-Carbon: Enols and Enolates	Ι. Γάλλος
41-45	Amines	Ι. Γάλλος
46-50	Carbohydrates	Ι. Γάλλος
51-55	Amino acids, Peptides and Proteins	Ι. Γάλλος
56-60	Lipids	Ι. Γάλλος
61-65	Complementary courses	Ι. Γάλλος

B) Tutorial
Two hours per week are used as tutorial hours (Tutor: J. K. Gallos).

Pharmaceutical Analysis I

Code number: 23
Cycle: Undergraduate
Semester: 3rd
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 7
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week):2
Course coordinator: Catherine Markopoulou
Tutor (s): Catherine K. Markopoulou Office 2nd floor, Pharmacy/Biology building, Coopreration with the students Wednesday and Thursday 11:00 a.m.-1:00 p.m.e-mail: amarkopo@pharm.auth.gr / office telephone 2310 99 76 65/laboratory telephone 2310 99 76 67

Aims of the course: The course enables students not only to identify medicines (active ingredients) but also to quantify them in their pure form, in pharmaceutical formulations and in biological liquids(active ingredients and metabolites) . Ultraviolet spectrophotometry is considered a very useful technique in Pharmaceutical Analysis because it is highly sensitive (due to electronic excitations-orbitals are involved in electronic transitions).

Furthermore, identification of medicines is carried out on the basis of their various chromophore groups(the chromophore concept) because they provide (give) specific spectrum) which is characterized from its fine structure: maxima, minima, diversions, shoulders, width of electronic excitations ,that is,width in the spectrum where the electronic promotions occur, values of specific absorption coefficient, A 1%, 1cm, ratios of absorption intensities in specific maxima, minima or combination of them, pH solution etc). The method, because of the above mentioned advantages, can be combined with High-Performance Liquid Chromatography in order to detect, identify and quantify the medicines in the presence of the various impurities and metabolites. Ultraviolet spectrophotometry is described extensively in various Pharmacopoeias (Greek, European etc) as a useful means for the identification of drugs, their purity control and the quantitative determinations of various medicines in pharmaceutical formulations. Also, instrumentation is described.
This kind of knowledge is considered fundamental and essential for a professional employment of a Pharmacy graduate in a Pharmaceutical Analysis Laboratory.

Skills: To become acquainted with basic concepts of Pharmaceutical Analysis.

Teaching methods: Lectures and Laboratory practice. The laboratory practice has been enhanced so that students can be acquainted with and become more familiar with the spectra of the medicines and with the additional use of computers to make possible the supervised self-study, which is very useful for the training of the students.

Contents of the course:
Principles of instrumental methods. Classification of instrumental analytical methods. General characteristics of instrumental methods that are used in Pharmaceutical Analysis. Energy and the electromagnetic spectrum. The nature of the radiated energy (ultraviolet/visible is a form of energy, which can be described by two complementary theories: the wave theory and the corpuscular theory. Classification of spectroscopic analytical techniques which can be applied in Pharmaceutical Analysis. Generally, about spectroscopic methods.
Control of the quality of analytical methods: Introduction, errors, Accuracy and precision, Validation of an analytical procedure,Standard operating procedure (SOP), basic calculations
Ultraviolet spectrophotometry: Absorption and emission spectra. Principles, applications and methods. Study of ultraviolet spectrum of various representative organic molecules (called chromophores) which are of particular interest in Pharmaceutical Analysis (spectra of benzen, aniline, pyridine ,phenol and diphenols, barbituric acid and its derivatives,

xanthines, hormones, corticosteroids (steroid enones), anti-inflammatory, anti-histamine).
Quantifications through ultraviolet spectrophotometry: The Beer-Lambert Law. The importance of specific absorption coefficient in quantitative analysis. Spectophotometric quantifications of active ingredients in different formulations. Polar and non- polar solvents. Stock solutions and dilutions. Methods of extraction in Pharmaceutical Analysis (liquid-liquid and solid-phase extraction). Construction of calibration graph-Standard Addition Method. Instrumentation: the light sources, the monochromator, the optics, diode array instruments, instrument calibration, calibration of absorbance and wavelength scale. Determination of instrumental resolution and stray light. Difference spectrophotometry and derivative spectra
Flame spectrophotometry and spectrophotometry of individual absorption: flames, burners nebulisers. Transmission Flame spectrophotometry. Individual absorption spectrophotometry. Instrumentation, sensitivity and detection limit. Applications
Infrared spectrophotometry, key points, instrumentation, factors determining intensity and energy, application. Near Infrared analysis, key points, instrumentation, additional problems, examples.
Fluorescence spectroscopy, key points, instrumentation, molecules which exhibit Fluorescence, applications.
Raman spectroscopy, theory, key points, instrumentation, applications.
Nuclear Magnetic Resonance Spectroscopy (NMR), theory, key points, instrumentation, proton NMR, carbon NMR, two dimensional NMR spectra, applications.
Proposed literature:

Educational activities: Attendance of the module and the laboratories, handing in of laboratory notebook.
Evaluation process and methods: Once the laboratory course is successfully completed with a pass mark(passing grate) and the laboratory notebook is handed in corrected, each student with his/her team should hand in a project on an earlier assigned topic (the project is prepared individually with the responsibility of the student) -the project should be corrected-. At the end of the academic year, students have to undergo oral exams. After having completed the above mentioned obligations, students can participate in the written examinations of the pharmaceutical analysis modules. Cooperativeness, initiative and interpersonal relationship with the instructor plays an important role in the student assessment.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures: The laboratory content of the module has been enriched with electronic educational material that is special software in CD-ROM format which contains the spectra of some representative medicines as well as their spatial configurations, that is, the chemical structure in space (bonds length, ring arrangement, various bonds

angles) so that the relation of the structure of the medicine with the relevant spectrum to be obvious. Moreover, a large part of the laboratory practice is done by the students with the application of a special UVPC programme.
The lectures of the modules are enriched by multimedia use (power point presentations, videos etc).

Teaching:
The module is taught both through lectures and laboratory practice.

A) **Lectures**.
The lectures, which last for two hours, take place twice a week in Classroom D12 and multimedia are used to present the topics to be dealt with.

Lecture	Title	Tutor
1	Principles of Instrumental Pharmaceutical Analysis, Electromagnetic Radiation	Catherine K. Markopoulou
2	Control of the quality of analytical methods	Catherine K. Markopoulou
3	Control of the quality of analytical methods	Catherine K. Markopoulou
4	Ultraviolet spectrophotometry	Catherine K. Markopoulou
5	Study of UV spectra (theory needed to interpret Spectra)	Catherine K. Markopoulou
6	*Infrared spectrophotometry*	Catherine K. Markopoulou
7	*Infrared spectrophotometry*	Catherine K. Markopoulou
8	*Fluorescence spectroscopy*	Catherine K. Markopoulou
9	*Nuclear Magnetic Resonance Spectroscopy (NMR)*	Catherine K. Markopoulou
10	*Nuclear Magnetic Resonance Spectroscopy (NMR)*	Catherine K. Markopoulou
11	Flame Photometry and atomic absorption spectrophotometry	Catherine K. Markopoulou
12	Flame Photometry and atomic absorption	Catherine K.

	spectrophotometry	Markopoulou
13	Raman spectroscopy	Catherine K. Markopoulou

B) **Laboratory work**

Lab	**Title: Pharmaceutical Analysis**	**Tutor**
1	Ultraviolet Spectrophotometry, Indroduction, Instrumentation	Catherine K. Markopoulou
2	a) Study of Benzene UV spectra with changes in the monochromator slit width. b) Study of UV spectra of acetylsalicylic acid, phenol, naphthalene, naphazoline ,etc	Catherine K. Markopoulou
3	Changes in UV absorption spectra due to methyl substitution on the aromatic ring of xylene, use of UVPC software	Catherine K. Markopoulou
4	Application of (Standard addition method) to perphenazine, amitriptyline, cyproterone acetate using the UVPC software	Catherine K. Markopoulou

ENGLISH LANGUAGE C

Code number: NP-16
Cycle: undergraduate
Semester: 3rd
Course type

X	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 0,5
Lectures (hours/week): 2

Course coordinator: Kontouli Kleopatra
Tutor (s): Kontouli Kleopatra
Aims of the course: Development of writing skills, further improvement of reading skills and enrichment of vocabulary.

Skills: Providing side-titles for the paragraphs and paraphrasing.

Teaching methods: Interactive teaching

Contents of the course:

A. Pre-reading activities

Questions to predict the content of the text and activate existing knowledge.

B. Activities following skimming or scanning

General questions, questions for locating specific information, filling

diagrams with the main titles of the text, checking the answers of the prereading questions.

C. Detailed-reading questions

True-False questions, matching side-titles with paragraphs, filling tables

and diagrams.

D. Vocabulary learning activities

Guessing the meaning of unknown words from context, blank filling, matching terms with definitions, understanding the meaning of prefixes and

unknown words, synonyms, antonyms, providing guided definitions of terms,

Proposed literature:

Ziaka, I. 2010. *English for Pharmaceutical Studies*, vol. II . Thessaloniki: University Studio Press.

Educational activities: Attendance of lectures

Evaluation process and methods: One final exam at the end of the semester

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Power point presentations with interactive activities. Supplementary teaching material is hosted on the Blackboard Platform e-courses, with open access.

Teaching:

A) **Lectures**.

Lecture	**Title**	**Tutor**
1	Advanced Drug Design and development - Introduction	Kontouli Kleopatra
2	Routes of drug administration – Oral route	Kontouli Kleopatra
3	Rectal route - Parenteral route	Kontouli Kleopatra
4	Respiratory route	Kontouli Kleopatra
5	Microorganisms-Viruses	Kontouli Kleopatra
6	Influence of excipients- Diluents-Surfactants	Kontouli Kleopatra
7	Lubricants-Disintegrants- Viscosity-enhancing agents	Kontouli Kleopatra
8	Vaccines	Kontouli Kleopatra
9	Fever and Hyperthermia	Kontouli Kleopatra
10	Antihistamines – Adverse Effects- Treatment	Kontouli

		Kleopatra
11	Antihistamines – Precautions- Interactions-Uses	Kontouli Kleopatra
12	DNA – Introduction	Kontouli Kleopatra
13	Genes - Chromosomes	Kontouli Kleopatra

ANATOMY

Code number:29
Cycle: Undergraduate, elective
Semester: 3rd semester
Course type

X	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 2
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator: Natsis Konstantinos, Professor
e-mail:natsis@auth.gr tel: 2310-999681
Tutor (s):

Natsis Konstantinos, Professor

Apostolodis Stylianos, Associate Professor

Paraskevas George, Associate Professor

Anastasopoulos Nikolaos, Assistant Professor

Asouhidou Irene, Assistant Professor

Lazaridis Nikolaos, Lecturer

Totlis Trifon, Lecturer

Assisting personnel: -

Aim of the course: to provide medical students with the fundamental knowledge of Anatomy especially those related with structural parts of the human body which have high importance in the clinical setting. Main aim of the subject is to provide information regarding pharmacokinetic and pharmacodymamic charactiristics of medicines related with the various human body organ systems so that an integrated knowledge will ensue between these and the basics of Anatomy

Skills: Familiarity with principal knowledge of human body Anatomy.

Teaching methods:

Lectures and laboratory practice.

Contents of the subject: Introduction to Anatomy, Osteology I, Osteology II, Arthrology, Muscular system I, Muscular system II, Respiratory system – endocrine glands, Alimentary system, Urinary system – genital system, Vascular system I, Vascular system II, Central nervous system, Peripheral and autonomic nervous system.

Proposed literature:

Human Anatomy. G Paraskevas University Studio Press, 2008

Descriptive anatomical manual, Platzer, Fritsch, Kuhnel, Kahle, Frotscher, Broken Hill Publishers , Athens 2011.

Learning activities:

Lecture attendance and participation in dissection sessions.

Evaluation methods and process:

Written exercises at the end of the semester. The written test is consisted of 5 questions, related with organ systems, having equal qualitative and difficulty value. Every question takes 2 points. The test time is **1.5 hour.**

Computer use in teaching / Electronic availability of the subject:

Lectures are computer based, with Power point presentations and videos. The teaching schedule, grades and various announcements are posted on a designated noticeboard of the Anatomy Laboratory.

Teaching (lectures/laboratories/classroom hours)

Teaching is provided with lectures and laboratory sessions.

a) Lectures. Lectures are weekly and last 2 hours, taking place in the Osteology classroom of the laboratory of Anatomy and are computer based.

Lecture	subject	Lecturer (-s)
1	Introduction to Anatomy	Natsis Konstantinos
2	Osteology I	Totlis Trifon
3	Osteology II	Totlis Trifon
4	Arthrology	Asouhidou Irene
5	Muscular System I	Anastasopoulos Nikolaos
6	Muscular System II	Anastasopoulos Nikolaos
7	Respiratory System	Asouhidou Irene
8	Alimentary System – Endocrine Glands	Apostolidis Stylianos
9	Urinary System – Genital System	Natsis Konstantinos
10	Vascular System I	Paraskevas George
11	Vascular System II	Paraskevas George
12	Central Nervous System – Sensory Organs	Lazaridis Nikolaos
13	Peripheral and Autonomic Nervous System	Lazaridis Nikolaos

Molecular Biology

Code: 84
Cycle/Level: 1st cycle / Undergraduate, elective
Semester: 3rd
Type of Course

X	Background
	Scientific Area (Pharmacy)

ECTS: 2
Lectures (hours): 2
Tutorials (hours):
Laboratory Work (hours): 2

Course Coordinator: Panagiotidis Christos, Professor

Faculty Instructors

Panagiotidis Christos, Professor http://users.auth.gr/pchristo/

Office 315, 3rd floor Biology/Pharmacy building
Office hours: weekdays 11-12 am
Contact: by email at pchristo@pharm.auth.gr

Pampalakis George, Assistant Professor

Office 306A, 3rd floor Biology/Pharmacy building
Office hours: weekdays 11-12 am
Contact: by email at gpampalakis@pharm.auth.gr

Teaching Assistants: -

Learning Outcomes:

- To enhance the student background of Molecular Biology of the cell.
- To promote the understanding of the complex inter-related and inter-regulated interactions between the various molecular processes of the cell, which are necessary for cell survival and function.

- To explain how the interactions between various biomolecules (e.g. protein- protein or protein-nucleic acid interactions) contribute to the regulation of cellular processes and to the biology of the whole cell.
- To provide knowledge on the molecular mechanisms involved in regulating the various cellular responses to environmental signals.
- To offer the students with hands-on expertise on some of the methodologies often used in the study of the molecular biology of the cell (through laboratory training).

The above targets are achieved through a combination of lectures and laboratory training that represent different and complementary forms of training. The lectures are the major means of knowledge transfer but their major disadvantage is the relatively small audience participation (it should not escape our attention the fact that lecture attendance is not compulsory). On the other side, the compulsory laboratory training helps the students understand the methods used in the analysis of the cellular and molecular processes, as well as of the practical problems that arise during these processes.

General Competences: After the successful completion of the Molecular Biology course the students should be able to:

- Describe the major points of DNA structure and replication.
- Describe the key aspects of chromosomal organization, recombination and repair.
- Describe the transcription process and the mechanisms involved in its regulation, as well as the post-transcriptional gene regulation processes. Furthermore, they should be able to describe the mechanisms involved in translational regulation both in prokaryotes and eukaryotes.
- Describe important issues of protein biochemistry, including the processes of protein folding, targeting and transport to the various subcellular compartments.
- Describe major aspects of the cellular signaling processes, both in prokaryotes and
eukaryotes, including the roles of tyrosine kinases, G-proteins, membrane and
nuclear receptors and bacterial two-component signal transduction systems.
- Describe the molecular mechanisms leading to the regulation of cell proliferation
and programmed cell death.

Teaching methods: Course lectures and laboratory exercises.

Course Content: Inheritance, genes and DNA. Inheritance and genes. Genes and enzymes. The elucidation of DNA as the genetic material.

Structure and organization of the genomes. Genomes of plant cells and of subcellular organelles (mitochondria, plastids). DNA replication. Expression of the genetic information. Relationship between genes and proteins. The role of messenger RNA. The genetic code. RNA viruses and reverse transcription. Transcription, RNA polymerase and transcription factors. Regulation of gene expression at the transcriptional, [post –transcriptional level, as well as at the level of translation. Protein transport into subcellular compartments and its regulation. Signal transduction. Hormones and other molecules involved in signal transduction. Functions of membrane and intracellular receptors. Mechanisms of intracellular signal transduction. Signal transduction and cytoskeleton. Introduction to the recombinant DNA. Restriction enzymes. Cloning vectors. Expression of cloned genes. Principles of DNA sequencing. DNA amplification with the polymerase chain reaction. Functional analysis of genes. Genetic analysis using yeast cells. Site-directed mutagenesis and introduction of mutations in cellular genes.

Proposed literature:

1. Alberts B., Bray D., Hopkin K., Johnson A., Lewis J., Raff M., Roberts K., Walter P. "Essential Cell Biology", 3rd edition, 2015 (Greek translation, Publisher: Broken Hill Publishers Ltd.).
2. Watson, J. D., Myers, R.M., Caudy, A.A., Witkowski, J.A. "RECOMBINANT DNA" Edition: 3/2007, Publisher: Akadimaikes Ekdoseis I. Basdra & Co.

Educational activities: Attendance of course lectures and laboratory exercises.

Evaluation process and methods:

Written final exams at the end of the spring semester or in the autumn examination period. The exact dates and places are organized by the School of Pharmacy.
The students are provided with 20 statements and they are asked to define whether the question is correct or wrong (0.1 points per correct answer, -0.1 points per mistaken answer) and to justify their answer (0.4 points per question). All questions are equivalent (0.5 points). Questions that have not been answered correctly by any students are withdrawn and final grade is calculated based on the grades from the remaining questions. The examination time is 1 hour.

Use of ICT (Information and communication technologies) / Electtronic distribution of the course materials:

ICT is being in the lectures of the course (Powerpoint presentations, interactive tutorials using ICT, videos etc.).

Lecture material, as well as course and exam announcements, exam results etc. are posted on the webpages of the course coordinator (Prof. Christos Panagiotidis, http://users.auth.gr/pchristo/, as well as in the webpage of Assistant Professor G. Pampalakis, http://users.auth.gr/gpampalakis).

Teaching:

Teaching takes place with course lectures and experimental lab work.

A) Lectures. The lectures (2 hours each) take place once a week in Lecture Hall Δ12 of the School of the Exact Sciences. The lectures, together with related educational material, are freely accessed in the webpages of the two course instructors

Lectures	Title	Instructor
1-3	Introduction to DNA technologies	C. Panagiotidis G. Pampalakis
4	Mutations and genetic diversity in bacteria	G. Pampalakis
5-6	Introduction to transcription and prokaryotic transcription	C. Panagiotidis
7-8	Eukaryotic transcription	C. Panagiotidis
9-10	RNA processing, introns/exons, post-translational regulation and microRNAs	C. Panagiotidis
11-13	Cell signalling	C. Panagiotidis

B) Laboratory exercises

Laboratory exercise	Title	Instructor
1	• *Escherichia coli* cultures • Experimentatl determination of bacterial numbers	Panagiotidis Pampalakis

	• Transformation of plasmid DNA into *Escherichia coli*	
2	• Observation and recording of the results of Laboratory Exercise 1 • Identification of the antibiotic resistance of the transformed *E. coli* • *E. coli* colony recovery and initiation of bacterial cultures	Panagiotidis Pampalakis
3	• Recovery of the *E. coli* cells from liquid cultures using centrifugation • *E. coli* cell lysis by lysozyme treatment • Plasmid DNA recovery and ethanol precipitation.	Panagiotidis Pampalakis
4	• Recovery of the *plasmid* DNA pellet using centrifugation • Dissolution of plasmid DNA in appropriate buffer • Digestion of plasmid DNA with restriction enzymes	Panagiotidis Pampalakis
5	• Electrophoretic separation of DNA restriction fragments by horizontal electrophoresis in agarose gels • Determination of DNA restriction fragment size • Visualization of DNA fragments under ultraviolet light and documentation of the results	Panagiotidis Pampalakis
6	• Introduction to the polymerase chain reaction (PCR) • PCR reactions to identify the presence of bacterial DNA in biological samples	Panagiotidis Pampalakis
7	• Agarose gel preparation for electrophoretic separation of PCR products • Electrophoretic analysis and characterization of PCR products • Visualization of PCR-amplified DNA fragments under ultraviolet light following gel electrophoresis and documentation of the results	Panagiotidis Pampalakis
8	• Evaluation and discussion of the results of the laboratory exercises	Panagiotidis Pampalakis
9	• Student preparation of lab reports	Panagiotidis Pampalakis

SEMESTER IV

PHYSIOLOGY II & HUMAN PATHOPHYSIOLOGY

Code number:NP31
Cycle: Undergraduate
Semester: 4th
Course type

x	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 3
Tutorial (hours/week):
Laboratory work (hours/week): 2
Course coordinator: Almpani M.
malmpani@auth.gr. + T: 2310999326.

Tutor (s):
1) Almpani M. (Professor)
2) Koutsonikolas D. (Associate Professor)
3) Kritis A. (Associate Professor)
4) Spandou E. (Associate Professor)
5) Symeonidou K. (Associate Professor)
6) Kapoukranidou D. (Associate Professor)
7) E. Kosmidi (Assistant professor)
8) Chatzisotiriou A. (Assistant professor)

Assisting personnel:

Aims of the course: Knowledge of the physiological function of the nervous, digestive and endocrine system of the human body.

Skills: Theoretical lesson: learning the operation of the systems of the human body. Laboratory exercises: the familiarization of students in methodology on issues contained in the material of the theoretical lesson.

Teaching methods: Lesson from the amphitheatre: the total of operating mechanisms of these systems in conjunction with basic anatomical concepts associated with the above functions. Laboratory exercises: their content refers to basic sections of the above-mentioned systems. Use of video projection and simulation programs to PCs. more detailed analysis on the targets of the course reported on the websites:

http://www.experimentalphysiology.gr and **http://physiology.med.auth.gr.** At the end of the exercises carried out examinations on development issues.

Contents of the course: Organization and functions of the nervous system. Aesthetic physiology.Active body system. Gastrointestinal tube. Movemement through the gastrointestinal tract. Gastrointestinal secretions. Hepatic-bileduct function, digestion and absorption. General principles of Endocrinology and hormones of the pituitary glands and the hypothalamous. Thyroid hormones. Hormones of the adrenal glands. Pancreas as endocrine portion. Hormones that regulate calcium. Hormones of the reproductive system.

BIOCHEMISTRY II

Code number: 31
Cycle: Undergraduate
Semester: 4th
Course type

x	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 3,5
Lectures (hours/week): 3
Tutorial (hours/week):
Laboratory work (hours/week):
Course coordinator: Anastasia Pantazaki, associate professor
Tutor (s):
1) Thomas Giannakouros, Associate Professor
Office 501, Chemical building 4th floor

Cooperation with students: daily 11-12 a.m.

Contact: by email (giannako@chem.auth.gr)

2)Anastasia Pantazaki, Associate Professor (Coordinator)

Office 511, 4th floor building Chemical

Cooperation with students: daily 11-12 a.m.

Contact: by email (natasa@chem.auth.gr)

3) Eleni Nikolakaki Associate Professor

Assisting personnel:

Aims of the course: The understanding on the part of students of biological macromolecules and mechanisms of biosynthesis and catabolism. Useful examples for students of pharmacy are given: such as biochemical basis of various diseases and the impact of specific medicines in biochemical and bio-molecules.

Skills: Familiarity with basic concepts of biochemistry.

Teaching methods: Lectures in class

Contents of the course: Carbohydrate metabolism (organic chemistry important carbohydrates, dietary carbohydrate utilization, glycolysis, alcoholic fermentation, phosphoric pentose pathway hydrolytic and phosphorolytic glyconeogenesis polysaccharides degradation, photosynthesis, biosynthesis di-and polysaccharides) – metabolism of lipids (lipids, organic chemistry major dietary lipids utilization, b, a and z-oxidations, fatty acids, triglycerides biosynthesis, phosphoglycerides, sfigolipids, isoprenoeids and ketobodies lipids) – Biosynthesis and degradation acids, Nucleic purines and pyrimidines. Metabolism and biosynthesis of amino acids – Organic nitrogen urea Cycle. Metabolic role of nucleic acids,Biosynthesis of proteins – metabolism of inorganic compounds (water-permeable, active permeability,Acid-basic balance – dietary requirements in minerals) – Vitamins (liposoluble vitamins, biochemistry optical excitation, blood coagulation, water-soluble vitamins and their role as co-enzymes) – Hormones the role of cyclic AMP receptors, amino acid derivatives, hormones, hormones, steroid prostagladines herbal hormones).

Proposed literature:

1. Introduction to Biochemistry: J.C. Gewrgatsos (versions: Giachoudi) 6th Edition, Thessaloniki, 2005).
2. Biochemistry, volume II, Biochemistry, volume 2: Berg Tymoczko L.J., M.J., Stryer l. (A. Aletras, I.D. Balkana Drainas, H. Kouvelas, G.K. Papadopoulos, M. Franc-Lazaridi versions Uc), 2005.
3. 3. Basic Biochemistry: K.A. Dimopoulos, A.. Andonopoulou-Wilson (versions: co-edition with P. Antonopoulou-Wilson-Provider-Publisher KONSTANTINOS A. DEMOPOULOS) 2nd adopted, Athens 2009.

Lecture	Title	Tutor

1	Basic concepts of metabolism	All tutors
2	structure and characterization of polysaccharides	All tutors
3-4	Glycolytic pathway and carbohydrates catabolismos	All tutors
5	Phosphoric pentose pathway glyconeogenesis	All tutors
6	Photosynthesis – Light reactions	All tutors
7-8	Dark reactions of Photosynthesis-Calvin cycle	All tutors
9	Biosynthesis glycogen stores and energy efficiency of sugars.	All tutors
10	Lipid Structure-structure of cell membranes	All tutors
11-12	Catabolism of lipids, Metabolism of neutral fats, fatty acids, phosphoglycerides	All tutors
13-14	Triglycerides Biosynthesis of fatty acids, Phosphoglycerides, isoprenoeids, ketobodies. Energy efficiency	All tutors
15-16	Amino acid Metabolism-urea cycle	All tutors
17	Convertion of ammonia into organic nitrogen, biosynthesis of amino acids.	All tutors
18	Biologically important derivatives of amino acids	All tutors
19	Biosynthesis porphrines, catabolism of protein, energy efficiency	All tutors
20-21	Primary and Secondary nucleic acids structure. Viruses, plasmids, catalytic RNA	All tutors

	(ribosomes)	
22	Nucleic acid Biosynthesis. DNA Synthesis	All tutors
23	Correction of DNA (mechanisms, enzymes)	All tutors
24-25	Biosynthesis of RNA. Basic principles of mechanism, enzymes and transcription.	All tutors
26	Catabolism of purines-pyrimidines	All tutors
27	mRNA Maturation of molecules in eukaryotes	All tutors
28	genetic code	All tutors
29	protein Mechanism composition	All tutors
30-31	Regulation of proteïn composition, homeopolic regulations, peptides marks, proteolytic maturation of insulin.	All tutors
32	Senior Assembly configurations of proteins, proteïnes escorts, finding of intracellular proteins	All tutors
33-34	Enzymes of recombinant DNA technology, construction of plasmid with foreign genetic material, recombination, process, construction of cDNA cloning, DNA polymerase chained reaction	All tutors
35-36	Water Channels-Hydropores-ion channels-ion-Pumps-ion transporters Ionic carriers	All tutors
37	Acid-basic balance of man	All tutors
38	Molecular basis of optical excitation ofvitamin A	All tutors
39	Second messages-Hormones, cytokines-Interferones	All tutors

Educational activities: Monitoring of lectures.

Evaluation process and methods: Written mid-term progress assessment (s) or written examination at the end of the semester

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

The lectures of the course made using slides. Announcements, rankings, etc. posted on the Bulletin Board of the laboratory of biochemistry.

Teaching: The teaching of the course are lectures.

A) **Lectures**.

The lectures (1 hour) takes place three times a week

Pharmaceutical Analysis II

Code number:33
Cycle: Under graduate
Semester: 4
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 7
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator: Markopoulou Catherine, assistant professor,
Catherine K. Markopoulou Office 2nd floor, Pharmacy/Biology building ,
Coopreration with the students Wednesday and Thursday 11:00 a.m.-1:00 p.m. e-mail: amarkopo@pharm.auth.gr/ office telephone 2310 99 76 65/laboratory telephone 2310 99 76 67

Aims of the course: The module enables students not only to identify medicines but also to quantify them in their pure form in pharmaceutical formulations and in biological liquids through various techniques such as **mass spectrometry** and chromatography (**thin layer, paper, open column chromatography, gas chromatography and high-performance liquid chromatography**).
This kind of knowledge is considered fundamental and essential for the possible future professional employment of a pharmacy graduate in a Pharmaceutical Analysis Laboratory.

Skills: To become acquainted with basic concepts of Pharmaceutical Analysis.

Teaching methods: Lectures and laboratory practice. The laboratory practice has been enriched so that students can be acquainted with and become more specialized in understanding the specta of different medicines˙ hence with the additional use of computers to make possible the supervised self-study, which is very useful for the training of the students.
Contents of the course: Infrared Absorption Spectrophotometry,Near-infrared analysis and Raman spectroscopy. Principle of the methods, recording techniques of infrared spectrums, the use of infrared in the qualitative control of the pharmaceutical active substances, clarification of a drug substance, quantification through base-line technique.
Chromatogaphy: principle, classification of chromatographic methods, applications in Pharmacetical Analysis, materials that are used as stationary phase in various chromatographic methods. Chromatography isotherms, open -column chromatography,
flat chromatographic methods: paper chromatography, thin layer chromatography. Gas chromatography (GSC, GLC), liquid chromatography (normal and reverse phase). Comparison of chromatographic methods, chromatographic parameters (development), chromatographic systems for HLPC applications. Selection of chromatographic system, preparation and de-gasing of the mobile phase, conservation of the column. Quality evaluation of chromatograms. Development of chromatographic system and improvement of its quality. Applications of chromatographic methods for the determination of active substances in formulations (active ingredients and impurities) and in biological liquids (active compounds and metabolites). Construction of calibration graphs and use of internal standard .
Mass photometry: Basic principle of the method.
Ionisation techniques:electron impact,positive ion chemical ionisation, and negative ion chemical ionisation. Mass spectra obtained under electron impact ionisation conditions: homolitic and heterolitic α-cleavage. Cleavage with proton transfer. Fragmentation of ring structures. McLafferty rearrangement. Metastable peaks. Instrumentation: Magnetic sector instruments and Quantropole instruments Characteristics of the molecular

ion. Study of splitting mechanisms of various groups of medicines (examples of 2-imidazolines and benzodiazepines). Gas chromatography-mass spectrometry and high performance liquid chromatography-mass spectrometry. Application on different groups of drugs. Examples from European Pharmacopoeia.

Proposed literature:

Educational activities: Attendance of the lectures and the laboratories, handing in of the laboratory notebook.
Evaluation process and methods: Once the laboratory course is successfully completed with a pass mark(passing grate) and the laboratory notebook is handed in corrected, each student with his/her team should hand in a project on an earlier assigned topic (the project is prepared individually with the responsibility of the student) -the project should be corrected-. At the end of the academic year, students have to undergo oral exams. After having completed the above mentioned obligations, students can participate in the written examinations of the pharmaceutical analysis modules. Cooperativeness, initiative and interpersonal relationship with the instructor plays an important role in the student assessment.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures: The laboratory has been enriched with electronic educational material, that is, special software in CD-ROM format which contains the spectra of the medicines as well as their solid chemical structure in space (bonds length, ring arrangement, various bonds angles) so that the relation of the medicine structure with the relevant spectrum to be obvious. Moreover, a large part of the laboratory practice is done by the students with the application of a special UVPC programme.
The lectures of the modules are enriched by multimedia use (power point presentations, videos etc).

Teaching: The course is taught both through lectures and laboratory practice.

A) Lectures. The lectures, which last for two hours, take place twice a week in Classroom D12 and multimedia is used to present the topics to be dealt with.

Lecture	Title	Tutor
1	Chromatography (Introduction, Classification)	Catherine K. Markopoulou

2	Chromatography (Chromatographic parameters)	Catherine K. Markopoulou
3	Chromatography (development of chromato-graphic techniques)	Catherine K. Markopoulou
4	Chromatography (development of chromato-graphic techniques)	Catherine K. Markopoulou
5	High Performance Liquid Chromatography/ properties of analytes	
6	High Performance Liquid Chromatography/ properties of analytes	Catherine K. Markopoulou
7	Chromatography (Mobile/stationary phase, Solvents)	Catherine K. Markopoulou
8	Chromatography (Gas Chromatography)	Catherine K. Markopoulou
9	Chromatography (Gas Chromatography)	Catherine K. Markopoulou
10	Mass Spectrometry	Catherine K. Markopoulou
11	Mass Spectrometry	Catherine K. Markopoulou
12	Mass Spectrometry	Catherine K. Markopoulou
13	Mass Spectrometry	Catherine K. Markopoulou

B) **Laboratory work**

Lab	**Title**	**Tutor**
1	Determination (using the calibration curve) of furosemide in pharmaceutical formulations (tablets). Study with UV Spectrophotometry	Catherine K. Markopoulou

	(Part A)	
2	Determination (using the calibration curve) of furosemide in pharmaceutical formulations (tablets). Study with UV Spectrophotometry (Part B)	Catherine K. Markopoulou
3	Study of UV spectrum of bromhexine hydrochloride and its calibration curve. Dilution factors, calculations. Overall Recovery	Catherine K. Markopoulou
4	Study UV spectrum of Ifeprodil. Standard addition method. UV spectrum derivative techniques	Catherine K. Markopoulou

PHARMACEUTICAL CHEMISTRY (ORGANOMETALLIC COMPOUNDS AND HORMONES)

Code number: 34
Cycle: Undergraduate
Semester: 4th semester

Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 7
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator:
Dimitra Hadjipavlou-Litina, Professor

Tutor (s):

Dimitra Hadjipavlou-Litina, professor
Room 408B, 4th floor Biology/Pharmacy building.
Collaboration with students: Every day.
Communication: email (hadjipav@pharm.auth.gr)

Dionysia Papagiannopoulou, assistant professor
Room 423a, 4th floor Biology/Pharmacy building.
Collaboration with students: Every day.
Communication: 2310-998680, email (papagd@pharm.auth.gr)

Eleni Pontiki, assistant professor
Room 410, 4th floor Biology/Pharmacy building.
Collaboration with students: Every day.
Communication: 2310-997672 email (epontiki@pharm.auth.gr)

Assisting personnel: One technician (the same person for all the students and all laboratory work in pharmaceutical chemistry, i.e. about 300 students per semester).

Aims of the course:

This course is addressed to 4th semester pharmacy students and it aims at a basic level of knowledge on the synthetic methods and characterization of hormones as well as metallic complexes with application in therapy or diagnosis. At a second level it covers the structure-activity relationship of hormones and influence of their absence on the organism as well as chemical interactions between metals and biomolecules. Futhermore, it focuses on the chemistry, drug design and mechanism of action of hormones and complexes.

Skills:

By the end of this course, the students should be able to:
Relate structural features to biologic activity
Comprehend the interactions of metals with biomolecules
Synthesize and characterize hormones and the structure of complexes

Teaching methods: Lectures and laboratory work. The material is covered by a textbook and laboratory notes.

Contents of the course:

Introduction to hormones. Classification of hormones and their studies from chemical, biological and therapeutical points of view. Design, synthesis, qualitative and quantitative evaluation of hormones, structure-activity relationships. Antagonist of hormones. Metabolism and mechanism of action. Role in the organism . Hormones as contraceptives. Insulin, calcitonin, hormones of hypophysis and hypothalamus.

Introduction to metal complexes: Chemical formulas, nomenclature, stereochemistry, synthesis of complexes. Importance of metals in living organisms.: trace elements, essential, non-essential. Metal complexes in biological systems, complexation with amino acids, with prosthetic groups. Introduction to the physiological function of metals in living organisms (charge carriers, strorage, molecule carriers, electron carriers, detoxification, enzymatic catalysis). *Chelation therapy*. Abnormalities in calcium metabolism-osteoporosis: diphosphonates (sodium alendronate): design, synthesis, drug action. Heavy metal intoxication: principles for the design of chelating agents. Chemistry and mechanism of toxicity of heavy metals: arsenic, lead, mercury. Copper metabolism (Wilson desease). Chelating agents as antidotes (synthesis, drug action, distribution-pharmacokinetics): desferral, 2,3-dimercaprol, dimercaptosuccimic acid, D-penicillamine, disodium-EDTA, calcium, disodium-EDTA, trientine. *Application of metallic complexes in therapy*. Anticancer platinum complexes (design-synthesis, drug avction, metabolism): cis-diammine-dichloro-platinum, carboplatin. Antirheumatic gold compounds (synthesis, biotransformation-metabolism, drug action) first and second generation gold compounds. *Application of complexes in diagnosis-imaging agents*. Principles of design of complexes for diagnosis. Properties of radioisotopes (^{99m}Tc) for application in radioimaging (scintigraphy). Imaging modalities. Properties of metal complexes for use in magnetic resonance imaging (MRI). Gadolinium compounds.

Proposed literature:

1. Notes supporting material available at the website user.auth.gr/hadjipav/

2. E. Chiotellis, D. Papagiannopoulou "Chapters of bioinorganic pharmaceutical chemistry" 5th Ed. 2015 (in Greek). (Available via the website user.auth.gr/papagd/Organometallika)
3. Laboratory Experiments (Available via Blackboard and the website user.auth.gr/papagd/Organometallika)

Educational activities: Lectures, discussion with the students in every lecture, problem solving and practical work in the laboratory.

Evaluation process and methods: Examination of the course can be done either by successful participation in two written mid-term exams (grade ≥5 in each mid-term exam) of by a final written examination at the end of the semester. Student eligibility to participate in the mid-term exams is gained by regular attendance of the lectures throughout the semester**.** The evaluation process is based on questions that the students are asked to answer based on their knowledge obtained from the lectures as well as on the critical thinking and ability to combine, evaluate and handle the acquired knowledge and information.
The duration of the examination is 3 hours.
The examination at the end of the semester is performed at dates, time and place arranged by the department.
During the laboratory work, students hand over a report of their results and are evaluated. At the end of the laboratory work, there is a written examination on this. Successful termination of the laboratory course permits their participation to the final examination.
At the examination of the course, each tutor gives out separate exam forms of equal grade.

Final grade is calculated by addition of the course exam grade (80%) and the lab exam grade (20%).

Use of ΤΠΕ / Electronic distribution of the lectures
Powerpoint presentation is used in the lectures.

The courses of D. Hadjipavlou-Litina in the form of ppt are located at the website user.auth.gr/hadjipav/

Teaching: Teaching of this course is accomplished through lectures and laboratory work.

A) **Lectures**. Lectures (26 of 1 hour each) are given in the lecture room Δ12 (this is a room of limited capacity, located in a different building).

Lecture	Title	Tutor
1	Introduction to hormones.	D. Hadjipavlou-Litina
2	Thyroid hormones	E. Pontiki
3	Thyreoglobulin	E. Pontiki
4	Parathyroid glands: their hormones	E. Pontiki
5	Hypophysis: its hormones	E. Pontiki
6	Hypothalamos: its hormones	D. Hadjipavlou-Litina
7-12	Steroid hormones	D. Hadjipavlou-Litina
13	Insoulin	D. Hadjipavlou-Litina
14	Introduction to metal complexes	D. Papagiannopoulou

15-16	Coordination of metals with biomolecules-Metalloenzymes	D. Papagiannopoulou
17-18	Metals and mechanism of toxicity	D. Papagiannopoulou
19-20	Chelation therapy for heavy metal poisoning (Synthesis-drug action)	D. Papagiannopoulou
21	Osteroporosis and diphosphonates (Design-synthesis and mechanism of drug action)	D. Papagiannopoulou
22-23	Anticancer platinum complexes (Design-synthesis and mechanism of drug action)	D. Papagiannopoulou
24	Antirrheumatic gold complexes (Synthesis-mechanism of drug action-Biotransformation products)-Sodium Nitroprusside (synthesis-mechanism of action-metabolism)	D. Papagiannopoulou
25	Coordination compounds as imaging agents – Radiodiagnostics and Scintigraphy (Properties of radionuclides-Imaging devices	D. Papagiannopoulou
26	Contrast agents in magnetic resonance imaging (General properties-Gadolinium compounds)	D. Papagiannopoulou

B) Laboratory work

Students must do laboratory work.

ATTENTION! The students have to register for the lab at the dates indicated following an announcement, before the beginning of the semester at the Laboratory of Pharmaceutical Chemistry. The announcement is posted at the announcement board of the Laboratory of Pharmaceutical Chemistry (4th fl).

Laboratory	Title	Tutor
1	Synthesis of $CuCl_2DMSO_2$ complex	D. Papagiannopoulou/ E. Pontiki
2	Crystallization of $CuCl_2DMSO_2$ complex	-//-
3	Synthesis of copper-penicillamine complex	-//-
4	Crystallization of copper-penicillamine complex	-//-
5	Infrared spectroscopy of $CuCl_2DMSO_2$ complex	-//-
6	Infrared spectroscopy of copper-penicillamine complex	-//-
7	Preparation of standard solutions of copper sulfate	-//-
8	Measurement of standard solutions of copper sulfate in	-//-

	UV-Vis spectrophotometer	
9	Preparation of standard curve and measurement of unknown solution	-//-
10	Preparation of solutions of Nickel chloride-EDTA	-//-
11	Measurement of Ni-EDTA solution in UV-Vis spectrophotometer	-//-
12	Determination of stoichiometry of reaction	-//-
13	Laboratory Test	**-//-**

GENERAL PHARMACEUTICAL TECHNOLOGY

Code number: 46
Cycle: Undergraduate
Semester: 4th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 6
Lectures (hours/week): 3
Tutorial (hours/week):
Laboratory work (hours/week): 2
Course coordinator: Ioannis Nikolakakis Associate. Professor
Tutor (s): Ioannis Nikolakakis, Associate. Professor
Kyriakos Kachrimanis, Associate. Professor
Assisting personnel: Chrysanthi Mpermperidou (IDOX)
Aims of the course: Basic knowledge of the design and operation of pharmaceutical units and of the steps of development of dosage forms through to the final product and submission to the Health authorities for Production licence and marketing.
The concept and the importance of particle size and particle shape in drug formulation. Understanding of the mechanism of basic pharmaceutical operations including crystallization, size reduction with dry and wet

milling,nanoparticles production with stabilizators,nanomilling, mixing, separation processes, filtration, drying and freeze-drying and supercritical fluids, its importance in drug formulation and practical application on a laboratory scale. The teaching with lecture presentation is enhanced with practical classes using drugs and excipients of pharmaceutical specifications.

Skills: Familiarisation with basic pharmaceutical processes and application of the knowledge to solve formulation problems on a laboratory scale.

Teaching methods: Power point lecture presentations, demonstrations and practical classes

Contents of the course: The design and operation of pharmaceutical industry. Development of pharmaceutical dosage forms. Production licence. Basic pharmaceutical operations. Size reduction – Mechanism, material properties, energy considerations, specific cases. Methods and milling equipment. Size distribution of the productand changes during milling. Mechanical separation of particles. Methods, assessment of efficiency. Separation from air with sieving, aerodynamic classification, sedimentation, elutriation. Filtration and factors that affect the filtration rate, mechanisms and filtration means. Mixing of powdered materials – Mechanism of random mixing and interactive mixing. Sampling techniques, size and mixing indices. Factors affecting the mixing process. Types, characteristics and operation of mixers. Drying- Definitions. Measurement of relative humidity. Theory of drying, movement of liquid during drying, mechanism of heat transfer, drying periods, equilibrium moisture and influence of material. Dryers. Freeze drying – Principles of freeze-drying and applications in Pharmacy.

The practical classes involve the processes of Particle size analysis by sieving and air permeability, size reduction, mixing and drying. Computers and appropriate software are used for data processing.

Proposed literature:

- I. Nikolakakis Lecture notes on Pharmaceutical Unit Operations (2010). They are aupdated every year and are made available in the internet through the Blackboard.
- T. Allen. Particle Size Measurement, 3rd edition Chapman and Hall, 1981

Aulton M.E. (editor) Pharmaceutics The Science of Dosage Form Design Churchill Livingstone 2nd edition, 2002.

Educational activities: Lectures and practical classes. The main goals of the subject are to understand the concept of particle size and its measurement. The understanding of basic processes applied in the production of medicines. The purpose of laboratory classed is to familiarise the students with the above processes.

Evaluation process and methods: Sitting 3h examination at the end of Semester. Evaluation is based on the student response in writing on 5-6 topics plus 1-2 questions/problems from laboratory work. Results are disclosed and shown on notice board of The Department within 1-2 weeks from the examination. Before sitting the exam the student completes a written detailed report on the work conducted in the practical classes

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

The lectures and tuition presentations are delivered using Powerpoint, video presentations etc.)

Teaching:

A) **Lectures**.

They are 3h presentations once a week in Room D12 of Physics Dept and delivered via electronic means. Teaching material including overhead projections and PowerPoint slides, lecture notes (150 pages) and Laboratory Class manual are available to the students via the Blackboard program operated by the University Library.

Lecture	**Title**	**Tutor**
1	Pharmaceutical industry	I. Nikolakakis
2	Particle size analysis, particle diameters and shape	I. Nikolakakis
3	Size distributions and particle size analysis methods	I. Nikolakakis
4	Size reduction – possible influence of crystallinity and fracture mechanism	I. Nikolakakis
5	Size reduction – description and operation of mills	I. Nikolakakis
6	Nanoparticles production with nanomilling and stabilizers	K. Kachrimanis
7	Crystalline lattice properties and prediction models for nanoparticle size reduction	K. Kachrimanis

8	Mechanical separation of particles and evaluation of the efficiency of the process – Aerodynamic classifiers, separation in gas and liquid medium. Filtration and factors that affect, mecahanisms and equipment	I. Nikolakakis
9	Powder mixing – Mechanism of random and interactive mixing. Sampling, sample size and mixing indices	I. Nikolakakis
10	Factors affecting the result of mixing process	
11	Drying –Definitions. Measurement of relative humidity. Drying theory, heat transfer, movement of water through the powder during drying, drying periods, moisture content	I. Nikolakakis
12	Dryers – Characteristics and operation	I. Nikolakakis
13	Freeze drying – Characteristics and operation	I. Nikolakakis

B) **Laboratory work**

Laboratory	**Title**	**Tutor**
1	Size reduction and size analysis by analytical sieves and air-permeametry	I.Nikolakakis
2	Powder mixing	X. Mpermperidou
3	Drying of lactose granules	I.Nikolakakis
4	Size analysis by Sedimentation - Andreassen Pipette	X. Mpermperidou

c) **Tutorials**

Tutorial	**Title**	**Tutor**
1	Calculations involved in the laboratory classes. Discussion of the results	I.Nikolakakis

ENGLISH LANGUAGE D

Code number: NP-21
Cycle: undergraduate
Semester: 4th
Course type

X	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 0,5
Lectures (hours/week): 2
Course coordinator: Kontouli Kleopatra
Tutor (s): Kontouli Kleopatra
Aims of the course: Further development of writing skills, improvement of reading skills, enrichment of vocabulary
Skills: Summarising, quoting directly, referring to sources.
Teaching methods: Interactive teaching
Contents of the course:
A. Pre-reading activities
Questions to predict the content of the text and activate existing knowledge.
B. Activities following skimming or scanning
General questions, questions for locating specific information, filling diagrams with the main titles of the text, checking the answers of the pre-reading questions.
C. Detailed-reading questions
True-False questions, matching side-titles with paragraphs, filling tables and diagrams.
D. Vocabulary learning activities
Guessing the meaning of unknown words from context, blank filling, matching terms with definitions, understanding the meaning of prefixes and unknown words, synonyms, antonyms, providing guided definitions of terms.
Proposed literature:
Ziaka, I. 2010. *English for Pharmaceutical Studies*, vol. II . Thessaloniki: University Studio Press.
Educational activities: Attendance of lectures
Evaluation process and methods: One final exam at the end of the semester

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Power point presentations with interactive activities.

Supplementary teaching material is hosted on the Blackboard Platform e-courses, with open access.

Teaching:

A) **Lectures**.

Lecture	**Title**	**Tutor**
1	Adrenocorticoids	Kontouli Kleopatra
2	Topical Glucocorticoids	Kontouli Kleopatra
3	Inhaled and Intranasal Glucocorticoids	Kontouli Kleopatra
4	Pharmaceutical Proteins	Kontouli Kleopatra
5	Characteristics of phytomedicines	Kontouli Kleopatra
6	The human nervous system	Kontouli Kleopatra
7	Peripheral nervous system	Kontouli Kleopatra
8	Autonomic nervous system	Kontouli Kleopatra
9	Chemical anatomy – Cholinergic transmission	Kontouli Kleopatra
10	Adrenergic transmission	Kontouli Kleopatra

11	Mechanisms involved in the induced differentiation of leukemia cells - ARTICLE (I) Abstract – Introduction	Kontouli Kleopatra
12	(II) Conventional cancer chemotherapy: successes, failures and obstacles	Kontouli Kleopatra
13	(III) Induction of differentiation and apoptosis in leukemic cells	Kontouli Kleopatra

Immunobiology - Immunochemistry

Course code number: NP32
Curriculum: Undergraduate
Semester: 4th
Course Type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 2
Lectures (hours/week): 2
Tutorials (hours/week):-
Laboratory work (hours/week): -

Aims of the course: To provide knowledge the higher organisms capacity that through the molecular and cellular elements of the immune system, develop mechanisms recognizing "self" from "non-self" components of the host-organism or the environment and exhibit natural innate or adaptive defense mechanisms leading in their neutralization or their selective tolerance. To familiarize students with the complex host defense mechanisms against external pathogens or infective environmental factors.

Skills: By the end of this course, the students should be able to recognize the molecular and cellular components of immune system in association with knowledge using antibodies or antigens as basic tools in prevention-protection against pathogens, in diagnosis, in research as well as in the development of immunotechnology.

Course coordinator: Sklaviadis Theodoros Prof

Tutors: Sklaviadis Theodoros Prof.
Yiangou Minas Prof.
Xanthopoulos Konstantinos Asst Prof.

Teaching methods: Lectures

Contents of the course:
1. Basic principles, historical aspects and evolution.
2. Organization of immune system and lymphatic system.
3. Host-defense mechanisms, Active (Vaccines) and passive (antisera) immunization.
4. Structure and function of antibodies. Genetic and molecular basis of antibody variation. 5. Immunogens/antigens.
6. Complement
7. Mechanisms of humoral and cellular immunity (molecular and cellular regulation-immunotolerance).
8. Major Histocompatibility complex and Transplantations.
9. Immunobiology of cancer – Autoimmunity.
10. Future and prospective.

Proposed literature:
1. IMMUNOBIOLOGY – Lygeri Hadjipetrou-Kourounakis - UNIVERSITY STUDIO PRESS 1987
2. **IMMUNOLOGY -**RICHARD GOLDSBY, THOMAS KINDT, BARBARA OSBORNE, JANIS KUBY**-**GREEK: ECATERINI GAITANAKI, CONSTANTINOS BAXEVANIS **–** MEDICAL EDITIONS P.C> PASCHALIDIS

Educational activities: Lectures, discussion with the students in every lecture.

Evaluation process and methods: Examination of the course can be done by a final written examination at the end of the semester. The duration of the examination is 3 hours.

Use of TIC / Electronic distribution of the lectures
Powerpoint presentation is used in the lectures and supporting material concerning immunology is located at https://elearning.auth.gr/

Teaching: Teaching of this course is accomplished through lectures (2 hours per week)

Lectures. Lectures are given in the lecture room Δ12 for 13 weeks

Lecture	Title	Tutor
1	Basic principles of immunity, historical aspects and evolution of immunobiology	Minas Yiangou
2	Organization of immunology system – cells and molecules of the immune system	Minas Yiangou
3	Organization of immunology system – tissues and organs of the immune system	Minas Yiangou
4	Host resistance: Innate and adaptive/Cellular and humoral immune response/Active and passive immunization (vaccines-antisera)	Minas Yiangou
5	Molecules involved in immune responses/Immunogens-Antigens Complement & immune responses	Minas Yiangou
6	Molecules involved in immune responses/Antibodies-Monoclonal antibodies (structure-activity-gene expression)	Minas Yiangou
7	Receptors of immune cells – Major Histocompatibility Complex and immune responses	Minas Yiangou
8	Mechanisms of humoral immunity/Stimulation and activation of B-lymphocytes	Konstantinos Xanthopoulos
9	Mechanisms of cellular immunity/Stimulation and activation of T-lymphocytes	Minas Yiangou
10	Mechanisms of immunotolerance and immunoregulation	Konstantinos Xanthopoulos
11	Histocompatibility and immunobiology of transplantation	Konstantinos Xanthopoulos
12	Autoimmunity/Immune system & cancer	Theodoros Sklaviadis

13	Future and prospective	Theodoros Sklaviadis

CLINICAL CHEMISTRY

Code number: 80
Semester:4th
Course type Undergraduate

X	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 2
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator: Pantelis Arzoglou, Associate Professor
Tutor (s): Pantelis Arzoglou, Associate Professor,
Assisting personnel:

Aims of the course: Correlation with physiological biochemical parameters and pathological situations. Quality control laboratory analyses. Methods of determination.

Skills: Familiarity with basic concepts of Clinical Chemistry and Pathological Biochemistry.

Teaching methods: Teaching using modern technology (animations) and laboratory exercises.

Contents of the course: Separation and analysis methods. Quality control in clinical chemisty laboratory. Protein. Amino acids and derivatives. Carbohydrates. Lipoproteines and lipids. Enzymes. Laboratory test functioning of endocrine, kidney, stomach, pancreas and bowel. Various fluids of the body. Acid basic balance and electrolytes. Automatic analysers. Coagulation of blood. Modern analytical methods (ELISA, western blot). Isotopic analysis methods. Data processing aiming at diagnosis.

Proposed literature:

1. (M) Georgatsou, e.g. Arzoglou: principles of Clinical Chemistry, Editions Giachoudi, Thessaloniki

2. p. karlson, Gerok w., w. Gross. Clinical Pathological Biochemistry, Special Edition Versions, Athens

Educational activities: Monitoring of lectures and laboratory exercises.

Evaluation process and methods: Examination with traditional issues in conjunction with multiple choice questions

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

The lectures of the course carried out using ITC (Powerpoint presentation, videos, animations etc).

Teaching:

Lectures.

The teaching of the course are lectures and exercises.

a) Lectures. The lectures (1 hour) take place 2 times a week in room A12.

Lecture	**Title**	**Tutor**
1-2	Introduction-Meaning physiological values	Arzoglou
3-4	Enzymes	Arzoglou
5-6	Hormones	Arzoglou
7-8	Lipids& lipoproteins	Arzoglou
9-10	Automatic analysers	Arzoglou
11-12	Carbohydrates	Arzoglou
13-14	Hepatic-Pancreas function	Arzoglou

15-16	Modern analytical methods	Arzoglou
17-18	Proteins	Arzoglou
19-20	Blood Coagulation	Arzoglou
21-22	Sample Preparation	Arzoglou
23-24	Acid basic balance	Arzoglou
25-26	Renal function	Arzoglou

B) **Laboratory work**

Laboratory	**Title**	**Tutor**
1	General urine analysis,	Arzoglou,
2	Microscopic observation of biolgical fluids	Arzoglou,
3	Investigation of diabetes mellitus, measuring glycosidised haemoglobin,	Arzoglou,

SEMESTER V

PHARMACOGNOSY I

Code number: NP-33
Cycle: Undergraduate
Semester: 5th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 6.5
Lectures (hours/week): 3
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator: Diamanto Lazari Associate Professor

Tutor (s):
Diamanto Lazari, Associate Professor
Room 317, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: 2310-997617, e-mail (dlazari@pharm.auth.gr)

Karioti Anastasia, Assistant Professor

Room 317, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: 2310-997617, e-mail (akarioti@pharm.auth.gr)

Dr Gabrieli Chrysi, RLT'S

Room 316A, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: e-mail (gabrieli@pharm.auth.gr)

Assisting personnel:

Aims of the course: Understanding by the students of the general content of Pharmacognosy and especially of substances belonging to groups of carbohydrates, lipids, and phenols and their derivatives. In order to achieve these objectives, the physical, chemical and biological properties of these substances are presented, as well as their chemical classification, their biosynthesis and medicinal plants containing them. It will also discussed uses of medicinal plants whose main active ingredients belong in these categories of natural products. Moreover, in the laboratory work the students will know and will analyze herbal medicines included in the European Pharmacopoeia 5, using the appropriate analytical methods (microscopic and phytochemical).

Skills: Familiarity with basic knowledge of Pharmacognosy. Also, knowledge of phytochemical groups of carbohydrates, lipids and phenols as well as of herbal medicines containing them.

Teaching methods: Lectures & laboratory work.

Contents of the course:

CARBOHYDRATES, LIPIDS, AND PHENOL DERIVATIVES

Introduction: Generally, control specifications of herbal medicines and herbal medicinal products of the European Pharmacopoeia(Phytochemical, microscopic, etc.) General scheme of biosynthetic pathways of primary and secondary metabolites.

CARBOHYDRATES: Simple sugars, Oligosaccharides, Polysaccharides. Homogeneous polysaccharides, Heterogeneous polysaccharides (Mucilage, gums), Cyanogenic glycosides, Mustard oils, Nutritional fiber

PLANT LIPIDS: Triglycerides, fatty acids, oils Essential fatty acids and biosynthesis of leukotrienes, prostaglandins, thromboxanes

PHENOLS AND THEIR DERIVATIVES: . Generally, groups of natural structures, reactions of phenols. General reagents for the detection of phenolic structures. Simple phenolic compounds. Benzoic acids, cinnamic acids, coumarins, Lignans, Neolignans and their derivatives, Flavonoids, tannins, quinines.

LABORATORY WORK:Microscopic and Phytochemical control of herbal drugs containing phenols and/or phenol derivatives of the European Pharmacopoeia.

Microscopic control: Starches (Amylum Solani, Amylum Oryzae, Amylum Maydis, Amylum Tritici, Amylum Marantae), Fibers (Cotton, Flax, Silk, Wool), Flores Malvae, Flores Tiliae, Folia Sennae, Rhizoma Rhei, Herba Hyperici, Fructus Anisi vulgaris, Fructus Foeniculi, Semina Psylii, Folia Gingo biloba

Phytochemical control: Extraction of phenolic compounds qualitative determination of anthraquinones

Suggested Literature:

1. European Pharmacopoeia .
2. Gunnar Samuelson, ΦΑΡΜΑΚΕΥΤΙΚΑ ΠΡΟΪΟΝΤΑ ΦΥΣΙΚΗΣ ΠΡΟΕΛΕΥΣΗΣ, Απόδοση στην Ελληνική: Π. Κορδοπάτης, Ε. Μάνεση-Ζούπα, Γ. Πάιρας, Πανεπιστημιακές Εκδόσεις Κρήτης, Ηράκλειο 1996
3. J. Bruneton. Pharmacognosie, Phytochimie, Plantes médicinales 3th édition Ed. TEC/DOC Paris 1999.
4. R. Hansel, O. Sticher. Pharmacognosie-Phytopharmazie. 7 Auflage, Springer-Verlag, Berlin-Heidelberg 2004.
5. Notes distributed by the teachers.

Educational activities: Lectures, laboratory work and optional scientific presentation

Evaluation process and methods: Written exam at the end of the semester. To compute the final grade, the grade which is given by each tutor (3.33) is added. The examination at the end of the semester is performed at dates, time and place arranged by the department. The duration of the examination is 3 hours for the three tutors.

Use of TIC / Electronic distribution of the lectures: Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy.

Teaching: Teaching of this course is accomplished through lectures and laboratory work.

(A) Lectures. Lectures (in total three hours per week) are given in the lecture room D12 (main building of the School of Natural Sciences)

Lecture	Title	Tutor
1-3	Introduction. General, control specifications of herbal drugs and herbal drug ingredients of the European Pharmacopoeia 5. Biosynthetic pathways. Primary, secondary metabolites	All tutors
4	Sugars (Simple sugars, Oligosaccharides, Polysaccharides)	All tutors
5-8	Triglycerides, fatty acids, oils, vegetable oil, mustard oil, other sulfur compounds Acetogenins, Glycoretins of Convolvulaceae, Cyanogenic glycosides Unusual toxic amino acids, Lectins	All tutors
9-10	Phenols and their derivatives. Introduction. Biosynthesis.	All tutors
11	Cinnamic acids, aryl- propenyl-phenols	All tutors
12	Phenolic acids and benzene derivatives	All tutors
13	Coumarins	All tutors
14-16	Lignans, Neolignans and their derivatives	All tutors
17-20	Flavonoids, Rotenoids, Neoflavonoids, Flavonolignans	All tutors
21-24	Anthocyanosides, Tannins	All tutors
25-27	Styrylpyrones, Stilbens	All tutors
28-32	Quinones, Naphthoquinones, anthracyclines, Naphthodianthrones, Miltionones (abietaquinones)	All tutors
33-36	Anthrones, Anthranoles, Anthraquinones, Homo- and Hetero-Dianthrones	All tutors
37-39	Orcinols and Phloroglucinols	All tutors

B) Laboratory work

Students must perform laboratory work (2 hours per week). Laboratories take place a) in the Microscopy room of the 3rd floor of the Biology/Pharmacy building and b) in the Hall of chemistry of natural products of the 3rd floor of the Biology/Pharmacy building.

Laboratory	**Title**	**Tutor**
1	Microscopic control: Starches (Amylum Solani, Amylum Oryzae, Amylum Maydis, Amylum Tritici, Amylum Marantae)	All tutors
2	Microscopic control: Fibers (Cotton, Flax, Silk, Wool)	All tutors
3	Microscopic control: Flores Malvae, Flores Tiliae	All tutors
4	Microscopic control: Folia Sennae, Rhizoma Rhei	All tutors
5	Microscopic control: Fructus Anisi vulgaris, Fructus Foeniculi	All tutors
6	Microscopic control: Rhizoma Rhei, Herba Hyperici	All tutors
7	Microscopic control: Semina Psylii, Folia Gingo biloba	All tutors

8	Phytochemical control: Folia Sennae – Qualitative determination of anthraquinones	All tutors

DISPENSING PHARMACY

Code number: 32
Cycle: UNDERGRADUATE STUDIES
Semester: 5th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 6,5
Lectures (hours/week): 2
Tutorial (hours/week):
Laboratory work (hours/week): 2
Course coordinator: Fatouros Dimitrios, associate professor
Tutor (s): Fatouros Dimitris, associate professor, e-mail: dfatouro@pharm.auth.gr

Panagopoulou Athanasia, lecturer e-mail:pathanas@pharm.auth.gr

Aims of the course: The main target of the dispensing is the acquisition of the necessary knowledge for the recognition and comprehension of the prescriptions following by the preparation of the appropriate technological formulation.

Skills: Acquisition of the necessary knowledge and possibilities for the recognition either of the raw material that are used in the different types preparations of the technological formulations, as far as the evolvement of the student skills in the management of the different preparation methods of the formulations. Nevertheless the students will be familiarized with the handling of the different laboratory apparatus and implements.

Teaching methods: Lectures and Laboratory exercises.

Contents of the course: Prescription, Dispensing, dosimetry, Pharmacopoeia, Formulations liquid, solids, aromatic waters, solutions, drops, syrup, emulsions, suspensions, ointments, pastae, suppositories, tablets, capsules,

extractions, essential oils, labels, medicinal gas, bandages, incompatibilities, dispensing problems.

Proposed literature: GALENIC PHARMACY

Educational activities: Attendance of the lectures and the Laboratory exercises.

Evaluation process and methods: Attendance of the Laboratory exercises regularly, writing and presentations of specified reports; evaluation. Written exams at the end of the semester

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures. Certain lectures are carried on with the use of electronic applications

Teaching:

A) Lectures. Two hours per week in the Δ12 classroom of the School of Science

Lecture	Title	Tutor
1	Introduction, dispensing	All tutors
2	Prescriptions, Liquid formulations	All tutors
3	Syrup, emulsions, suspension	All tutors
4	. Ointments, crèmes	All tutors
5	Suppositories	All tutors
6	Tablets, capsules	All tutors
7	Parenterally	All tutors
8	Extractions	All tutors
9	Essential oils	All tutors
10	Essential oils winning	All tutors

11	Packing materials	All tutors
12	Labels, Bandages	All tutors
13	Incompatibility	All tutors

B) Laboratory work

Laboratory	Title	Tutor
1	Formulation of different Preparations	All tutors
2	Formulation of different Preparations	All tutors
3	Formulation of different Preparations	All tutors
4	Formulation of different Preparations	All tutors
5	Formulation of different Preparations	All tutors
6	Formulation of different Preparations	All tutors

PHARMACEUTICAL CHEMISTRY I

Code number: 48
Cycle: Undergraduate
Semester: 5th semester
Course type

X	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 6.5
Lectures (hours/week): 3
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator:
Vasilis Demopoulos, Professor

Tutor (s):

Vassilis Demopoulos, Professor

Room 408A & 409B, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 1-2 pm.

Communication: e-mail (vdem@pharm.auth.gr)

Eleni A. Rekka, Professor

Room 409, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: email (rekka@pharm.auth.gr)

Assisting personnel: Dr. Antonios Gavalas, RLT'S

Aims of the course: The aim of this course is to act as an introduction to chemistry of vitamins as well as to the specific pharmaceutical - medicinal chemistry courses, to teach the causes of pathologic conditions and general properties of vitamins and drug molecules. Other aims are to present some important characteristics of drugs such as selectivity and the role of various chemical bonds developed in drug action. An important aim is the transfer of a sound knowledge of role of xenobiotics and vitamins in human organism as well as drug metabolism and the consequences on drug action and toxicity. Also important are the issues of the pharmacodynamic and chemotherapeutic drugs as a concept, general anaesthetics, as well as the chemical and molecular aspects of drug - drug and drug - food interactions.

Skills:

By the end of this course, the students should be able to:

Know the basic classification and causes of important diseases;

Know the characteristics of vitamins as well as of pharmacodynamic and chemotherapeutic drugs;

Know the characteristics of a satisfactory drug molecule, such as selectivity, potency, toxicity;

Have a good knowledge of the fate of a drug, including vitamins, in the body, its kinetics and, most important, its metabolism, as well as the phenomenon of xenobiotic metabolism from various aspects;

Know the formation of various types of chemical bonds and the effects on the development of drug action;

Have a good knowledge of the molecular and chemical basis of drug interactions.

Teaching methods: Lectures and laboratory work. The material is covered by textnotes and laboratory notes.

Contents of the course: Introduction. Pharmacochemical studies of vitamins. Synthesis/isolation, properties, action, structure-activity relationships usage of water soluble vitamins (ascorbic acid, thiamine, niacin, folic acid), and oil soluble vitamins (vitamins D, E and K). Hyper/hypovitaminosis. Metabolism. Interractions. Rellated drugs [sulfanilamides, isoniazide, NSAIDs (acidic and non-acidic), antithrombotic coumarins]. Biomimetic reactions.

A chemical introduction on drug action and xenobiotic behaviour. Impact of drugs on health and disease. Differences and similarities between food and drugs.

General characteristics of drug molecules-Xenobiotics. General anaesthetics. Chemical bonds, drug properties and drug action. Covalent, coordinated bonds, coulombic forces, hydrogen bond, van der Waals forces, lipophilic interactions.

Principles of selectivity based on differences in cytology, biochemistry and distribution.

Ways of drug loss, elements of drug absorption, distribution and excretion.

Drug metabolism. Objectives, evolution, site, chemical nature of structural changes. Oxidations, reductions, hydrolyses and other phase I biotransformations. Conjugations with glucuronic acid, glycine, sulphate, glutathione, and other phase II biotransformations. Structure and function of cytochromes P450. P450 induction and inhibition. Biodetoxication, Biotoxication. Drug metabolism and drug stereochemistry.

Molecular aspects of drug-drug and drug-food interactions. Consequences of interactions, applications in therapy, elements of drug design and development.

Proposed literature:

1. "Vitamins", 2005 Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, ISBN 10.1002/14356007.a27 443

2. Joseph J. Cannon "Pharmacology for Chemists", Oxford University Press, 2007, ISBN-10: 0841239274.

3. R.B. Silverman "The Organic Chemistry of Drug Design and Drug Action", 2nd ed., 2004, Academic Press.

4. J.P. Uetrecht, W. Trager "Drug Metabolism: Chemical and Enzymatic Aspects: Textbook Edition", 2007, Informa Healthcare.

Educational activities: Lectures, discussion with the students in every lecture, problem solving and practical work in the laboratory.

Evaluation process and methods: Written examination at the end of the semester. The evaluation process is based on questions that the students are asked to answer based on their knowledge obtained from the lectures as well as on the critical thinking and ability to combine, evaluate and handle the acquired knowledge and information.

The duration of the examination is 3 hours.

The examination at the end of the semester is performed at dates, time and place arranged by the department.

During the laboratory work, students hand over a report of their results and are evaluated. At the end of the laboratory work, there is a written examination on this. Successful termination of the laboratory course permits their participation to the final examination.

At the examination of the course, each tutor gives out separate exam forms.

To compute the final grade, the grade given by each tutor is randomly varied each exam period.

Final grade is calculated by addition of the course exam grade (80%) and the lab grade (20%).

Example: Supposing a course, where tutor A gives 60% of the grade in a given exam period and tutor B 40%, the final grade is calculated by the following formula:

$$F.G.= 0.8(a+b) +0.2c,$$

Where, a the grade given by tutor A (in a scale of 0-6), b the grade given by tutor B (in a scale of 0-4), c the lab grade (the average of the lab book grade and the lab exam grade).

Use of ΤΠΕ / Electronic distribution of the lectures

Lectures, notes, statements etc are presented in the website: http://users.auth.gr/vdem/

Teaching: Teaching of this course is accomplished through lectures and laboratory work.

A) **Lectures**. Lectures (39 total, 3 hours per week) are given in the lecture room Δ12.

Lecture	Title	Tutor

1-3	Introduction/definition of vitamins. Folic acid and derived coenzyme. Physicochemical properties, chemical stability, absorption, deficiency, supplementation, toxicity, and synthetic strategy in preparing folic acid. Sulfanilamides as related drugs.	V. Demopoulos
4-5	Structure/physicochemical properties and activity relationships of sulfanilamides. Synthetic strategy, chemical quantitative analysis, and their metabolism.	V. Demopoulos
6-8	Niacin and derived coenzymes. Physicochemical properties, chemical stability, absorption, deficiency, supplementation, toxicity, and synthetic strategy in preparing niacin. Isoniazid as a related drug.	V. Demopoulos
9-12	Ascorbic acid and α-Tocopherol as free radical scavengers. Physicochemical properties, chemical stability, absorption, deficiency, supplementation, toxicity, synthetic strategy in preparing ascorbic acid and α-tocopherol. NSAIDs as related drugs. Chemical quantitative analysis and biomimetc reaction of ascorbic acid.	V. Demopoulos
13-15	NSAIDs (acidic and non-acidic). Structure/physicochemical properties and activity relationships, synthetic strategy, chemical quantitative analysis, and their metabolism.	V. Demopoulos
16-18	Vitamin K and Thiamine. Their coenzymes. Physicochemical properties, chemical stability, absorption, deficiency, supplementation, toxicity, and synthetic strategy in preparing vitamin K and thiamine..	V. Demopoulos
19-20	Biomimetic reaction and chemical quantitative analysis of thiamine. Coumarines as anticoagulants in relationship to vitamin K.	V. Demopoulos
21	Chemical aspects of drug action and xenobiotic behaviour. Differences and similarities between food and drugs.	E. Rekka
22-25	General characteristics of drug molecules-Xenobiotics. General anaesthetics. Chemical bonds, drug properties and drug action. Covalent, coordinated bonds, coulombic forces, hydrogen bond, van der Waals forces, lipophilic interactions.	E. Rekka
26-29	Principles of selectivity based on differences in cytology, biochemistry and distribution. Examples from drugs, explanation of their mode of action.	E. Rekka

30-32	Xenobiotic metabolism: Oxidations, reductions, hydrolyses and other phase I biotransformations.	E. Rekka
33-35	Xenobiotic metabolism: Conjugations with glucuronic acid, glycine, sulphate, glutathione, and other phase II biotransformations. Structure and function of cytochromes P450. P450 induction and inhibition.	E. Rekka
36-37	Biodetoxication, Biotoxication. Drug metabolism and drug stereochemistry.	E. Rekka
38-39	Molecular aspects of drug-drug and drug-food interactions, applications. Review exercises.	E. Rekka

C) Laboratory work

Students must perform laboratory work (2 hours per week).

ATTENTION! The students who want to attend the lab have to fill out a participation form before the beginning of the semester at the Laboratory of Pharmaceutical Chemistry. There is an announcement, calling students to fill out the participation forms at the announcement board of the Laboratory of Pharmaceutical Chemistry.

Laboratory	Title	Tutor
1-5	General introduction to the laboratory, and quantitative determination of sulfanilamide.	V. Demopoulos A. Gavalas
6-9	Detection of N, S and Cl in organic compounds	V. Demopoulos A. Gavalas
10-13	Quantitative determination of aspirin	V. Demopoulos A. Gavalas
14-17	Quantitative determination of ascorbic acid	V. Demopoulos A. Gavalas
18-21	Quantitative determination of procaine hydrochloride under anhydrous conditions	V. Demopoulos A. Gavalas
22-26	Thin Layer Chromatography of common drugs, and delivery of the laboratory report	V. Demopoulos A. Gavalas

PHARMACOLOGY I

Code number: 49
Cycle: UNDERGRADUATE
Semester: 5th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 6,5
Lectures (hours/week):3
Tutorial (hours/week):1
Laboratory work (hours/week):2
Course coordinator: Vizirianakis S. Ioannis, Assoc. Professor
Tutors:

1. Vizirianakis S. Ioannis, Assoc. Professor
2. Papadopoulou C. Lefkothea, Assoc. Professor

Aims of the course:
To introduce students into the basic principles of Pharmacology; the pharmacodynamic and pharmacokinetic parameters of drugs; drug receptor interactions; drug transporters and ion channels; the emergence of adverse drug reactions (ADRs) and drug interactions; pharmacogenomics; clinical pharmacology and drug prescription guidelines; pharmacovigilance; various pharmacological classes of drugs; mechanisms underlying the actions of the drugs in the body; factors contributing to pharmacological response;.

Skills:
Appointment of lectures, tutorials and laboratory tests – essays writing

Teaching methods:

Lecture presentations, Computer-Assisted Learning in Pharmacology (PCAL), Tutorials, and Discussion of specific drug-related case studies

Contents of the course:

Introduction to Pharmacology; Drug-receptor interactions; Drug Transporters – Ion Channels; Pharmacokinetic - Drug interactions; Pharmacogenetics-Pharmacogenomics; Nervous system and cardiovascular function; Cardiac glycosides and positive inotropic agents; Antihypertensive drugs; Diuretic drugs; Vasodilators; Anti-angina agents; Antiarrhythmic agents; Antineoplastic agents - Drug resistance mechanisms; Cancer Immunotherapy; Antibiotics - Drug resistance mechanisms; Antifungal drugs; Antituberculosis drugs; Drugs affecting the respiratory system; NSAIDs; Antigout and anti-hyperuricemia drugs; Anticoagulant (anticlotting) agents; Anemias - Iron pharmacology, Vitamin B12, Folic acid; Drugs acting on the gastrointestinal tract and the liver-bile duct system

Proposed literature:

Textbooks written in Greek and English as well as pharmaceutical journals.

Educational activities:

Through lectures, tutorials and practical courses

Evaluation process and methods:

Exams at the end of the semester; essay submission in laboratory tests.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

PowerPoint slides, computer use, PCAL CD-ROMs, experimental pharmacology animations/modelling, videos.

The lectures will be available to students in PDF format through AUTh's e-learning platform.

Teaching:

B) **Lectures**

Lecture	Title	Tutor
1	Pharmacology - New Drug Development - Pharmaceutical care	I.S. Vizirianakis
2	Pharmacodynamics - Drug interactions & receptors	I.S. Vizirianakis
3	Pharmacokinetics – ADME - Drug transporters and Ion channels	I.S. Vizirianakis
4	Pharmacogenomics and pharmacology: A PCAL related CD-ROM presentation for GPCRs (Adrenergic receptors and related drugs: (modeling – binding- pharmacological response correlation)	I.S. Vizirianakis
5	Pathophysiology of heart failure – Positive inotropic drugs	I.S. Vizirianakis
6	Pathophysiology of hypertension – Antihypertensive drugs	I.S. Vizirianakis
7	Clinical pharmacology of antihypertensive drugs – Drug selection upon prescription	I.S. Vizirianakis
8	Physiology of urine production (diuresis) and pathophysiology – Diuretic drugs	I.S. Vizirianakis
9	Vasodilating agents – Anti-angina drugs	I.S. Vizirianakis
10	Pharmacogenomics and pathophysiology of the cardiovascular system	I.S. Vizirianakis
11	Antiarrhythmic agents	I.S. Vizirianakis
12	Pathophysiology of Neoplasia	L.C. Papadopoulou
13	Antineoplastic agents (chemotherapeutics)	L.C. Papadopoulou
14	Antineoplastic agents (targeted agents)	L.C.

		Papadopoulou
15	Cancer immunotherapy	L.C. Papadopoulou
16	Antimicrobial agents I	L.C. Papadopoulou
17	Antimicrobial agents II	L.C. Papadopoulou
18	Drug resistance mechanisms	I.S. Vizirianakis
19	Antifungal agents	L.C. Papadopoulou
20	Antimalarial agents	L.C. Papadopoulou
21	Bronchodilators and treatment of asthma	L.C. Papadopoulou
22	Non steroidal anti-inflammatory agents – analgesics. Pharmacological treatment of gout	L.C. Papadopoulou
23	Blood Coagulation	L.C. Papadopoulou
24	Anticoagulants drugs	L.C. Papadopoulou
25	Anaemias – Iron pharmacology – Vitamin B12 and Folates	L.C. Papadopoulou
26	Drugs acting on the gastrointestinal tract and the liver-bile duct system	L.C. Papadopoulou I.S. Vizirianakis

B) **Laboratory work**

Laboratory	**Title**	**Tutor**
1	Antineoplastic chemotherapeutics: *In vitro* assessment of the antineoplastic efficiency of drugs in leukemic lines	I.S. Vizirianakis

2	Genomic DNA isolation from cultured cells and electrophoretic analysis: Study of drug actions	I.S. Vizirianakis
3	Antimicrobial chemotherapeutics: Evaluating the sensitivity and resistance of microorganisms toward antibiotics	L. Papadopoulou
4	Anticoagulant agents – PT / aPTT screening tests for abnormalities of coagulation factors	L. Papadopoulou

C) **Tutorials**

Tutorial	Title	Tutor
1	Pharmacology, Pharmacogenomics and the new drug development era	I.S. Vizirianakis
2	Pharmacovigilance: The NSAIDs case	I.S. Vizirianakis
3	Pharmaceutical care of hypertension: Toward understanding drug-gene interactions in the clinical practice	I.S. Vizirianakis
4	Cancer pharmacogenomics: pharmacological evaluation and pathophysiological assessment	I.S. Vizirianakis

PHARMACEUTICAL TECHNOLOGY UNIT OPERATIONS

Code number: 50
Cycle: Undergraduate

Semester: 5th

Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 4

Lectures (hours/week): 2

Tutorial (hours/week): -

Laboratory work (hours/week): 4

Course coordinator:

Kachrimanis Kyriakos Assoc. Professor

Tutor (s): Kachrimanis Kyriakos Assoc. Professor, Fatouros Dimitrios, Assoc. Professor, Barmpalexis Panagiotis, Assist. Professor

Aims of the course: The course's objective is to promote the understanding of the physicochemical principles of pharmaceutics, and the interrelations between the physical properties of the raw materials and those of the pharmaceutical formulations and final dosage forms.

Skills:

Apply knowledge in practice
Make decisions
Work in teams
Work in an interdisciplinary team

Teaching methods:

Book, lecture notes, powerpoint slide presentations

Contents of the course: Introductory physics and mathematics concepts in pharmaceutics. Gases, vapors and supercrtitical fluids: physical properties and applications in pharmaceutics. Solid state properties (crystal structure, polymorphism, solvate formation) and applications in pharmaceutics. Dissolution of substances. Principles of rheology and rehological properties of pharmaceutical fluid formulations. Surface and interfacial phenomena. Pharmaceutical dispersion systems (suspensions, emulsions, micro-emulsions, micelles). Solubilization of poorly soluble substances. Diffusion and dissolution of dosage forms. Polymers, their structure and physical properties.

Proposed literature:

Kachrimanis, K. Lecture notes, 2012, available through the e-learning platform.

Ktistis, G. Courses in Physical Pharmacy, 2007.

Aulton, M.E. Pharmaceutics The Science of Dosage Form Design. 2nd ed. Churchill Livingstone Press, Spain, 2002.

Florence A.T., Atwood D., Physicochemical Principles of Pharmacy, 3rd edition, Creative Print & Design, London 1998.

Sinko, P. Martin's Physical Pharmacy and Pharmaceutical Sciences, 5th edition, Lippincott Williams & Wilkins, 2006.

Educational activities:

Lectures and practical classes. The main goals of the subject are to understand the concept of particle size and its measurement. The understanding of basic processes applied in the production of medicines. The purpose of laboratory classes is to familiarise the students with the above processes.

Evaluation process and methods:

Final examination at the end of the semester - submission of a practical lab report.

Questionaire available to the students through the Blackboard academic platform.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Course lectures in the form of powerpoint presentation, available to the students through the Blackboard academic platform.

Teaching:

A) **Lectures**.

They are 3h presentations once a week in Room D12 of Physics Dept and delivered via electronic means. Teaching material including overhead projections and PowerPoint slides, lecture notes (150 pages) and Laboratory Class manual are available to the students via the E-learning program operated by the University Library.

Διάλεξη	**Τίτλος**	**Διδάσκων**
1	Introduction – physicochemical principles of pharmaceutics	K.Kachrimanis
2	Gases, vapours, supercritical fluids	K. Kachrimanis
3	The crystalline state	K. Kachrimanis
4	Amorphous solids and solid dispersions	K. Kachrimanis

5	Dissolution of pharmaceutical substances	P. Barmpalexis
6	Solubility of electrolytes	P. Barmpalexis
7	Solubility of weak electrolytes	P. Barmpalexis
8	Rheology	D. Fatouros
9	Disperse systems - suspensions	D. Fatouros
10	Disperse systems – emulsions, microemulstions	D. Fatouros
11	Disperse systems - micelles	D. Fatouros
12	Diffusion – Fick's laws	D. Fatouros
13	Introductory polymer science	K.Kachrimanis

B) **Laboratory work**

Laboratory	Title	Tutor
1	Determination of viscosity dependence on temperature	P. Barmpalexis
2	Emulsion stability	K. Kachrimanis
3	Determination of pKa of weak electrolytes	P. Barmpalexis
4	Determination of membrane permeability	D. Fatouros

SEMESTER VI

PHARMACOGNOSY II

Code number: NP-34
Cycle: Undergraduate
Semester: 6th
Course type

	Background/General knowledge
x	Scientific area (pharmacy)

Credit units (ECTS): 5.5
Lectures (hours per week): 3
Tutorial (hours): -
Laboratory (hours per week): 2
Course coordinator: Dr. Anastasia Karioti, Assistant Professor

Tutors:

1) Dr. Anastasia Karioti, Assistant Professor

Office 317b, 3rd floor Biology/Pharmacy building.

Office hours: Monday to Friday 11-12 π.μ.

contact: e-mail (akarioti@pharm.auth.gr)

2) Dr. Diamanto Lazari, Associate Professor

Office 317a, 3rd floor Biology/Pharmacy building.

Office hours: Monday to Friday 11-12 π.μ.

contact: e-mail (dlazari@pharm.auth.gr)

3) Dr. Cryssi Gavrieli, (RLT'S)

Office 316A, 3rd floor Biology/Pharmacy building.

Office hours: Monday to Friday 11-12 π.μ.

contact: e-mail (gabrieli@pharm.auth.gr)

Aims of the course: Students should become familiar with the basic concepts of terpenoids, steroids and their derivatives. To this end, the physical, chemical and biological properties, are examined, along with their biosynthesis. Furthermore, herbal drugs rich in terpenoids with use in clinical practice are discussed. The selection of the medicinal plants is based on EMA and European Pharmacopoeia. During laboratory exercises students carry out microscopic and phytochemical analysis of herbal drugs include in European Pharmacopoeia 5

Skills: Familiarization and deeper knowledge of the phytochemical groups of terpenoids, steroids and their derivatives and the medicinal plants which contain these groups.

Teaching methods: Lectures, tutoring and laboratory exercises and practices.

LABORATORY EXERCISES:

Microscopic and chemical assay of herbal drugs rich in terpenoids.

Microscopic assay: Folia Menthae, Folia Melissae, Folia Lavandulae, Folia Salviae, Folia Digitalis, Radix Liquiritiae, Herba Absinthii, Flores

Chamomillae, Radix Valerianae, Herba Cannabis, Radix Gentianae, Folia Eucalypti

Phytochemical assay: Digitalis purpurea: quantitative determination of cardiac glycosides.

Proposed Literature:

1. European Pharmacopoeia 5.
2. Gunnar Samuelson, Drugs of Natural Origin : A Textbook of Pharmacognosy.
3. J. Bruneton. Pharmacognosie, Phytochimie, Plantes médicinales 3th édition Ed. TEC/DOC Paris 1999.
4. R. Hansel, O. Sticher. Pharmacognosie-Phytopharmazie. 7 Auflage, Springer-Verlag, Berlin-Heidelberg 2004.
5. Notes distributed by the tutors.

Educational activities: Lectures and laboratory work.

Evaluation process and methods: Written exam at the end of the semester. To compute the final grade, the grade which is given by each tutor (3.33) is added. The examination at the end of the semester is performed at dates, time and place arranged by the department. The duration of the examination is 3 hours for the three tutors.

Use of TIC / Electronic distribution of the lectures: Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy.

Teaching: Teaching of this course is accomplished through lectures and laboratory exercises.

Teaching methods: Lectures (three hours per week).

(A) Lectures. Lectures (in total three hours per week) are given in the lecture room D12 (main building of the School of Natural Sciences)

B) Laboratory exercises

Students must perform laboratory exercises (2 hours per week). Laboratories take place a) in the Microscopy room of the 3rd floor of the Biology/Pharmacy building and b) in the Hall of chemistry of natural products of the 3rd floor of the Biology/Pharmacy building.

Contents of the course:

Introduction, Biosynthesis, Origin of C5 units-Mevalonic acid and MEP pathways

The following classes of constituents are described
Monoterpenes, Sesquiterpenes, Essential oils, Iridoids, Pyrethrins-pyrethroids, Sesquiterpene lactones, Diterpenes, Triterpenes and steroids, Cardiac glycosides, Oleoresins, Tetraterpenes and Carotenoids. For all phytochemical groups the biosynthesis and general physical, chemical and biological properties are described. Herbal drugs containing each group of terpenoids are selected according to the proposed literature, EMA and European Pharmacopoeia 9. For each herbal drug the chemical content, structures of the main constituents, pharmacological activity, toxicological effects, uses and possible interactions with drugs are described.

BIOPHARMACEUTICS

Code number: 51
Cycle: Undergraduate
Semester: 6th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator: Ioannis Nikolakakis Assoc. Professor
Tutor (s): I. Nikolakakis, Assoc. Professor,

K. Kachrimanis, Assoc. Professor

D. Fatouros, Assoc. Professor.

Aims of the course: The main objective is the complete presentation of the influence offormulation factors on the therapeutic efficacy and safety of pharmaceutical products. Also, the influence of the roots of administration in

combination with the physicochemical characteristics of the drugs, on the efficacy and safety fo the product.

Skills:

Apply knowledge in practice

Make decisions

Work in teams

Work in an interdisciplinary team

Teaching methods: Book, lecture notes, powerpoint slide presentations

Contents of the course: Introductions-Definitions. Pharmacokinetic parameters and absorption, distribution, metabolism and excretion models. Bioavailability and bioequivalence of pharmaceutical products and drug substances. Route of the drug from the dosage form to the gastric fluids (instant and modified dosage forms, mechanisms, equations and ways to study drug release). Movement of dosage forms in the gastro-intestinal tract (anatomy and physiology of GI tract, biologic barriers and mechanisms of transport and absorption of medicines, physiologic and formulation factors that affect the bioavailability of per os administered pharmaceutical products). Routes of drug administration other than per os (oral cavity, skin, intra-muscular injection, rectum, nasal cavity, lungs etc.) The drug after arrival in the systemic circulation (distribution, protein binding and elimination). Excretion and drug metabolism (renal and hepatic clearance, hepatocholic excretion and enterohepatic circulation). First pass metabolism (factors that affect its appearance and consequences for the bioavailability of drugs). Dosage scheme for specific medicines and diseases. Procedures for removing the drug from the body: a) clearance in general, b) liver clearance, c) biotransformation in the liver, d) biliary excretion and enterohepatic circulation, e) pre-systemic metabolism

Practical classes in pharmacokinetic simulations and calculation of pharmacokinetic parameters using computers and interactive software for self-teaching. In vitro - in vivo correlation of pharmacokinetic behaviour of pharmaceutical products and drugs.

Proposed literature:

1. Biopharmaceutics notes (Biopharmaceutical behaviour and dosage form development) S. Malamataris, 2010

2. Biopharmaceutics notes (Routes of drug disposition, alternative routes of administration) I. Nikolakakis

Educational activities: Lectures and practical classes. The main goals of the subject are to understand the concept of particle size and its measurement. The understanding of basic processes applied in the production of medicines. The purpose of laboratory classes is to familiarise the students with the above processes.

Evaluation process and methods: Three hours writing examination at the end of Semester. Evaluation is based on the student response in providing answers on 6-8 topics. Results are disclosed and shown on notice board of The Department within 1-2 weeks from the examination. Before sitting the exam the student completes a written detailed report on the work conducted in the practical classes

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Course lectures in the form of powerpoint presentation, available to the students through the e-learning academic platform.

Teaching:

A) **Lectures**.

They are 2h presentations once a week in the Department's seminar room and delivered via electronic means. Teaching material including PowerPoint slides and Laboratory Class manual are available to the students via the e-learning program operated by the University Library.

Lecture	Title	Tutor
1	Course of the drug through the body	I. Nikolakakis
2	Drug absorption	I. Nikolakakis
3	Drug transition from the dosage form to the biological fluids	I. Nikolakakis
4	The drug from at the GI tract microenvironment	I. Nikolakakis

5	Drug permeation through the GI tract barriers	K. Kachrimanis
6	The drug in the systemic circulation	K. Kachrimanis
7	Alternative routes of administration	K. Kachrimanis
8	Introductory pharmacokinetics	K. Kachrimanis
9	Protein binding effects	K. Kachrimanis
10	Distribution of the drug in the body	K. Kachrimanis
11	Volume of distribution	K. Kachrimanis
12	Renal and hepatic clearance	K. Kachrimanis
13	First pass effect	K. Kachrimanis
14	Ocular delivery	D.Fatouros
15	Skin delivery	D.Fatouros
16	Buccal delivery	D.Fatouros

B) **Laboratory work**

Laboratory	Title	Tutor
1	Introduction to biopharmaceutics with the computer	I. Nikolakakis
2	In vitro simulation of the compartmental model	K. Kachrimanis

SPECIFIC PHARMACEUTICAL TECHNOLOGY I

Code number: 52

Cycle: Undergraduate
Semester: 6th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 5.5
Lectures (hours/week): 3
Tutorial (hours/week): 2
Laboratory work (hours/week): 1
Course coordinator: Kyriakos Kachrimanis Assoc. Professor
Tutor (s): Kyriakos Kachrimanis Assoc. Professor, I. Nikolakakis, Assoc. Professor, A. Panagopoulou, Lecturer
Assisting personnel: -
Aims of the course: Understanding of pharmaceutical product formulation methods at the laboratory and industrial scale.
Understanding the functionality of excipients in the final dosage form.
Discussion of compendial requirements of the various marketed pharmaceutical dosage forms.
Skills:
Apply knowledge in practice
Make decisions
Work in teams
Work in an interdisciplinary team
Teaching methods:
Book, lecture notes, powerpoint slide presentations
Contents of the course:
A. Solid dosage forms: Solid state properties, fundamental and particulate properties. Granulation methods. Constituents, formulation, properties, filling of capsules and compendial requirements. Tablets: types, excipients, tests and requirements. Methods for the development of controlled release oral solid dosage forms.
B. Aerosols, foams: Foams (stability and applications). Aerosols and pulmonary drug delivery.
Proposed literature:
Solid dosage forms, S. Malamataris
Aerosols, Foams, S. Malamataris, K. Kachrimanis
Laboratory Manual, S. Malamataris

Aulton, M.E. Pharmaceutics The Science of Dosage Form Design. 2nd ed. Churchill Livingstone Press, Spain, 2002.

Educational activities:

Lectures and practical classes. The main goals of the subject are to understand the concept of particle size and its measurement. The understanding of basic processes applied in the production of medicines. The purpose of laboratory classes is to familiarise the students with the above processes.

Evaluation process and methods:

Final examination at the end of the semester - submission of a practical lab report.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Course lectures in the form of powerpoint presentation, available to the students through the e-learning academic platform.

Teaching:

A) **Lectures**.

They are 3h presentations once a week in Room D12 of Physics Dept and delivered via electronic means. Teaching material including PowerPoint slides and Laboratory Class manual are available to the students via the e-learning program operated by the University Library.

Lecture	Title	Tutor
1	Granulation methods – wet granulation	I. Nikolakakis
2	Granulation methods – other methods	I. Nikolakakis
3	Capsules – composition and preparation	I. Nikolakakis
4	Capsules – filling and requirements	I. Nikolakakis
5	Tablets – tablet types	K. Kachrimanis
6	Tablets – tableting excipients	K. Kachrimanis
7	Tablets – pharmacopoeial requirements	K. Kachrimanis
8	Design and development of sustained release dosage forms	K. Kachrimanis

9	Solid state properties	K. Kachrimanis
10	Fundamental and derived powder properties	K. Kachrimanis
11	Aerosols – particle deposition	K. Kachrimanis
12	Aerosols – inhalers, pharmacopoeial requirements	K. Kachrimanis
13	Foams – formation, stability, applications	K. Kachrimanis

B) **Laboratory work**

Laboratory	**Title**	**Tutor**
1	Capsule filling	I. Nikolakakis
2	Dissolution testing	K. Kachrimanis
3	Tablet tests	A. Panagopoulou
4	Powder flow and packing	I. Nikolakakis

C) Tutorial

Tutorial	**Title**	**Tutor**
1	Tableting	I. Nikolakakis
2	Aerosols	K. Kachrimanis
3		

ORGANIC PHARMACEUTICAL CHEMISTRY II

Code number: 54
Cycle: Undergraduate

Semester: 6th semester
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 5.5
Lectures (hours/week): 3
Tutorial (hours/week): -
Laboratory work (hours/week): 2

Course coordinator:

Vasilis Demopoulos, Professor

Tutors:

1) Vassilis Demopoulos, Professor

Room 408A & 409B, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 1-2 pm.

Communication: e-mail (vdem@pharm.auth.gr)

2) Ioannis Nicolaou, Assistant Professor

Room 404, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 12-1 pm.

Communication: e-mail (inikolao@pharm.auth.gr)

3) Dimitra Hadjipavlou-Litina, Professor

Room 408/B & 410, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12 am.

Communication: e-mail (hadjipav@pharm.auth.gr)

Assisting personnel:

Dr. Antonios Gavalas, RLT'S

Aims of the course::

-Relationships between chemical structure & physicochemical properties with the activity of drug molecules.

-Molecular & chemical mode of action of drug molecules.

-Chemical stability of drug molecules.

-Biotransformatinos of xenobaiotics.

-Representative synthetic strategies and chemical quantitative identification of drug molecules.

Skills:

-Practical implementation of the following types of reactions:

a) oxidative modification, *b)* double nucleophilic attack on carbonyls, *c)* intramolecular rearrangement of a phenyl moiety, & *d)* thermodynamic formation of a heterocyclic ring under anhydrous conditions.

-Gradual changes of the pH of the milieu aiming to the purification of organic drug molecules.

-Identification/explanation of the fingerprint of drug molecules in the ^{1}H-NMR spectrum.

-Chemical oxido-reductive quantitative identification of drug molecule.

Teaching methods:

Lectures, theoretical and practical laboratory work.

Contents of the course:

1) Vassilis Demopoulos, Professor

Synthetic strategy, source identification-isolation, structural elucidation, analysis, molecular mechanism of action, selectivity, stability and bio-transformations for the following classes of drug molecules: antibacterial agents, antifungal agents, antiviral agents, drugs for the gout, diuretics,

histamine receptor (H1 & H2) agonists and antagonists, introductive molecular modeling and statistical computational approaches.

2) Ioannis Nicolaou, Assistant Professor

Pharmacochemical approach (as design, synthesis, physicochemical properties, target cell interactions, structure-activity relationships, pharmacochemical interpretation of toxicity, metabolism) of the below classes of drugs: antineoplastics & antineoplastic detoxifying agents, antidiabetic agents & agents for the treatment of obesity, renin inhibitors-angiotensin converting enzyme inhibitors & angiotensin II inhibitors, calcium channel blocking agents, nitrates (for the treatment of angina), platelet aggregation inhibitors, local anesthetics.

3) Dimitra Hadjipavlou-Litina, Professor

Synthetic strategy-structural characterization-analysis-molecular mechanism of action, structure activity-relationships, selectivity, pharmacochemical aspect of activity and metabolism in the human organism of the following groups of drugs: acetyl-choline's agonists and antagonists, inhibitors of acetyl-cholinesterase, anti-alzheimer, hybrid molecules, polotic and apopolotic agents, sympathomimetics (α- & β- receptor agonists), sympatholytics (α- & β- receptors antagonists), inhibitors of lipoxygenase.

Proposed literature:

1) Vassilis Demopoulos

- Βασίλης Ι. Δημόπουλος "ΦΑΡΜΑΚΕΥΤΙΚΗ ΧΗΜΕΙΑ- Ομάδες Χημειοθεραπευτικών και Φαρμακοδυναμικών Φαρμάκων", Θεσσαλονίκη 2002, ISBN 960-317-063-1 **(Εύδοξος)**
- Richard B. Silverman "The Organic Chemistry of Drug Design and Drug Action", Academic Press, 2004, ISBN-10: 0126437327
- Annual Reports in Medicinal Chemistry, http://www.sciencedirect.com/science/bookseries/00657743
- Joseph J. Cannon "Pharmacology for Chemists", Oxford University Press, 2007, ISBN-10: 0841239274
- E. J. Corey, B. Czako, L. Kurti "Molecules and Medicine", Wiley, 2007, ISBN-10: 0470227494

2) Ioannis Nicolaou

- *Journal* of Medicinal *Chemistry* (ACS Publications)
- *Bioorganic & Medicinal Chemistry Letters* - Elsevier

- *Bioorganic & Medicinal Chemistry* (ISSN 0968-0896)
- The *Journal* of Biological *Chemistry*
- *Chemical* Research in *Toxicology* (ACS Publications)
- *Drug Metabolism and Disposition*

3) Dimitra Hadjipavlou-Litina

- Medicinal Chemistry Principles and Practice, Ed. F.D.King. 1994, The Royal Society of Chemistry, ISBN 0-85186-494-5
- Contemporary Drug Synthesis Li J.J, Johnson D., Sliskovic D., Roth B. Wiley-Interscience,2004, ISBN 0-471-21480-9
- New Trends in Synthetic Medicinal Chemistry, Ed. F. Gualtieri, Wiley –VCH, Vol. 7, 2000
- Annual Reports in Medicinal Chemistry, Academic Press
- *Journal* of Medicinal *Chemistry* (ACS Publications)
- *Bioorganic & Medicinal Chemistry Letters* - Elsevier
- *Bioorganic & Medicinal Chemistry* (ISSN 0968-0896)
- "Practical Pharmaceutical Chemistry part I, II) The Athlone Press 1975
- "Principles of Medicinal Chemistry" W.O. Foye, ed. Lea & Febiger, 1995
- "Remington's Pharmaceutical Sciences", Osol A. ed. Mack Publishing Co., 1980
- « Goodman & Gilman's The Pharmacological Basis of Therapeutics » Goodman a., Hardman J., Limbird L., eds MacMillan Publishing Co 2001
- "Strategies for Organic Drug Synthesis and Design" Lednicer, D., ed. Wiley J. & Sons 2000
- "Essentials of Pharmacology" Theocharidis T. Little, Brown & Company 2nd edition, 1999
- Drug Actions, Basic Principles and Therapeutic Aspects, Mutschler/Devendorf
- Archiv.Pharm 317, 183-185, 1984
- Arch Pharm 325, 483-90, 1992.
- Arch Pharm 328, 689-698, 1995
- Intensive Care Med. 18, 449-454, 1992
- Greenblatt et al. (1999) FEBS Letters **463**, p321
- Dvir et al. (2003) JACS **125**, p363
- Bar-On et al. (2002) Biochemistry **41**, p3555.
- Kryeger et al.,(1997) Structure 7,297
- Raves et al. (1997) Nature Structural Biology 4, p57
- Εθνικό Συνταγολόγιο 2007, Εθνικός Οργανισμός Φαρμάκων

Educational activities:

Lectures, discussion with the students in every lecture.

Evaluation process and methods:

The evaluation of knowledge and skills which have been acquitted by the students from the course work is attested with written examinations (80% of the final grade + 20% of experimental aptitude) which are conducted in a fixed date. The written examinations have duration of 3.5h, and consist of approximately ten (10) composite questions spherically covering the tough subjects. Grading is proportionally allocated to the tutors. Optional periodic examinations, partially covering the tough subject, could be also arranged between tutors and students.

Use of TIC / Electronic distribution of the lectures:

Tutors:

1) Vassilis Demopoulos, Professor

Lectures, notes, statements etc are presented in the website: http://users.auth.gr/vdem/

2) Ioannis Nicolaou, Assistant Professor

Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy.

3) Dimitra Hadjipavlou-Litina, Professor

Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy.

Teaching

Teaching of this course is accomplished through lectures, special supportive lectures and laboratory work.

A total of 39 lectures (13 weeks x 3 hours) are given in the lecture room Δ12 implementing power point projection and/or overhead projection, as well as with chalk and a blackboard.

α) Lectures:

Lecture	Title	Tutor
1	Chemotherapeutic drugs, selective toxicity, antibacterial antibiotics, penicillins, structural and physicochemical aspects in their molecular mechanism of action	V. Demopoulos
2-3	Synthetic strategy towards benzylpenicillin, carbenicillin, & ampicillin	V. Demopoulos
4	Cephalosporins, structural/functional characteristics & activity, semisynthetic preparation of 7-ACA	V. Demopoulos
5-6	Various antibacterial antibiotics with molecular focusing on monobactams, chloramphenicol, cycloserine, tetracyclines, aminoglycosides & macrolides	V. Demopoulos
7-9	Non-antibiotic antibacterial drugs with molecular focusing on metronidazole, nitrofuradoine, and quinolones	V. Demopoulos
10	Antifugal phenacylimidazoles. Antiviral chemotherapeutics with focus on acyclovir	V. Demopoulos
11-13	Drugs for the gout, chemical biology of their pharmacodynamic and pharmacokinetic behavior, methods of retrosynthetic preparation & physicochemical identification	V. Demopoulos
14-15	Diouretics, chemical biology of their pharmacodynamic and pharmacokinetic behavior, synthetic strategy & physicochemical identification	V. Demopoulos
16	Physicochemical properties and selectivity of histamine receptor ligands	V. Demopoulos

17-20	Antineoplastics & antineoplastic detoxifying agents	I. Nicolaou
21-23	Antidiabetic agents & agents for the treatment of obesity	I. Nicolaou
24	Renin inhibitors-angiotensin converting enzyme inhibitors & angiotensin II inhibitors	I. Nicolaou
25	Calcium channel blocking agents & nitrates (for the treatment of angina)	I. Nicolaou
26	Platelet aggregation inhibitors	I. Nicolaou
27	Local anesthetics	I. Nicolaou
28-29	Peripheral Nervous System-Cholinergics-Synthetic Strategy & structure activity relationships	D.Hadjipavlou-Litina
30-32	Acetylocholine antagonists- Inhibitors of Achetylcholinesterase-Organophosphoric esters-Antiglavcoma agents- Synthetic Strategy & structure activity relationships	D.Hadjipavlou-Litina
33	Acetyl-choline antagonists -- Synthetic Strategy & structure activity relationships	D.Hadjipavlou-Litina
34	Anti-Alzheimer drugs- Synthetic Strategy & structure activity relationships	D.Hadjipavlou-Litina
35-36	Adrenergics- Synthetic Strategy & structure activity relationships	D.Hadjipavlou-Litina
37	Agonists of α -receptors- Synthetic Strategy & structure activity relationships	D.Hadjipavlou-Litina
	Sympathomimetic amines-Aliphatic adrenergic amines- Synthetic Strategy & structure activity relationships	D.Hadjipavlou-Litina
38	Antagonists of α- and β-receptors-Synthetic Strategy & structure activity relationships	D.Hadjipavlou-Litina

39	Inhibitors of Lipoxygenase- Synthetic Strategy & structure activity relationships	D.Hadjipavlou-Litina

b) Laboratory Work:

Students are notified on February of each year to enroll for laboratory work. Students who neglect to enroll in time will perform the laboratory work next proper semester.

Laboratory	Title	Tutors
1-4	General introduction to the laboratory, first step reaction in the synthesis of phenytoin and isolation of crude benzil	V. Demopoulos, D.Hadjipavlou-Litina, I. Nicolaou
5-8	Drying/weighting of benzil. Implementation of spectrometric methods in identification of specific organic molecules	V. Demopoulos, D.Hadjipavlou-Litina, I. Nicolaou
9-11	Second step reaction in the preparation of phenytoin	V. Demopoulos, D.Hadjipavlou-Litina, I. Nicolaou
12-15	Isolation/purification, drying/weighing & identification of phenytoin	V. Demopoulos, D.Hadjipavlou-Litina, I. Nicolaou
16-18	Reaction for the preparation of hymechromone under anhydrous conditions	V. Demopoulos, D.Hadjipavlou-Litina, I. Nicolaou
19-22	Isolation/purification, drying/weighing & identification of hymechromone	V. Demopoulos, D.Hadjipavlou-Litina, I. Nicolaou
23-26	Chemical quantitative analysis of hydralazine hydrochloride, and delivery of the laboratory report	V. Demopoulos, D.Hadjipavlou-Litina, I. Nicolaou

Pharmacology II

Course code number: 55
Curriculum: Undergraduate
Semester: 6th
Course Type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 5.5
Lectures (hours/week): 3
Tutorials (hours/week): 1
Laboratory work (hours/week): 2

Course coordinator:
Sklaviadis Theodoros Prof.
Tutors (Academic Year 2018-2019)
Sklaviadis Theodoros Prof.
Xanthopoulos Konstantinos Assistant Prof.

Teaching assistants:
Pharmacology graduate and doctoral students

Aims of the course:
By the end of the course, students should be able to understand the basic principles of Pharmacology, Pharmacodynamics and Pharmacokinetics and to know the various pharmacologic classes and their mechanisms of action. They should appraise the factors determining the net pharmacological result, the emergence of adverse reaction and drug interactions and understand how treatment is selected in everyday clinical praxis.

Skills:
Appointment of lectures, tutorials and laboratory tests

Teaching methods:
Lecture presentations, Computer-Assisted Learning in Pharmacology (PCAL), Tutorials, and Discussion of specific drug-related case studies

Course content:
Introduction to the Nervous System pharmacology. Neuron cell types. Synapses. Taxonomy of neuronal receptors. Structure-activity relationships of neurotransmitters. Autonomous nervous system. Parasympathomimetic drugs. Acetyl-cholinesterase-inhibiting drugs. Parasympatholytic drugs. Ganglioplegic drugs and drugs acting on the neuromuscular junction.

Sympathomimetics. Sympatholytics acting on adrenergic alpha- or beta-receptors. Anti-parkinsonism drugs. CNS depressant agents. Barbiturates. Antidepressant and antianxiety agents. Psychotropics. Anti-psychosis drugs. Psycho-stimulants. Alcohols. General and local anesthetic agents. Opioid analgesics. Immunosuppressants. Sera. Vaccines. Antibodies. Anti-hypercholesterolemia drugs. Hormones of hypothalamus and pituitary gland (hypophysis). Thyroid hormones and related drugs. Adrenal glands hormones and related agents. Estrogens. Androgens. Diabetes. Insulin and related drugs. Vitamins. Antiviral agents.

Educational activities:
Lectures, tutorials and practical courses

Evaluation process and methods:
Exams at the end of the semester; essay submission in laboratory tests.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures
PowerPoint slides, experimental pharmacology simulations/modelling, videos. The lectures will be available to students in PDF format through AUTh's e-learning platform (www.e-class.auth.gr).

Teaching:

A) Lectures. Lectures, 21 in total will take place twice weekly in room D12, and tutorial in room A31of the Sciences building.

Academic Year: 2018-2019

#	Title	Tutor
1	Introduction to the pharmacology of the NS	T. Sklaviadis
2	Neuron cell types. Synapses. Taxonomy of neuronal receptors. Structure-activity relationships of neurotransmitters.	T. Sklaviadis
3	Autonomous nervous system.	T. Sklaviadis
4	Parasympathomimetic drugs. Acetyl-cholinesterase-inhibiting drugs.	T. Sklaviadis
5	Parasympatholytic drugs. Ganglioplegic drugs and drugs acting on the neuromuscular junction.	K. Xanthopoulos
6	Sympathomimetics.	T. Sklaviadis
7	Sympatholytics acting on adrenergic alpha- or beta-receptors.	T. Sklaviadis
8	Parkinson's disease and treatment	K. Xanthopoulos

9	CNS depressant agents and barbiturates.	K. Xanthopoulos
10	Antidepressant and antianxiety agents.	K. Xanthopoulos
11	Psychotropics. Anti-psychosis drugs.	K. Xanthopoulos
12	Psycho-stimulants and Alcohols.	K. Xanthopoulos
13	General and local anesthetic agents.	K. Xanthopoulos
14	Opioid analgesics	K. Xanthopoulos
15	Introduction to Hormones	T. Sklaviadis
16	Hormones of hypothalamus and pituitary gland (hypophysis).	T. Sklaviadis
17	Steroid hormones, Estrogens, Androgens	T. Sklaviadis
18	Thyroid hormones and related drugs	T. Sklaviadis
19	Adrenal glands hormones and related agents	T. Sklaviadis
20	Vitamins.	K. Xanthopoulos
21	Immunosuppressants, sera, vaccines and antibodies.	K. Xanthopoulos

B) Laboratory work

#	Title	Tutor
1	Assessing the postsynaptic potential	T. Sklaviadis
2	Simulation exercise: drugs acting on the autonomous nervous system	K. Xanthopoulos
3	Symptoms and Circuits: A Brain Game	K. Xanthopoulos
4	Electrophoretic Analysis of Proteins	T. Sklaviadis

C) Tutorials

#	Title	Tutor
1	Antiviral agents	T. Sklaviadis
2	Lipoproteinemia Symptoms, Diagnosis, Treatments	T. Sklaviadis
3	Diabetes and its treatment	K. Xanthopoulos

BIOINFORMATICS

Code number: NP47
Cycle: Undergraduate
Semester: 6th
Course type

x	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2 weeks
Tutorial (hours/week): 2 weeks
Laboratory work (hours/week):

Course coordinator Aletras A. Professor
Tutor (s): Aletras A. Professor

Chouvarda I. Assist. Professor

Assisting personnel:

Aims of the course: Training in computer applications on organizing and understanding of biological information. Familiarity with the management, control and analysis of molecular data, in particular with a view to extracting biological conclusions

Skills: Acquisition of capacity use of the numerous biological information databases through the Internet. Familiarization with recovery tools, comparison and analysis of biological information. Familiarity with the use of computer programs and Internet servers to find the bond, sequences and genome analysis, determining 3D macromolecules. Introduction to molecular evolution models.

Teaching methods: During the lectures, exercises,tutorials

Contents of the course: Categories: genetic markers and molecular information. Definition, design and structure of a database. Search strategies. Analysis and evaluation of search results. Prediction of protein structures. Analysis patterns. Determination of 3D structure. Alignment and find bond sequences. Models of evolution.Pharmacodynamicsi. Molecular diagnosis. Future developments in Bioinformatics and computational biology.

Proposed literature: Baxevanis, A.D. and Ouellette, F. (Greek version). 2004. Bioinformatics. Scientific Editions Parisianou S.a. Athens (edited by Greek version: Evangelos n. Moudrianakis, Stavros j. Chamodrakas).

Educational activities: Monitoring of lectures,Working on different projects, Collaboration in teams

Evaluation process and methods: Written Examination, Written Tasks

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

The lectures of the course made use of ICT/course material available on Blackboard

Teaching: The teaching of the course are lectures, written exercises and tutorials

A) **Lectures**.

The lectures (2 hours) take place once a week in room D12 and use electronic media to view the lectures. Copies of lectures and posted on the website of the course (Blackboard) by free access.

Lecture	**Title**	**Tutor**
1	Genetic markers – Molecular information	All tutors
2	Introduction to bioinformatics	All tutors
3	Databases – Search Strategies (1)	All tutors
4	. Databases – Search Strategies (2	All tutors
5	Analysis of DNA and amino acid sequences	All tutors
6	Protein databases	All tutors
7	Aligning sequences	All tutors

8	Molecular Evolution (1)	All tutors
9	Molecular Evolution (2)	
10	Polymorfisms single nucleotide and pharmacodynamics	All tutors
11	Molecular diagnosis	All tutors
12	Applications of bioinformatics	All tutors
13	Future developments in Bioinformatics and computational biology	All tutors

FIRST AID

Code number: NP48
Cycle: Undergraduate
Semester: 6th
Course type

x	Background/General knowledge
	Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator: Grosomanidis B. Assist. Professor
Tutor (s): Grosomanidis B. Assist. Professor
Karakoulas K. Assist. Professor
Thomareis O. Assist. Professor
Amaniti A. Lecturer
Argiriadou E. Lecturer
Tsaousi G. Lecturer
Assisting personnel:
Aims of the course:
Skills:
Teaching methods: Lectures & laboratory exercises '.

Contents of the course: To rescue and correct placement of patients who need emergency care. Endotracheial intubation. Trachea, or first aid. Shock. First aid for heart-circulatory disorders. First aid in multiple traumas. Haemoostasis. First aid in thorax trauma. Skull and brain lesions. First aid for burns.Poisoning.Heart and lung rejuvenation in adults and children.
Proposed literature:
Educational activities:
Evaluation process and methods: Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

SEMESTER VII

Pharmaceutical Biotechnology

Code: ΝΠ-35
Cycle/Level: 1st / Undergraduate
Semester: 7th

Type of Course

	Background
X	Scientific Area (Pharmacy)

ECTS: 4
Lectures (hours): 3
Tutorials (hours):
Laboratory Work / Written Assignments (hours): 2

Course Coordinator:
Panagiotidis Christos, Professor (http://users.auth.gr/pchristo/)

Faculty Instructors
Panagiotidis Christos, Professor http://users.auth.gr/pchristo/
Office 315, 3rd floor Biology/Pharmacy building
Office hours: weekdays 11-12 am
Contact: by email at pchristo@pharm.auth.gr

Pampalakis George, Assistant Professor, http://users.auth.gr/gpampalakis
Office 306A, 3rd floor Biology/Pharmacy building
Office hours: weekdays 11-12 am
Contact: by email at gpampalakis@pharm.auth.gr

Xanthopoulos Konstantinos, Assistant Professor, http://users.auth.gr/xantho
Office 306B, 3rd floor Biology/Pharmacy building

Office hours: weekdays 11-12 am
Contact: by email at (xantho@pharm.auth.gr)

Teaching Assistants: -

Learning Outcomes: To introduce students to the rapidly developing, in recent years, area of «Pharmaceutical Biotechnology» and familiarize them with the basic concepts, technologies and applications of molecular biotechnology in the production of pharmaceuticals, using enzymes, genes, genetically modified organisms and plants.

General Competences: Apply knowledge in practice; retrieve, analyze and synthesize data and information, with the use of necessary technologies; adapt to new situations; work autonomously, work in teams; work in an international context; work in an interdisciplinary team; generate new research ideas; respect natural environment; Advance free, creative and causative thinking. These targets are being achieved through a combination of lecture presentations and bibliographic assignments (written papers and oral presentations) in selected topics in Pharmaceutical Biotechnology. The oral presentations of these assignments are designed to help the students develop both creative thinking and presentation skills pertaining to the expression/presentation of complex scientific aspects.

Teaching methods:

Lectures and student presentations of selected topics in Pharmaceutical Biotechnology.

Course Content:

Molecular Biotechnology (Principles and applications) – Gene cloning, identification and gene expression for producing recombinant proteins – Expression systems for recombinant protein production (bacteria, fungi, plant cells/plants, mammalian cells etc.) – Problems associated with recombinant protein production (factors affecting protein expression levels, as well as protein folding and functionality) – Technologies of intracellular transport of recombinant proteins – Protein transduction technologies – Formulation of therapeutic proteins – Pharmacokinetics, pharmacodymamics and immunogenicity of therapeutic proteins – Hematopoietic and growth factors – Interferons – Interleukins – Insulin, growth hormone and other peptide hormones – Recombinant human coagulation and thrombolytic

factors – Therapeutic and diagnostic antibodies – Vaccines – Genomics and other –omics technologies – Gene therapy – Cell therapies and regenerative medicine – Biotherapeutics and biosimilars – Regulatory issues related to the quality, production and licensing of biotherapeutics – Bioethics and issues related to the use of genetically modified organisms in producing biotherapeutics.

Proposed literature:

1. D.J.A. Crommelin, R.D. Sindelar, B. Meibohn, «Φαρμακευτική Βιοτεχνολογία» (3η έκδοση, 2011) Επιμέλεια Ελληνικής Έκδοσης: Α. Σ. Τσιφτσόγλου, Γ. Σωτηροπούλου

2. Watson, J. D., Myers, R.M., Caudy, A.A., Witkowski, J.A. ”RECOMBINANT DNA” Edition: 3/2007, Publisher: Akadimaikes Ekdoseis I. Basdra & Co.

Additional bibliography and study materials: Lecture slides and additional educational material and notes, will be posted on the instructors’ websites.

Educational activities:

Lectures and student presentations involving in-depth bibliography mining, organization, writing and presentations on selected Pharmaceutical Biotechnology topics.

Evaluation process and methods:

Student performance is evaluated in written exams that take place at the end of the semester (90% of the final grade), as well as during the presentation of the student bibliographic assignments (10% of the final grade).

Written final exams at the end of the spring semester or in the autumn examination period. The exact dates and places are organized by the School of Pharmacy. The students are provided with 20 statements and asked to define whether each statement is correct or wrong (0.1 points/ correct answer, -0.1 points/ mistaken answer) and to justify their answer (0.4 points/ question). Questions that have not been answered correctly by any students are withdrawn and final grade is calculated based on the grades from the remaining questions. The examination time is 1 hour.

Use of ICT (Information and communication technologies) / Electtronic distribution of the course materials:

ICT is being in the lectures of the course (Powerpoint presentations, interactive tutorials using ICT, videos etc.).

Lecture material, course and exam announcements, exam results etc. are posted on the webpages of the course coordinator and the course instructors.

Teaching:

Teaching takes place with course lectures and student bibliographic assignments and presentations.

A) Lectures. The lectures (2 hours each) take place twice a week in Lecture Hall Δ12 of the School of the Exact Sciences. The lectures, together with related educational material, are freely accessed in the webpages of the two course instructors

Lectures	Title	Instructor
1	Introduction to Pharmaceutical Biotechnology	Panagiotidis
2-4	Introduction to the recombinant DNA technology	Panagiotidis
5-6	DNA cloning and introduction of recombinant DNA in cells	Panagiotidis
7-8	Recombinant protein expression in bacteria	Panagiotidis
9	Recombinant protein expression in eukaryotic systems	Pampalakis
10	Transgenic animals – generation and usage in the production of biotechnological drugs and in the identification of targets for therapeutic intervention	Pampalakis
11-12	Formulation and quality assurance of biotechnological drugs	Pampalakis
13	Pharmacokinetics and pharmacodynamics of biotechnological drugs	Xanthopoulos
14-16	Pharmaceutical proteins (production and therapeutic applications)	Pampalakis
17-18	Therapeutic antibodies	Pampalakis
19	Vaccines	Pampalakis
20-21	RNA interference and oligonucleotide drugs	Pampalakis

22	Gene and cell therapies	Xanthopoulos
23	Genomics and other -omics technologies	Pampalakis
24	Biosimilars	Xanthopoulos
25	Regulatory considerations and procedures pertaining to the quality, production and approval of biotherapeutics	Xanthopoulos
26	Ethical issues in Biotechnology	Panagiotidis

B) Supervision of student bibliographic assignments and presentations (in groups, 5 students/group)

PHARMACOGNOSY III

Code number: NP-36
Cycle: Undergraduate
Semester: 7th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 7
Lectures (hours/week): 3
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator: Diamanto Lazari, Associate Professor
Tutor (s):

Diamanto Lazari, Associate Professor

Room 317, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: 2310-997617, e-mail (dlazari@pharm.auth.gr)

Karioti Anastasia, Assistant Professor

Room 317b, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: 2310-997617, e-mail (karioti@pharm.auth.gr)

Dr. Gavrieli Chrysi, RLT'S

Room 316A, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: e-mail (gabrieli@pharm.auth.gr)

Assisting personnel:

Aims of the course: Understanding by the students of the substances belonging to groups of alkaloids and their derivatives. In order to achieve these objectives, the physical, chemical and biological properties of these substances are presented, as well as their chemical classification, their biosynthesis and medicinal plants containing them. It will also discussed uses of medicinal plants whose main active ingredients belong in these categories of natural products. Moreover, in the laboratory work the students will know and will analyze herbal medicines included in the European Pharmacopoeia 5, using the appropriate analytical methods (microscopic and phytochemical).

Skills: Familiarity and in depth knowledge of phytochemical groups of alkaloids and their derivatives, as well as of herbal medicines containing them.

Teaching methods: Lectures & laboratory work.

Contents of the course:

ALKALOIDS AND RELATED COMPOUNDS

Natural products derived biosynthetically from amino acids (non-alkaloids) Papain, Ficin, Bromelain, Abrin and Ricin. Lectins, Mushroom Poisoning—Amatoxins. Phallotoxins, Antamanin, Phallolysin. Enzymatic toxins from snake venom. Neurotoxins, Cardiotoxins. Toxins of *Viscum album* L.

ALKALOIDS. Introduction, chemical structures of alkaloids. Biosynthesis. Detection. Extraction. Isolation. Pharmacological activities. Medical uses.

Alkaloids derived from lysine and ornithin.

Mannich-type reaction and aldol condensation, Schiff Base reaction.

Tropane alkaloids. Structures, biosynthesis of tropane nucleus, biosynthesis of the tropic acid, Medicinal plants: *Atropa belladonna* L*., Datura stramonium* L*., Hyoscyamus niger.* Solanaceae: Industrial sources of tropane alkaloids: Plants (*Datura sanguinea, D. metel, Hyoscyamus muticus, Duboisia myoporoides, D. leichhardtii*)

Alkaloids of Erythroxylaceae: Cocaine.

Pyrrolizidine alkaloids. Structures. Biosynthesis. Toxicity in animals and human. Plants containing pyrrolizidine alkaloids: *Borago officinalis, Symphytum officinale, Tussilago farfara, Eupatorium cannabinum, Senecio vulgaris.*

Quinolizidine alkaloids. *Cytisus scoparius*. Sparteine, *Laburnus anagyroides, Lupinus* spp.

Indolizidine alkaloids. (-)–Swainsonine, (+)–Castanospermine.

Piperidine alkaloids. *Lobelia inflata*. *Punica granatum*.

Piperidine Amides and Piperidine Alkaloids not from the Metabolism of Lysine.

Piper nigrum L. (piperine), *Conium maculatum* coniine, N-methylconiine, conhydrine, conhydrinone. Toxicity.

Nicotinic acid derivatives. *Nicotiana tabacum*. Nicotine, anatabine, quinolinic acid.

Areca catechu L.

Alkaloids derived from phenylalanine and tyrosine.

Isoquinoline alkaloids.

Simple tetrahydroisoquinolines. *Lophophora williamsii* (Peyotl).

Phenylethylamines. *Ephedra* spp. Ephedrine, *Catha edulis*.

Benzyltetrahydroisoquinolines alkaloids. Biosynthesis. Papaverine.

Benzylisoquinolines.

Curare of Menispermaceae and Loganiaceae. Pharmacological properties. Medical uses.

Erythrina alkaloids.

Aporfinoids. Apomorphine.

Boldin and isoboldin from *Peunus boldus.*

Protoberberines and their derivatives. *Hydrastis canadensis* (berberine),

Fumaria officinalis, *Chelidonium majius*.

Biosynthesis of benzophenanthrines (chelidonine, sanguinarine) from stylopine. *Sanguinara canadensis*. *Eschscholtzia californica. Papaver roeas.*

Morphinanes. *Papaver somniferum*. Opium. Morphine. Codeine, Noscapine, Papaverine (pharmacological activity). Extraction and isolation of opium alkaloids. Medical uses, Contraindications and side effects.

(Codethriline, Pholcodine, Dihydrocodeine, N-allyl-normorphine (nalorphine), N-cyclopropylmethyl-14-hydroxynordihydromorphinone (nalthrexone), N-allyl-14-hydroxynordihydromorphinone (naloxone).

Heroine.

Phenylethylisoquinolines.

Colchicum autumnale (colchicine)

Alkaloids of Amaryllidaceae (galanthamine).

Isoquinoline-monoterpenic alkaloids.

Cephaelis spp. (Ipeca).

Alkaloids derived from tryptophan.

Simple amines and carbolines.

Indolines derived from cyclization of tryptophan.

Ergolines.

Indole-monoterpenic alkaloids.

β-Carbolines – Hallucinogens of C. America, Agaricaceae (psilocin, psilocybin)

Myristicaceae of S. America – Mimosaceae of S. America – Malpighiaceae of S. America – *Peganum harmala* L..

Alkaloids derived from 5-hydroxytryptophan. *Physostigma venenosum* (*Physostigmatis semen* or Calabar semen).

Ergot alkaloids (*Claviceps purpurea*).

Indole-monoterpenic alkaloids. Biosynthesis – strictosidine.

Corynantheanes, Strychnanes, alkaloids of *Catharanthus,* Cinchona alkaloids (Loganiaceae, Rubiaceae, Apocynaceae).

Alkaloids derived from anthranilic acid (quinolines, acridines, quinazolines)

Alkaloids derived from histidine – Imidazoles.

Alkaloids derived from terpene metabolism. Mono- and sesquiterpene alkaloids. Diterpene alkaloids, *Aconitum* spp., Ranunculaceae alkaloids.

Steroidal alkaloids - Apocynaceae, Liliaceae, Solanaceae.

Alkaloids of different chemical structures (spermine, spermidine, macrocyclic peptides, maytansinoids).

Purines (caffeine, theophylline, theobromine).

LABORATORY WORK:

Microscopic and Phytochemical control of herbal drugs containing alkaloids.

Microscopic control: Folia Hyoscyami, Folia Belladonnae, Folia Stramonii, Radix Ipecacuanhae, Rhizoma Hydrastis, Semen Colae, Cortex Cinchonae, Semen Colchici, Herba Chelidonii, Herba Lobelia, Folia Jaborantii, Folia Boldi

Phytochemical control: *Hyoscyamus niger*: qualitative and quantitative control, Isolation of caffeine from leaves of *Camelia sinensis,* Radix Ipecacuanha: qualitative and quantitative determination of emetine and cephaeline, qualitative and quantitative determination of quinine and quinidine.

Suggested Literature:

6. European Pharmacopoeia 5.

7. Gunnar Samuelson, ΦΑΡΜΑΚΕΥΤΙΚΑ ΠΡΟΪΟΝΤΑ ΦΥΣΙΚΗΣ ΠΡΟΕΛΕΥΣΗΣ, Απόδοση στην Ελληνική: Π. Κορδοπάτης, Ε. Μάνεση-Ζούπα, Γ. Πάιρας, Πανεπιστημιακές Εκδόσεις Κρήτης, Ηράκλειο 1996

8. J. Bruneton. Pharmacognosie, Phytochimie, Plantes médicinales 3th édition Ed. TEC/DOC Paris 1999.

9. R. Hansel, O. Sticher. Pharmacognosie-Phytopharmazie. 7 Auflage, Springer-Verlag, Berlin-Heidelberg 2004.

10. Notes distributed by the teachers.

Educational activities: Lectures and laboratory work.

Evaluation process and methods: Written exam at the end of the semester. To compute the final grade, the grade which is given by each tutor (5.0) is added.

The examination at the end of the semester is performed at dates, time and place arranged by the department

The duration of the examination is 3 hours for the two tutors.

Use of TIC / Electronic distribution of the lectures

Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy.

Teaching

Teaching of this course is accomplished through lectures and laboratory work.

(A) Lectures. Lectures (in total three hours per week) are given in the lecture room D12 (main building of the School of Natural Sciences)

Lecture	**Title**	**Tutor**
1-2	*Natural products derived biosynthetically from amino acids (non-alkaloids)*	All tutors
3-4	ALKALOIDS. Introduction, Biosynthesis.	All tutors
5-6	Alkaloids derived from lysine and ornithin. Tropane alkaloids.	All tutors
7-8	Alkaloids of Erythroxylaceae,Pyrrolizidine alkaloids, alkaloids of quinolizidine, indolizidine, piperidine, nicotinic acid.	All tutors
9-10	Alkaloids derived from phenylalanine and tyrosine. Simple tetrahydroisquinolines, phenylethylamines.	All tutors
11-12	Isoquinoline alkaloids, benzyltetrahydroisoquinoline alkaloids,	All tutors

	benzylisoquinoline alkaloids.	
13-14	Curares, Aporphinoids, Protoberberines and derivatives	All tutors
15-17	Morphinanes, Hemisynthetic alkaloids	All tutors
18-20	Isoquinoline alkaloids, Phenylethylisoquinolines, Alkaloids of Amaryllidaceae, Isoquinoline-monoterpene alkaloids	All tutors
21-22	Alkaloids derived from tryptophan, Simple amines and carbolines, Indolines derived from cyclization of tryptophan	All tutors
23-24	Indole-monoterpenic alkaloids. Alkaloids derived from 5-hydroxytryptophan.	All tutors
25-27	Ergot alkaloids, Indole-monoterpenic alkaloids	All tutors
28-30	Biosynthesis of indole alkaloids, Corynantheanes, Strychnanes.	All tutors
31-33	Alkaloids derived from anthranilic acid (quinolines, acridines, quinazolines)	All tutors
34-35	Alkaloids derived from histidine – Imidazoles.	All tutors
36-37	Alkaloids derived from terpene metabolism. Mono- and sesquiterpene alkaloids.	All tutors
38-39	Diterpene alkaloids, Steroidal alkaloids, Alkaloids of different chemical structures, Purines	All tutors

B) Laboratory work

Students must perform laboratory work (2 hours per week). Laboratories take place a) in the Microscopy room of the 3rd floor of the Biology/Pharmacy building and b) in the Hall of chemistry of natural products of the 3rd floor of the Biology/Pharmacy building.

Laboratory	Title	Tutor
1	Microscopic control: Folia Hyoscyami, Folia Belladonnae, Folia Stramonii	All tutors
2	Microscopic control: Radix Ipecacuanhae, Rhizoma Hydrastis, Semen Colae	All tutors
3	Microscopic control: Cortex Cinchonae, Semen Colchici	All tutors
4	Microscopic control: Herba Chelidonii, Herba Lobelia	All tutors
5	Microscopic control: Folia Jaborantii, Folia Boldi	All tutors
6-7	Phytochemical control: qualitative and quantitative control of leaves of *Hyoscyamus niger*	All tutors
8-9	Phytochemical control: Isolation of caffeine from leaves of *Camelia sinensis*	All tutors
10-11	Phytochemical control: Radix Ipecacuanha: qualitative and quantitative determination of emetine and cephaeline	All tutors
12-13	Phytochemical control: qualitative and quantitative determination of quinine and quinidine	All tutors

SPECIFIC PHARMACEUTICAL TECHNOLOGY II

Code number: 66
Cycle : Undergraduate
Semester : 7th
Course Type

	Background/ General knowledge
x	Scientific Area (pharmacy)

Credit units (ECTS): 6
Lectures (hours per week): 3
Tutorial (hours per week):
Laboratory work (hours per week): 2
Course coordinator: Ioannis Nikolakakis, Associate Professor
Tutors :

1. Kyriakos Kachrimanis Associate Professor

2. Ioannis Nikolakakis, Associate Professor

3. Athanasia Panagopoulou, Lecturer

Room 207, 2nd floor, Biology/Pharmacy building

Aims of the course: Education about the sterile dosage forms and the liquid non sterile dosage forms.

Skills : The students learn how to work and use instruments that are used for the preparation and control of sterile pharmacological dosage forms and methods for the preparation of liquid non sterile dosage forms.

Teaching methods : Lectures and laboratory work.

Contents of the course :

A . Sterile dosage forms: general information on microbes. Microbiological contamination of pharmaceutical products. Antimicrobial action of chemical substances. Sterilization of pharmaceutical products. Ophthalmic products. Injectable (parenteral) products. Production of water with pharmaceutical purity specifications.

B. Liquid dosage forms. Solutions of drugs for oral administration: general views. Water and other solvents. Auxiliary substances. Production of pharmaceutical solutions – Syrups – Elixirs. Pharmaceutical solutions prepared form extracts of pharmaceutical plants.

Proposed literature :

S. Malamataris. Technology of sterile liquid pharmaceutical dosage forms.

Th. Brousali. Liquid non sterile dosage forms.

Educational activities: Lectures and laboratory work.

Evaluation process: Written examinations at the end of the semester. The duration of the exams is 2 hours.

After the students finish their laboratory work, they prepare reports about their results.

Use of ΤΠΕ / electronic distribution of the lectures.

Power point presentation is used in the lectures.

Teaching :

Teaching is accomplished through lectures and laboratory work.

A . The lectures are taking place (one of 2h and the other of 1h) two times a week in the seminar room of the 2nd floor in the Biology/Pharmacy building.

Lecture	**Title**	**Tutor**
1	General information on microbes (1) Solubility and solvents	All tutors
2	General information on microbes (2) Co –solvents in pharmacy	All tutors
3	Microbiological contamination of pharmaceutical products. Physicochemical properties of pharmaceutical substances.Electrolytes.	All tutors
4	Antimicrobial action of chemical substances. Buffer solutions.	All tutors

5	Sterilization of pharmaceutical products. Solvents used for the preparation of liquid pharmacological dosage forms.	All tutors
6	Sterilization of pharmaceutical products (2) Auxiliary substances used for the improvement of pharmacological dosage forms.	All tutors
7	Laminar flow. Clean rooms.(1) Auxiliary substances used for the colorance of pharmaceutical dosage forms.	All tutors
8	Laminar flow. Clean rooms (2) Auxiliary substances used for the improvement of taste and odor.	All tutors
9	Preservation of pharmaceutical products. Preparation or solutions for per os administration.	All tutors
10	Ocular products. Syrups.	All tutors
11	injectibles (1). Elixirs.	All tutors
12	Injectibles (2).	All tutors

	Tinctures.	
13	Production of water of pharmaceutical purity specifications. Fluid extracts.	All tutors

Γ) laboratory work.

Laboratory classes are held 3 times per week and the duration of each is 2 hours. They take place in the pharmaceutical technology department.

Lab	**Title**	**Tutors**
1	Measurement and control of the osmolarity or injectables and eye drops.	Kachrimanis
2	Practical training on pharmaceutical microbiology using interactive software.	Panagopoulou
3	Sterilization techniques and assessment of microbiological contamination.	Nikolakakis

ORGANIC PHARMACEUTICAL CHEMISTRY III

Code number: 70
Cycle: Undergraduate
Semester: 7th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 8

Lectures (hours/week): 3
Tutorial (hours):
Laboratory (hours): 2
Course Coordinator: Dimitra Hadjipavlou-Litina, professor

Tutors:
1) Eleni A. Rekka, Professor

Room 409, 4th froor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: email (rekka@pharm.auth.gr)

2) Ioannis Nicolaou, Assistant Professor

Room 404, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 12-1.

Communication: email (inikolao@pharm.auth.gr)

3) Dimitra Hadjipavlou-Litina, Professor

Room 408/B & 410, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: e-mail (hadjipav@pharm.auth.gr)

Assisting Personnel: Dr A. Gavalas RLT'S

Aims of the course: This course is concerned with the discovery, design, synthesis and identification of biologically active compounds acting on the central nervous system (CNS), antiepileptics drugs: miscellaneous anticonvulsants, miscellaneous antiparkinson agents, NMDA receptor antagonists for the treatment of Alzheimer's disease, antimigraine agents, agonists/antagonists of Adenosine, Inhibitors of adenyl-cyclase- Inhibitors of PDEs, Methylphenidate and analogues, Inhibitors of serineproteases, Statines, Agonists/Antagonists of CCK. Quantitative structure-activity relationships (SAR/QSAR). Finally, agents used illegally, such as opioids, cannabinoids and other drugs of addiction, with special pharmaco-sociologic interest, are studied.

Aims are the critical knowledge and thorough examination of synthesis, structure, correlation of structure with drug action, fate of the drugs in the organism, sites of loss, therefore duration of drug action. Aim is also to familiarise the students with relations governing molecules acting on CNS

and the central nervous system site of action, as well as the involved neurotransmitters.

Skills: By the end of this course, the students should be able to: Know the synthesis of the important drug molecules used for pathologic conditions concerning CNS and cardiovascular system, the physical and chemical properties of these drugs, the biological properties that give the therapeutic potential to these groups of drugs, the structural changes (i.e. metabolism) and fate of these molecules in the organism, the duration of action, the possibility of biodetoxication or biotoxication. Reach conclusions on the relationships between action and structural and physicochemical characteristics and examples are studied of characteristic molecules used illegally as narcotic and addictive agents, from the pharmacochemical point of view.

Teaching methods: Lectures and laboratory work. The material is covered by a textbook, text notes and laboratory notes.

Contents of the course:

1) Eleni A. Rekka

This course analyses synthetic pathways, extraction-isolation, physical, chemical, biological properties, purity and quality control, identification, quantitative determination, molecular mode of action, side effects, fate in the organism - drug metabolism, structure-activity relationships, therapeutic uses, adverse actions and doses of drugs acting on the Central Nervous System, i.e. hypnotics, anxiolytics, neuroleptics (drugs acting against mania and psychoses), antidepressants. Opioids and other centrally acting analgesic and antitussive agents. Opioid antagonists. Introduction to addiction. Agents used in detoxication and addiction therapy. Cannabinoids, psychotoxic and psychedelic drugs.

2) Ioannis Nicolaou

Pharmacochemical approach (as design, synthesis, physicochemical properties, target cell interactions, structure-activity relationships, pharmacochemical interpretation of toxicity, metabolism) of the below classes of drugs: miscellaneous anticonvulsants, miscellaneous antiparkinson agents, NMDA receptor antagonists for the treatment of Alzheimer’s disease, antimigraine agents.

3) Dimitra Hadjipavlou-Litina

Stimulants-Analeptics -Agonists/antagonists of Adenosine, Inhibitors of adenyl-cyclase- Inhibitors of PDEs, Methylphenidate and analogues, Inhibitors of serineproteases, Statines, Agonists/Antagonists of CCK. Quantitative structure activity relationships (SAR/QSAR). Examples of Quantitative structure activity relationshipsdetermination and chemical identifications.

Proposed Literature:

1) Eleni A. Rekka

- A. Korolkovas, "Essentials of Medicinal Chemistry", Wiley International Publications, John Wiley & Sons, 2003.
- J.M. Beale, J. Block, "Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry", Lippincott Williams & Wilkins; 12th ed., 2010

2) Ionnis Nicolaou

- *Journal* of Medicinal *Chemistry* (ACS Publications)
- *Bioorganic & Medicinal Chemistry Letters* - Elsevier
- *Bioorganic & Medicinal Chemistry* (ISSN 0968-0896)
- The *Journal* of Biological *Chemistry*
- *Chemical* Research in *Toxicology* (ACS Publications)
- *Drug Metabolism and Disposition*

3) D.Hadjipavlou-Litina

- Medicinal Chemistry Principles and Practice, Ed. F.D.King. 1994, The Royal Society of Chemistry, ISBN 0-85186-494-5
- Contemporary Drug Synthesis Li J.J, Johnson D., Sliskovic D., Roth B. Wiley-Interscience,2004, ISBN 0-471-21480-9
- New Trends in Synthetic Medicinal Chemistry, Ed. F. Gualtieri, Wiley –VCH, Vol. 7, 2000
- Annual Reports in Medicinal Chemistry, Academic Press
- *Journal* of Medicinal *Chemistry* (ACS Publications)
- *Bioorganic & Medicinal Chemistry Letters* - Elsevier

- *Bioorganic & Medicinal Chemistry* (ISSN 0968-0896)
- "Practical Pharmaceutical Chemistry part I, II) The Athlone Press 1975
- "Principles of Medicinal Chemistry" W.O. Foye, ed. Lea & Febiger, 1995
- "Remington's Pharmaceutical Sciences", Osol A. ed. Mack Publishing Co., 1980
- « Goodman & Gilman's The Pharmacological Basis of Therapeutics » Goodman a., Hardman J., Limbird L., eds MacMillan Publishing Co 2001
- "Strategies for Organic Drug Synthesis and Design" Lednicer, D., ed. Wiley J. & Sons 2000
- "Essentials of Pharmacology" Theocharidis T. Little, Brown & Company 2nd edition, 1999
- Drug Actions, Basic Principles and Therapeutic Aspects, Mutschler/Devendorf
- Archiv.Pharm 317, 183-185, 1984
- Arch Pharm 325, 483-90, 1992.
- Arch Pharm 328, 689-698, 1995
- Intensive Care Med. 18, 449-454, 1992
- Greenblatt et al. (1999) FEBS Letters 463, p321
- Dvir et al. (2003) JACS 125, p363
- Bar-On et al. (2002) Biochemistry 41, p3555.
- Kryeger et al.,(1997) Structure 7,297
- Raves et al. (1997) Nature Structural Biology 4, p57
- National Formulary 2007, National Organization of Drugs

Educational Activities: Lectures, discussion with the students in every lecture, laboratory work and tutorials.

Evaluation process and methods: Examination of the course can be done either by successful participation in two written mid-term exams (grade ≥5 in each mid-term exam) of by a final written examination at the end of the semester. Student eligibility to participate in the mid-term exams is gained by regular attendance of the lectures throughout the semester**.** The evaluation process is based on questions that the students are asked to

answer based on their knowledge obtained from the lectures as well as on the critical thinking and ability to combine, evaluate and handle the acquired knowledge and information. The duration of the examination is 4 hours.The examination at the end of the semester is performed at dates, time and place arranged by the department.During the laboratory work, students hand over a report of their results and are evaluated. At the end of the laboratory work, there is a written examination on this. Successful termination of the laboratory course permits their participation to the final examination.

To compute the final grade: the grade given by each tutor is taken (E. Rekka = 4.5/ D. Hadjipavlou-Litina = 3.5 /I. Nicolaou = 2.5) and the final grade is calculated by addition of the course exam grade (80%) and the lab exam grade (20%).

Use of TIC / Electronic distribution of the lectures:

Tutors:

1) Eleni A. Rekka, professor

Relevant announcements are presented in the corresponding place of the website of the School of Pharmacy.

2) Ioannis Nicolaou, Lecturer

Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy

3) Dimitra Hadjipavlou-Litina, professor

Lectures, notes, statements etc are presented in the corresponding place of the website of the School of Pharmacy

Teaching (Lectures/Laboratory work/ Tutorial)

In general: Lectures, discussion with the students in every lecture, in the classroom, review of basic knowledge and practical work in the laboratory. Supportive teaching and discussions are provided when needed.

Powerpoint presentation is used in the lectures, as well as slides and blackboard.

E. Rekka *(especially)*: Lectures, discussion with the students in every lecture, problem solving, homework and answers in the classroom, review of

basic knowledge and practical work in the laboratory. Supportive teaching and discussions are provided when needed.

a) Lectures.

Lectures are given 3 hours per week (and additionally) in the lecture room D12 (located in the School of Natural Sciences)

Lecture	**Title**	**Tutors**
1	Hypnotics, Ethyl and methyl alcohols	E. Rekka
2-4	Neuroleptics-Phenothiazines, Butyrophenones, Newer	E. Rekka
5-7	Anxiolytics-Benzodiazepins, Newer	E. Rekka
8-10	Antidepressants-Tricyclic, Selective serotonin reuptake inhibitors, Newer	E. Rekka
11-13	Morphinomimetics-Natural, Semisynthetic, Synthetic	E. Rekka
14	Centrally acting antitussives, Opioid antagonists	E. Rekka
15-16	Cannabinoids, Psychotropics	E. Rekka
17	Non-therapeutic use of drugs (opioids, cannabinoids, psychotropics) - Addiction - Drugs used for detoxication	E. Rekka
18-19	Analeptics- synthetic strategy and structure activity relationships	D. Hadjipavlou-Litina
20-22	Analeptics-Agonists/antagonists of adenosine synthetic strategy and structure activity relationships	D. Hadjipavlou-Litina
23-24	Analeptics-Agonists/antagonists of adenosine – Inhibitors of adenyl cyclase-synthetic strategy and	D. Hadjipavlou-Litina

	structure activity relationships	
25-26	Inhibitors of PDEs- synthetic strategy and structure activity relationships	D. Hadjipavlou-Litina
27	Methylphenidate and analogues synthetic strategy and structure activity relationships	D. Hadjipavlou-Litina
28	Inhibitors of serinproteases - synthetic strategy and structure activity relationships	D. Hadjipavlou-Litina
29	Statins- synthetic strategy and structure activity relationships	D. Hadjipavlou-Litina
30-31	Agonist/antagonist of CCK- synthetic strategy and structure activity relationships	D. Hadjipavlou-Litina
32-35	Miscellaneous anticonvulsants	I. Nicolaou
36-38	Miscellaneous antiparkinson agents & NMDA receptor antagonists for the treatment of Alzheimer's disease	I. Nicolaou
39	Antimigraine agents	I. Nicolaou

b) Laboratory work

Students must do laboratory work (4 hours twice per week).

ATTENTION! The students who want to attend the lab have to fill out a participation form before the beginning of the semester at the Laboratory of Pharmaceutical Chemistry. There is an announcement, calling students to fill out the participation forms at the announcement board of the Laboratory of Pharmaceutical Chemistry. During the laboratory work, students report their results and are evaluated. At the end of the laboratory work, there is a written examination on this. Successful termination of the laboratory course permits their participation to the final examination.

Laboratory	Title	Tutor(s)
1-4	Synthesis of benzocaine	E. Rekka – D.Hadjipavlou-Litina- I. Nicolaou
5-6	Determination of saccharin sodium	E. Rekka - D.Hadjipavlou-Litina- I. Nicolaou
7-8	Determination of chlordiazepoxide hydrochloride	E. Rekka - D.Hadjipavlou-Litina- I. Nicolaou
9	Determination of nicotinamide	E. Rekka - D.Hadjipavlou-Litina- I. Nicolaou
10	Spectroscopic identification (IR spectroscopy) of benzocaine (labs. 1-4)	E. Rekka - D.Hadjipavlou-Litina- I. Nicolaou
11	Preparation and titration of standard solutions	E. Rekka - D.Hadjipavlou-Litina- I. Nicolaou
12	Digestive decomposition of organic compounds (for the determination of nitrogen and chloride)	E. Rekka - D.Hadjipavlou-Litina- I. Nicolaou
13	Literature survey	E. Rekka - D.Hadjipavlou-Litina- I. Nicolaou

TOXICOLOGY

Code number: 71
Cycle: UNDERGRADUATE
Semester: 7th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 5.5
Lectures (hours/week): 3
Tutorial (hours/week):
Laboratory work (hours/week): 1
Write and defence of a bibliographic toxicology topic on a voluntary basis

Course coordinator: Sklaviadis Theodoros, Professor

Tutors in lectures:

1. Sklaviadis Theodoros, Professor
2. Papadopoulou Lefkothea, Associate Professor
3. Xanthopoulos Konstantinos, Assistant Professor

Aims of the course:

- To acquire knowledge on basic concepts and tests of Toxicology, mechanisms of action of various toxic substances and their toxic effects on various organs and tissues of the body.
- To acquire knowledge of clinical toxicology (symptoms, therapeutic measures, antidotes, detoxification measures) of various toxic substances or drugs, and to acquire knowledge about substances used for doping of athletes (doping)
- Study of the toxicity of various environmental factors [based either on the biological responses (e.g., carcinogenicity and teratogenicity) or on the effects on specific target organs] as well as protection capacities.
- Correlation of the physiological processes and the molecular mechanisms responsible for the corresponding toxicity

- Students are taught how to search for the relevant information so that they can later seek bibliography and deepen and other issues not covered during the one semester

Skills:
Lectures

Teaching methods: Lectures and bibliographic group work

Contents of the course:
1) Theodoros Sklaviadis
Introduction to Toxicology. Basic principles of the action of toxic substances. Toxicity testing in animals. Toxicokinetics: Absorption, distribution and excretion of toxic substances. Metabolism of toxic substances (xenobiotics). Mechanisms of nephrotoxicity and renal failure. Mechanisms of hepatotoxicity. Mechanisms of toxicity to the skin. Poisons and poisoning. Therapeutic management of poisoning - general and specific antidotes. Drug abuse of drugs and substances in sport (doping): Anabolics/Androgens, CNS stimulants, beta-blockers, diuretics, narcotics/analgesics, human growth hormone, erythropoietin and blood, ergogenic vitamins, non-pharmaceutical doping, control of doping.
2) Lefkothea Papadopoulou
Mutagenesis – Toxicogenomics – New technologies - Protocols for the detection of mutagenic substances –
Carcinogenesis from environmental factors (chemicals, viruses, drugs, radiation)
Teratogenesis

3) Konstantinos Xanthopoulos
Mechanisms of toxicity in the nervous, hematopoietic, respiratory and cardiovascular systems
Clinical Toxicology I: Toxicokinetics, treatment of acute poisoning, supportive measures, measures to reduce absorption of toxic substances, measures to increase excretion of toxic substances. Clinical Toxicology II: Paracetamol, salicylates, cardiac glycosides, ethanol, tricyclic antidepressants, benzodiazepines, derivatives phenothiazines, anticholinergics, amphetamine and related compounds, opioids, pesticides (chlorinated hydrocarbons, organophosphorus esters, carbamates), cyanide, iron, mercury.

Proposed literature:

1) ΤΣΙΦΤΣΟΓΛΟΥ ΑΣΤΕΡΙΟΣ «ΒΑΣΙΚΗ ΚΑΙ ΚΛΙΝΙΚΗ ΤΟΞΙΚΟΛΟΓΙΑ», Έκδοση: 1/1997, Εκδότης: ΧΑΡΙΣ ΕΠΕ
2) Α. ΚΟΥΤΣΕΛΙΝΗΣ «Τοξικολογία (επίτομο)», Έκδοση: 1η έκδ./2004, Εκδότης: ΠΑΡΙΣΙΑΝΟΥ ΑΝΩΝΥΜΗ ΕΚΔΟΤΙΚΗ ΕΙΣΑΓΩΓΙΚΗ ΕΜΠΟΡΙΚΗ ΕΤΑΙΡΙΑ ΕΠΙΣΤΗΜΟΝΙΚΩΝ ΒΙΒΛΙΩΝ
3) Νέου Π. «Κλινική Τοξικολογία & Θεραπευτική Αντιμετώπιση Δηλητηριάσεων», Έκδοση: 1η εκδ., Εκδότης: ΕΚΔΟΣΕΙΣ Π.Χ. ΠΑΣΧΑΛΙΔΗΣ
4) Ιωάννης Νιώπας «Σημειώσεις Αναλυτικής - Κλινικής Τοξικολογίας» (είναι αναρτημένες στο **eClass** του μαθήματος)
5) Lecture updates as .pdfs: http://www.pharm.auth.gr/papadopoulou/lessonsgr.html
6) Casarett & Doull «Βασική Τοξικολογία». Έκδοση 2/2015. Εκδότης: Παρισιάνου Α.Ε.

Educational activities:
Lectures, discussion with students. Supervision and guidance concerning the bibliographical work (search for valid and updated literature, power point presentation and defense)

Evaluation process and methods:
Examination of the course at the end of the semester performed at dates, time and place arranged by the department (grade ≥5). The duration of the examination is 3 hours.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures
Powerpoint presentation is used in the lectures

Teaching:

Lectures.

Lectures are given 3 hours per week (and additionally if required)

Lecture	**lecture**	**lecture**
1	Introduction to Toxicology. Basic principles of the action of toxic substances. Toxicity	Sklaviadis T

	testing in animals.	
2	Toxicokinetics: Absorption, distribution and excretion of toxic substances. Metabolism of toxic substances (xenobiotics).	Sklaviadis T
3	Mechanisms of nephrotoxicity and renal failure. Mechanisms of hepatotoxicity. Mechanisms of toxicity to the skin.	Sklaviadis T
4	Poisons and poisoning. Therapeutic management of poisoning - general and specific antidotes. Drug abuse of drugs and substances in sport (doping): Anabolics/Androgens, CNS stimulants, beta-blockers, diuretics, narcotics/analgesics, human growth hormone, erythropoietin and blood, ergogenic vitamins, non-pharmaceutical doping, control of doping.	Sklaviadis T
5	Clinical Toxicology I: Toxicokinetics, treatment of acute poisoning, supportive measures, measures to reduce absorption of toxic substances, measures to increase excretion of toxic substances.	Xanthopoulos K.
6	Clinical Toxicology II: Paracetamol, salicylates, cardiac glycosides, ethanol, tricyclic antidepressants, benzodiazepines, derivatives phenothiazins, anticholinergics, amphetamine and related compounds, opioids	Xanthopoulos K.
7	Pesticides (chlorinated hydrocarbons, organophosphorus esters, carbamates), cyanide, iron, mercury.	Xanthopoulos K.
8	Mutagenesis / Toxicogenomics	Papadopoulou L
9	Novel *in vitro* methods for the identification of mutagens	Papadopoulou L
10	Carcinogenesis from environmental factors (chemicals, viruses, drugs, radiation)	Papadopoulou L
11	Embryogenesis and Teratogenesis	Papadopoulou L
12	Mechanisms of toxicity in the nervous and	Xanthopoulos K.

	haemopoietic systems	
13	Mechanisms of toxicity in the respiratory and cardiovascular systems	Xanthopoulos K.

SEMESTER VIII

CLINICAL PHARMACOLOGY-THERAPEUTICS

Code number: NP37
Cycle: UNDERGRADUATE
Semester: 8th

Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS):5
Lectures (hours/week): 3
Tutorial (hours/week):
Laboratory work (hours/week): 5

Course coordinator: Lefkothea Papadopoulou, Associate Professor
Tutors in lectures: Lefkothea Papadopoulou, Associate Professor

Aims of the course:

The in-depth understanding, knowledge, and the critical thinking skills through relevant clinical case studies, for the pathophysiology and treatment of major human diseases.

- The ability to apply that knowledge to optimize the health and quality of life of the patient with an effective, safe, economical and generally rational use of medicines to patients, in the practice of pharmacy in community or hospital pharmacy.
- With the examples of clinical case studies pharmacy students can develop skills in pharmacotherapy and "bridge the gap" between the acquisition of theoretical knowledge about drugs and their clinical

application in personalized patient, with the aim of choosing the right drug, at right patient at the right dose at the right time and for the right reasons.

- Study of the molecular mechanisms underlying various pathophysiological conditions, their diagnosis with new technologies and therapeutic approaches and responses.

Teaching methods: Lectures

Contents of the course:

Migraine,
Meningititis,
Hepatitis Pathophysiology and treatment
Thyroid gland disorders,
Diabetes
Physiological Hemostasis - Disorders of blood coagulation factors.
Hemoglobinopathies
Diseases of the lower respiratory tract (pneumonia, asthma, chronic obstructive pulmonary disease),
Peptic ulcer
Diseases of the upper respiratory tract (viral rhinitis, pharyngitis, sinusitis, tonsillitis, laryngitis, flu, allergic rhinitis), rheumatoid arthritis, osteoarthritis, gout and hyperuricemia, congestive heart failure, hypertension, coronary heart disease (angina, myocardial infarction), urinary tract infections (UTIs).
Tutorials on technologies necessary for the diagnosis, prophylaxis and the potential therapeutic approaches for diseases examined [e.g. diagnostic technologies, like Microarrays, RNA interference, RIA (Radioimmunoassay)].

Proposed literature:

1. Ιωάννης Δ. Νιώπας - Λευκοθέα Χ. Παπαδοπούλου «Κλινική Φαρμακευτική και Θεραπευτική», Έκδοση: 1/2008, Εκδότης: Σταύρος Αντ. Σαρτίνας.

Lecture updates : http://www.pharm.auth.gr/ papadopoulou/lessonsgr.html

2. Graham-Smith D. G., Aronson J. K. «Κλινική φαρμακολογία και φαρμακοθεραπεία», Έκδοση: 1η έκδ./2001, Εκδότης: Γ. ΔΑΡΔΑΝΟΣ - Κ. ΔΑΡΔΑΝΟΣ Ο.Ε.

3. ΚΩΝΣΤΑΝΤΙΝΟΣ ΑΘ. ΤΣΟΧΑΣ. ΕΛΕΝΗ Θ. ΧΑΤΖΗΧΡΗΣΤΟΥ «ΚΛΙΝΙΚΗ ΦΑΡΜΑΚΟΛΟΓΙΑ», Έκδοση: 1/2005, Εκδότης: ΛΥΧΝΟΣ ΓΡΑΦΙΚΕΣ ΤΕΧΝΕΣ ΕΚΔΟΤΙΚΕΣ ΕΠΙΧΕΙΡΗΣΕΙΣ ΕΠΕ.

4. ΚΥΡΙΑΚΗ ΜΑΖΑΡΑΚΗ «ΕΦΑΡΜΟΣΜΕΝΗ ΦΑΡΜΑΚΟΛΟΓΙΑ», Έκδοση: 1/2009, Εκδότης: ΚΥΡΙΑΚΗ ΜΑΖΑΡΑΚΗ.

Educational activities:
Lectures, discussion with students, and tutorials.

Evaluation process and methods:
Examination of the course at the end of the semester performed at dates, time and place arranged by the department (grade ≥5) .The duration of the examination is 3 hours.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures
Powerpoint presentation is used in the lectures

Teaching:

Lectures.

Lectures are given 3 hours per week (and additionally)

lectures	**Title**	**tutor**
1-2	Headache – migraine	Papadopoulou L
3-4	Meningitis	Papadopoulou L
5-8	Hepatitis (viral, autoimmune, alcohol, drug-induced)	Papadopoulou L

9-10	Thyroid gland disorders	Papadopoulou L
11-14	Diabetes (Pathology – insulin – hypoglycemic drugs – new therapeutic approaches – diagnosis)	Papadopoulou L
15-17	Physiological Hemostasis – Disorders of blood coagulation factors	Papadopoulou L
18-19	Hemoglobinopathies	Papadopoulou L
20-21	Asthma	Papadopoulou L
22	Pneumonia Chronic Obstructive Pulmonary disease	Papadopoulou L
23	Peptic ulcer	Papadopoulou L

ORGANIC AND RADIOPHARMACEUTICAL CHEMISTRY

Code number: NP38
Cycle: Undergraduate
Semester: 8th
Course type

		Background/General knowledge

X		Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator: Eleni A. Rekka, Professor
Tutor (s): Eleni A. Rekka, Professor

Room 409, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: email (rekka@pharm.auth.gr)

Dionysia Papagiannopoulou,Assistant Professor

Room 423a, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: 2310-998680, email (papagd@pharm.auth.gr)

Assisting personnel: One technician

Aims of the course: This course is an introduction to the applications of modern pharmacochemical aspects in drug design and in the successful confrontation of pathologic conditions (incurable, insufficiently cured diseases, toxicity of chemicals), using contemporary pharmacochemical methods. Relations of chemical structure, physicochemical properties and activity are studied. Another aim is the acquisition of satisfactory knowledge of the medicinal chemistry of free radicals, role of oxygen in life, free radical reactions in biological systems, reactive oxygen species and mechanisms of radical attack to lipids, proteins and DNA. Knowledge of physiological defensive mechanisms against free radicals, as well as explanation of oxidative stress are among the aims of this course. Comprehension of the blood-brain barrier, construction, function and physiologic role, in relation to drug action, is another aim.

Furthermore, the course aims at providing basic knowledge on the properties and medical applications of ionizing radiation, as well as the nuclear properties requirements of radionuclides used in radiopharmacy. In a deeper scope, this course covers the pharmaceutical radiochemistry of commonly used radionuclides in radiopharmacy. The design and mechanism of action of common radiopharmaceuticals at the target site is discussed.

Finally, the course covers methods of evaluation of the radiochemical purity of radiopharmaceuticals.

Skills: By the end of this course, the students should be able to:

Relate structural features to biologic activity

Comprehend the structure, function and role of blood-brain barrier

Know the phenomenon of oxidative stress, role of free radicals and other active oxygen species in the organism

Comprehend oxidative attack, pharmacochemical confrontation and consequences in health.

The application of radionuclides for diagnosis or treatment based on the type of ionizing radiation emitted, γ, X, β^-, β^+, α.

The basic methods of radiolabeling with radionuclides used in radiopharmaceuticals, ^{99m}Tc, $^{186/188}$Re, $^{123/131}$I, ^{111}In, ^{11}C, ^{18}F.

Quality control methods of technetium radiopharmaceuticals.

Clinical applications of radiopharmaceuticals.

Teaching methods: Lectures and laboratory work. The material is covered by a textbook and laboratory notes.

Contents of the course: This course presents some modern aspects in the broad field of bioactive molecules (drugs, poisons) and the molecular approach to pathologic conditions, aiming to a rational confrontation of them through drug design. The effect of the chemical characteristic groups on activity and toxicity of drug molecules is studied and an approximation in physicochemical properties/chemical structure/activity relationships is performed. Further topics are: Pharmacochemistry of free radicals. Role of oxygen in aerobic life, free radical reactions in biological systems. Reactive oxygen species. Mechanisms of radical attack on lipids, proteins, DNA. Defence of the body against radical offence, the involved mechanisms. Structure, function of blood brain barrier and drug permeability.

Radioactivity: Radioactive decay, α, β^-, β^+, particle emissions, electron capture, γ ray emission, isomeric transition, internal conversion, Auger electrons. Law of radioactivity, Half-life, Successive decay equations, transient and secular equilibrium. Interaction of radiation with matter: ionization, bremsstrahlung, annihilation, photoelectric effect, Compton scattering, pair production. Radiolysis of water, effect of radiation on macromolecules, DNA strand breaks, oxygen effect. *Radionuclide generator:*

Principles of a generator. ^{99}Mo/^{99m}Tc generator. Yield of ^{99m}Tc. Radionuclide, radiochemical and chemical purity of ^{99}Mo/^{99m}Tc generator eluate. *Labeled compounds:* Radionuclide, radiochemical and chemical purity of labeled compounds. Methods of radiochemical yield calculation (radiochromatography). *Radiopharmaceuticals*: general principles, diagnostic and therapeutic radiopharmaceuticals. Properties of ^{99m}Tc. Chemistry of ^{99m}Tc. Labeling with ^{99m}Tc (Labeling with reduced ^{99m}Tc, Formation of ^{99m}Tc-complexes by ligands exchange, reducing agents). Techentium(V), oxo core, isomerism. Methods of radioiodination of proteins (iodine chloride, iodogen, chloramin-T, enzymatic methods) *Radiopharmaceuticals of ^{99m}Tc and other radionuclides* (preparation, clinical applications, pharmacokinetic data). Sodium pertechnetate, technetium-sulfur colloid, technetium-human albumin macroaggregates, technetium-DTPA, technetium-glucoheptate, technetium-succimer, trivalent and pentavalent, technetium-methylendiphosphonate, technetium-iminodiacetic acid derivatives, technetium-hexamethylene amine oxime, technetium-ethyl cysteinate dimmer, technetium-mercaptoacetyltriglycine, technetium-hexacis(2-methoxy-isobutyl-isonitrile). [^{188}Re]-rhenium-(hydroxiethylidine diphosphonate). [^{111}In]-Indium-tris (oxine). [$^{123/131}$I]-Sodium Iodide, [$^{123/131}$I]-metaiodobenzyl-guanidine. [^{18}F]-2-fluorodeoxyglucose. Thallium-201. Labeling monoclonal antibodies-advantages and disadvantages. Direct labeling of mAbs with radio-iodine and technetium. Red blood cell labeling with technetium and indium.

Proposed literature:

1. E.A. Rekka, P.N. Kourounakis, "Organic Pharmaceutical Chemistry: Topics in Medicinal Chemistry-Drug Design", F. Hatzipantou, Ed., 2010 (ISBN 978-960-98594-3-1) (in Greek).

2. R. Rodrigo, "Oxidative Stress and Antioxidants: Their Role in Human Disease", 2009, Nova Science Pub Inc.

3. E. Chiotellis, "Radiopharmaceutical Chemistry" Ed. "Pigasos", 2000 (in Greek).

4. Gopal B. Saha, "Fundamentals of Nuclear Pharmacy", Springer, 5th Ed.2003.

Educational activities: Lectures, discussion with the students in every lecture, problem solving and practical work in the laboratory.

Evaluation process and methods: Examination of the course can be done either by successful participation in two written mid-term exams (grade ≥5

in each mid-term exam) of by a final written examination at the end of the semester. Student eligibility to participate in the mid-term exams is gained by regular attendance of the lectures throughout the semester**.** The evaluation process is based on questions that the students are asked to answer based on their knowledge obtained from the lectures as well as on the critical thinking and ability to combine, evaluate and handle the acquired knowledge and information. The duration of the examination is 3 hours.

The examination at the end of the semester is performed at dates, time and place arranged by the department.

During the laboratory work, students hand over a report of their results and are evaluated. At the end of the laboratory work, there is a written examination on this. Successful termination of the laboratory course permits their participation to the final examination.

At the examination of the course, each instructor gives out separate exam forms.

To compute the final grade, the grade given by each tutor is weighted proportionately to the number of hours he/she has taught.

Final grade is calculated by addition of the course exam grade (90%) and

the lab exam grade (10%).

Example: Supposing a course, where 60% of the hours are taught by tutor A and 40% by tutor B, the final grade is calculated by the following formula:

$$F.G.= 0.9(a+b) +0.1c,$$

Where, a the grade given by tutor A (in a scale of 0-6), b the grade given by tutor B (in a scale of 0-4), c the lab grade (the average of the lab book grade and the lab exam grade).

Use of TIC / Electronic distribution of the lectures

Powerpoint presentation is used in the lectures (D. Papagiannopoulou) and the pdf files of the classes are available on Blackboard as well as on the website: user.auth.gr/papagd/Radiofarmaka

Teaching: Teaching of this course is accomplished through lectures and laboratory work.

A) **Lectures**. Lectures are given 2 hours per week in the lecture room D12 (located in the School of Natural Sciences)

Lecture	Title	Tutor
1	Rational drug design. The main role of oxygen in aerobic life. Generation of free radicals in biologic systems.	E. Rekka
2-4	Important reactive oxygen species. Partially reduced oxygen, free radicals.	E. Rekka
5-7	Molecular mechanism of free radical attack. Lipid peroxidation. Protein oxidation. DNA oxidation.	E. Rekka
8-9	Effect of chemical characteristic groups on drug action.	E. Rekka
10-11	Relationships between physicochemical properties and drug action.	E. Rekka
12	Blood brain barrier, physiologic significance, pathologic conditions, drug transport.	E. Rekka
13	Review exercises and problem solving.	E. Rekka
14-15	Properties of Radionuclides	D. Papagiannopoulou
16	Diagnostic and Therapeutic radiopharmaceuticals	D. Papagiannopoulou
17	Radiopharmaceutical preparations and quality control	D. Papagiannopoulou
18	Production and nuclear properties of ^{99m}Tc-^{99}Mo/^{99m}Tc generator	D. Papagiannopoulou
19	Chemistry of technetium-preparation of technetium radiopharmaceuticals	D. Papagiannopoulou
20-22	Technetium Radiopharmaceuticals (renal, cerebral, myocardial, hepatobiliary, lung and bone imaging)	D. Papagiannopoulou
23	Iodine Radiopharmaceuticals	D.

		Papagiannopoulou
24	Cell Labelling	D. Papagiannopoulou
25	Labelling proteins and monoclonal antibodies	D. Papagiannopoulou
26	Cyclotron Radiopharmaceuticals	D. Papagiannopoulou

B) Laboratory work

Students must do laboratory work (2 hours each).

ATTENTION! The students who want to attend the lab have to fill out a participation form before the beginning of the semester at the Laboratory of Pharmaceutical Chemistry. There is an announcement, calling students to fill out the participation forms at the announcement board of the Laboratory of Pharmaceutical Chemistry.

Laboratory	**Title**	**Tutor**
1-8	Synthesis of sulfanilamide.	E. Rekka
9,10	Identification of an unknown compound by IR spectroscopy and melting point determination.	E. Rekka
11,12	Colourimetirc determination of procaine hydrochloride.	E. Rekka
13	Laboratory test	E. Rekka

DRUG QUALITY CONTROL I

Code number: 69
Cycle: Undergraduate
Semester: 8th

Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course coordinator: Dimitris G. Fatouros, (Associate Professor)
Tutors
Dimitrios G. Fatouros, Associate Professor
Contact hours with students: every day.
Communication: e-mail :dfatouro@pharm.auth.gr
Athanasia Panagopoulou, Lecturer
Contact hours with students: every day.
Communication: e-mail : pathanas@pharm.auth.gr
Aims: To introduce the students to the subject of quality control of pharmaceuticals and the physical, chemical, physicochemical and biological tests and assays used for their assessment.
To establish understanding of laboratory techniques for some of the major branches of pharmaceutical sciences.
To instruct the student on the preparation of laboratory reports, using appropriate statistical and mathematical calculations.
Learning Outcomes: On successful completion of this unit should be, at threshold level,
Demonstrate an understanding of methods employed for the quality controls of pharmaceuticals.
Perform experiments in the laboratory using the most up-to-date techniques for drug stability.
Carry out a given set of laboratory instructions, record and manipulate numerical data and to present this information in an appropriate format.
Syllabus outline: Introduction to quality control of pharmaceuticals. Methods of analysis (physical and physicochemical methods). Pharmaceutical technical procedures. Biological tests and assays. Pharmaceutical stability.
Laboratory practical: Decomposition of phenobarbital and salicylic acid in alkaline environment (orders of reactions, Arrhenius equation, activation energy). Quality control assays of tablets containing ampicillin and

prednisolone (dissolution studies, analysis of drug content and weight uniformity).

Learning and Teaching Strategy: The unit will be delivered through a combination of formal lectures and laboratory classes. All laboratory reports will require statistical, computing and mathematical skills. The material is covered by a textbook and a lab note.

Assessment: Four (4) laboratory reports will be submitted within 2 weeks after the final laboratory class and will require analysis and interpretation of experimental data. A successful completion of the unit will be demonstrated by a final written examination at the end of the semester (grade ≥5).

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Lectures are carried on with the use of electronic applications

Διάλεξη	**Τίτλος**	**Διδάσκων (οντες)**
1	Introduction to Quality control	Panagopoulou
2	Introduction to analytical methods	Fatouros D
3	Chromatography methods	Fatouros D
4	Differential scanning calorimetry Flourescence spectroscopy	Fatouros D
5	Έλεγχος υλικών συσκευασίας, έλεγχος καταθρυμματισμού, έλεγχος ομοιομορφίας περιεχομένου	Παναγοπούλου
6	Dissolution studies	Panagopoulou
7	Sterile assays and antimicrobial activity	Panagopoulou
8	methods for sterile products of sterile	Panagopoulou
9	Quality control studies of pyrogenics	Panagopoulou
10	Factors affecting drug stability during storage	Fatouros D
11	Chemical, physical, decomposition. Their effect to the kinetics of hydrolysis.	Fatouros D
12	Microbial drug decomposition	Fatouros D
13	Kinetcis, vitamin stability, Thermal stability	Fatouros D

B) Laboratories

Lab	**Title**	**Tutors**
1	Stability studies of ambicillin capsules	All tutors
2	Stability studies of phenobarbital	All tutors

3	Stability studies of prednisolone tablets	All tutors
4	Stability studies of acetyl-salicilic acid	All tutors

Indicative Reading

1. Physical Pharmacy Fourth Edition, Ed. Al. Martin Lea & Febiger Philaddelphia, London 1993.
2. Pharmaceutics – the Science of Dosage Form Design, 2nd Edition, Churchill Livingstone, London 2002.
3. Drug Stability: Principles and practices Ed. C. T. Rodes and J.O. Cartensen, Marcel Dekker: New York. 1990.

CLINICAL PHARMACOKINETICS

Code number:79
Cycle: Undergraduate
Semester:8th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 5
Lectures (hours/week):3 hours per week
Tutorial (hours/week):
Laboratory work (hours/week):1 hour per week

Course coordinator: Ioannis S. Vizirianakis, Associate Professor of Molecular Pharmacology and Pharmacogenomics

Tutors: Ioannis S. Vizirianakis, Associate Professor of Molecular Pharmacology and Pharmacogenomics

Assisting personnel: George A. Mystridis, MSc Candidate in Pharmacology and Therapeutics

Aims of the course:

Lectures/tutorials:

The lectures and tutorials aim to assist pharmacy students in developing their skills to understand and assess clinically relevant drug interactions in a way to finally contribute for minimizing adverse drug interactions (ADRs) in healthcare. To this end, the predictive as well as the assessment capabilities of students for drug interactions and ADRs will be clearly strengthen and an overall benefit for both pharmaceutical care environment and drug delivery outcomes will be achieved. As a matter of fact, students are expected to acquire knowledge and practical skills as practitioners in order to improve drug efficacy and safety profiles in clinical practice.

In order for these targets to be achieved, specific teaching methodologies are applied:

a) lectures focusing on selected pharmacokinetics, pharmacodynamics, pharmacogenomics and personalized medicine concepts;

b) b) discussions of specific clinical drug interaction case studies within the frame of evidence-based medicine; and

c) c) tutorials for specific drug dosage scheme data evaluation by implementing the "Simcyp-Population Based Pharmacokinetic Modelling and Simulation» platform (academic license agreement since 2009).

Skills: Students assessment capability for drug interactions and ADRs

Teaching methods: Presentations, PowerPoint slides, books, drug case-studies discussion

Contents of the course:

Lectures content

Protein binding of drugs, Intestine drug metabolism, Hepatic drug metabolism, Assessment of drug interactions mechanisms, Drug-drug drug-food and drug-herb interactions, Mechanisms involved in the emergence of adverse drug interactions, Pharmacogenomics and adjustment of drug dosage delivery, PK-based drug prescription principles, Pharmacoeconomy issues in drug delivery, Clinical relevance of drug metabolizing enzymes and

transporters genetic polymorphism, Individualizing drug delivery dosage schemes in clinical practice, Environmental toxicants and drug delivery. Examples of pharmacokinetic case studies discussed: a) cerivastatin market removal, b) removal of rofecoxib from the market/clinical practice, c) drug-induced QT-elongation and drug cardiotoxicity and d) PK-based methodological improvements applied upon indinavir new drug

N° / duration	**Title**	**Tutorσ**
1st/ 3 hours	Basic principles of clinical pharmacokinetics: Drug uptake, assessment and clinical utility	Ioannis S. Vizirianakis
2nd / 3 hours	Basic principles of clinical pharmacokinetics: Drug distribution, assessment and clinical utility	Ioannis S. Vizirianakis
3rd / 3 hours	Basic principles of clinical pharmacokinetics: Drug elimination, assessment and clinical utility	Ioannis S. Vizirianakis
4th / 3 hours	Basic principles of clinical pharmacokinetics: Drug metabolism, assessment and clinical utility	Ioannis S. Vizirianakis
5th / 3 hours	Pharmacokinetic models, dosage regimens, depiction and application of clinical pharmacokinetic data in clinical practice	Ioannis S. Vizirianakis
6th / 2 hours	The role of clinical pharmacokinetics in modern therapeutics towards improving new drug development era as well as efficacy and safety profiles in clinical practice	Ioannis S. Vizirianakis
7th / 2 hours	Protein binding and drug distribution: Consequences for drug bioavailability and clinically relevant interactions	Ioannis S. Vizirianakis
8th / 3 hours	Hepatic function and drug distribution	Ioannis S. Vizirianakis

9th / 5 hours	Drug metabolizing enzymes and transporters: Function, tissue distribution, pharmacokinetics- pharmacogenomics evaluation and pharmacological assessment	Ioannis S. Vizirianakis
10th / 2 hours	Drug-food interactions: Mechanisms and clinical relevance	Ioannis S. Vizirianakis
11th / 2 hours	Drug-herb interactions: Mechanisms and clinical relevance	Ioannis S. Vizirianakis
12th / 2 hours	Drug-drug interactions: Mechanisms and clinical relevance	Ioannis S. Vizirianakis
13th / 5 hours	Prediction of clinically relevant drug interactions: Pharmacogenomics and pharmacoeconomic evaluation and clinical relevance	Ioannis S. Vizirianakis
14th / 1 hour	Environmental toxicants and drug distribution: clinical evaluation	Ioannis S. Vizirianakis
15th / 2 hours	Pharmacological and pharmacogenomics approaches to improve drug delivery clinical outcomes: Implementation of personalized medicine concepts in drug delivery development.	Ioannis S. Vizirianakis

Tutorials content

Exercises and tutorials to understand the concepts covered in the lectures so that students acquire skills for the use and application of pharmacokinetic data in drug regimens in clinical practice. At the same time, the "Simcyp-Population Based Pharmacokinetic Modeling and Simulation" tool is utilized with specific clinical data for prediction and adaptation of dosage regimens in the context of a population pharmacokinetic approach titled *"Analysis of Pharmacological Results in Different Population Groups: Monotherapy and Drug Administration".*

Referred Books - Handouts - Slides:

1. Ioannis S. Vizirianakis (In Greek). «Clinical Pharmacokinetics: Basic Principles of Pharmaceutical Care in Clinical Practice", 2016; Stavros Sartinas Publishing: Thessaloniki, Greece.

2. Ioannis S. Vizirianakis. (In Greek). Course handouts referring to slides/presentations available to students for download in the University e-Class Platform of AUTh (slides in total 299) and also the material related to the population pharmacokinetics lessons by the application of "Simcyp- Population Based Pharmacokinetic Modelling and Simulation» (academic license agreement since 2009).

a) Lectures

b) Tutorials/Exercises

Tutor: Ioannis S. Vizirianakis, Associate Professor of Molecular Pharmacology and Pharmacogenomics

Assistant: George A. Mystridis, MSc Candidate in Pharmacology and Therapeutics

N°	Title	Tutors
1st	Absorption: • Drug Dissolution, • Membrane permeability, • Routes of administration, • Bioavailability • Drug Interactions on absorption **Exercises and examples**	Ioannis S. Vizirianakis, George Mystridis
2nd	Distribution: • Apparent volume of distribution • Protein binding • Unbound fraction of drug • Drug interactions on distribution **Exercises and examples**	Ioannis S. Vizirianakis, George Mystridis
3rd	Renal Elimination: • Mechanisms of renal elimination • Rate of elimination • Drug remaining to be excreted • Drug interactions in renal excretion **Exercises and examples**	Ioannis S. Vizirianakis, George Mystridis

4th	Hepatic Elimination: • Effect of hepatic blood flow • Effect of protein binding • Effect of intrinsic clearance • Drug interactions on hepatic elimination • First pass effect and bioavailability • Differences between low and high extraction drugs	Ioannis S. Vizirianakis, George Mystridis
5th	Orders of drug elimination • 0-order kinetics • 1st order kinetics • Elements of enzyme kinetics • Saturation of enzyme processes **AUC calculation methods**	Ioannis S. Vizirianakis, George Mystridis
6th	Introduction to Compartmental Models: • Link of previously taught to pharmacokinetic models	Ioannis S. Vizirianakis, George Mystridis
7th	One Compartment IV Bolus: • Equation of plasma drug concentration • Half-life • Clearance • Volume of distribution • Fixed rate of elimination (excretion) • Calculation of plasma concentration and volume of distribution • Estimation of parameters from plasma concentration values. **Exercises and examples in the "IV Bolus**	Ioannis S. Vizirianakis, George Mystridis
8th	One compartment intravenous infusion model: • Plasma concentration equation • Steady States and factors influencing it. • Time to get to Steady State. • Estimation of parameters from plasma concentration values. • Predicted plasma levels based on dosage • Calculation of loading dose • Calculation of rate of administration. **Exercises and examples in the "IV Infusion Model"**	Ioannis S. Vizirianakis, George Mystridis

9th	One compartment per os model (1st order absorption): • Kinetics of absorption • Extent and rate of absorption • Estimation of Absorption Parameters – Curve stripping • Influence of absorption changes on plasma drug concentration • Bioavailability calculation • Time concentration equation **Exercises and examples in the Model**	Ioannis S. Vizirianakis, George Mystridis
10th	Multiple dosing kinetics (Iv and per os) • Concentration at steady state • Maximum and minimum concentrations • Rate of administration • Delivery interval • Dosage scheme design **Exercises and examples**	Ioannis S. Vizirianakis, George Mystridis
11th	Applying population pharmacokinetic models to predict and analyze interactions of drugs of clinical interest • Introduction to Simcyp Platform • Modeling based on physiology (PBPK Modeling and Simulation)	Ioannis S. Vizirianakis, George Mystridis

NON PRESCRIPTION DRUGS

Code number: NP 39
Cycle : Undergraduate (selective)
Semester : 8
Course Type

	Background / General Knowledge
+	Scientific area: Pharmacy

Credit units (ECTS): 4

Lectures (hours per week): 2
Tutorial (hours): -
Laboratory (hours per week): 2
Course coordinator: Panagopoulou Athanasia, Lecturer in Pharmaceutical Technology.
Tutor Panagopoulou Athanasia Lecturer) E-mail:pathanas@pharm.auth.gr

Aims of the course: Tutoring about the drugs and pharmaceutical forms that are supplied from the pharmacy stores without the need of a doctors rp. The pharmacist role in self care and all they need to know about patient education.

Skills : By the end of the course , the student should be able to work in a pharmacy store and attend to the needs of the patients that come for help before attending to a doctor , seeking for self therapy.

Teaching methods: Lectures.

Contents of the course: Over the Counter or Non Prescription Drugs. Pharmaceutical dosage forms. Introduction, basic principals of Self Care and Nonprescription Pharmacotherapy. Criteria of choice. Non Prescription Drugs in Greece and in the European Community. Characterization of drugs as OTC. The pharmacists role in self care and Non Prescription Pharmacotherapy. Patient assessment and consultation. OTC drugs for dermatologic disorders. Anatomy and physiology of the skin. External use pharmaceutical forms for the treatment of atopic dermatitis, acne. fungal skin infections , contact dermatitis, psoriasis, dry skin therapy. Pain and fever disorders. Non prescription analgesics, drugs for the treatment of fever, anti- inflammatory drugs. Non Prescription Drugs for the treatment of minor burns and sunburns. OTC for diabetes mellitus.OTC for ophthalmic disorders. Gastrointestinal disorders (antacids, laxatives, antidiarrheal agents, antiemetic drugs). Alternative medicine.

Educational activities: Lectures, discussion with the students in every lecture .

Evaluation process: Written examination by the end of the semester. The duration of the examinations is 2 hours.

Use ofΤΠΕ / electronic distribution of the lectures: Power point presentation is used in the lectures.

Teaching (lectures, laboratories)

Teaching of this course is accomplished through lectures.

α) Lectures . The lectures (2 hours per week) are taking place once a week in the lecture room of the 2nd floor , in the building of Biology and Pharmacy. (Department of Pharmaceutical Technology).The titles of the lectures are in preparation.

COSMETICS

Code number: 40
Cycle: UNDERGRADUATE STUDIES
Semester: 8th
Course type

	Background/General knowledge
X	Scientific area (Pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2
Tutorial (hours/week):
Laboratory work (hours/week): 2
Course coordinator: Fatouros Dimitrios (Associate Professor)

Tutor (s): Fatouros Dimitrios (Associate Professor)
e-mail: dfatouro@pharm.auth.gr

Aims of the course: The main target of the acquisition of the necessary knowledge for the recognition and comprehension of the prescriptions following by the preparation of the appropriate technological formulation of cosmetics.

Skills: Acquisition of the necessary knowledge and possibilities for the recognition either of the raw material that are used in the different types of the cosmetic preparations and of the technological formulations, as far as the evolvement of the student skills in the management of the different preparation methods of the cosmetic formulations. Nevertheless the students will be familiarized with the handling of the different laboratory apparatus and implements in cosmetics.

Teaching methods: Lectures and Laboratory exercises.

Content: Basic on the anatomy and the physiology of the skin. Cosmetics such as emulsions, refreshing creams O/W and W/O. Lotions, face masks, cosmetic powders, lipsticks, nails cosmetics, shampoo and hair preparations, deodorants and antiperspirants, suntan preparations, face and eye makeup, bath preparations, perfumes and colognes, shaving preparations. Procedures for the Headspace Extraction coupled on Gas Liquid Chromatography.

Laboratory Exercises: Preparations of cosmetics

Educational activities: Attendance of the lectures and the Laboratory exercises.

Evaluation process and methods: Attendance of the Laboratory exercises regularly, writing and presentations of specified reports; evaluation.Written exams at the end of the semester

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Certain lectures are carried on with the use of electronic applications

Teaching:

A) **Lectures**. Two hours per week in the Δ12 classroom of the School of Science

Lecture	**Title**	**Tutor**
1	Introduction, Basic on the anatomy and the physiology of the skin	Fatouros D.
2	Preparation of cosmetics, emulsions, refreshing creams O/W and W/O	Fatouros D.
3	Preparation of cosmetics, Lotions	Fatouros D.
4	Preparation of cosmetics, face masks	Fatouros D.
5	Preparation of cosmetics, cosmetic powders	Fatouros D.
6	Preparation of cosmetics, Make-up,	Fatouros D.

	lipsticks	
7	Preparation of cosmetics, nails cosmetics	Fatouros D.
8	Shampoo and hair preparations	Fatouros D.
9	Preparation of cosmetics, bath preparations	Fatouros D.
10	Preparation of cosmetics, shaving preparations	Fatouros D.
11	Preparation of cosmetics, deodorants and antiperspirants, suntan preparations	Fatouros D.
12	Perfumes and colognes	Fatouros D.
13	Procedures for the Headspace Extraction coupled on Gas Liquid Chromatography	Fatouros D.

B) **Laboratory work** The Laboratory exercises are carried out by Katsiotis and Athanasiou.

Laboratory	**Title**	**Tutor**
1	Preparation of Cosmetics	Fatouros D.
2	Preparation of Cosmetics	Fatouros D.
3	Preparation of Cosmetics	Fatouros D.

DRUG QUALITY CONTROL II

Code number: NP 42
Cycle: Undergraduate
Semester: 8th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2
Course Coordinator: Barmbalexis Panagiotis, Assist. Professor
Tutors: Barmbalexis Panagiotis, Assist. Professor
Panagopoulou Athanasia, Lecturer

Aims: To introduce the students to the subject of bioequivalence as a tool for the quality assessment of pharmaceutical formulations.

To establish understanding of laboratory techniques for some of the major branches of pharmaceutical sciences.

To instruct the student on the preparation of laboratory reports, using appropriate statistical and mathematical calculations.

Learning Outcomes: On successful completion of this unit should be, at threshold level,

Demonstrate an understanding of methods employed for the quality controls of pharmaceuticals.

Perform experiments in the laboratory using the most up-to-date techniques for drug quality control.

Carry out a given set of laboratory instructions, record and manipulate numerical data and to present this information in an appropriate format.

Syllabus outline: The use of Bioequivalence as a tool for the assessment of pharmaceuticals. Development of in *vitro / in vivo* correlations as a tool for the quality control of pharmaceuticals. Statistics for bioequivalence studies.

Laboratory practical: Quality control assays of tablets containing acetaminophen (dissolution studies, analysis of drug content and weight uniformity).

Learning and Teaching Strategy: The unit will be delivered through a combination of formal lectures and laboratory classes. All laboratory reports will require statistical, computing and mathematical skills. The material is covered by a textbook and a lab note.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures

Lectures are carried on with the use of electronic applications

Assessment: Two (2) laboratory reports will be submitted within 2 weeks after the final laboratory class and will require analysis and interpretation of experimental data. A successful completion of the unit will be demonstrated by a final written examination at the end of the semester (grade ≥5).

A.Lectures

Lecture	Title	Tutors
1	Bioavailability, dosage forms	
2	Quality control for in vitro release studies	
3	In vitro-in vivo correlations	
4	Biopharmaceutical classification and in vitro in vivo correllations	
5	Bioavailability and Bioequivalance.	
6	Assesement of bioavailability dat.	
7	Bioavailability studies for dosage forms with modified drug release	
8	Cross-over studies	
9	dosage forms with low bioavailability	
10	Protein and peptide stability I	
11	Protein and peptide stability II	
12	Stability tests for materials used in clinical studies I	
13	Stability tests for materials used in clinical studies II	

B.Laboratory

Laboratory	Title	Tutors
1	Stability studies of marketed products	

Indicative Reading

1. Physical Pharmacy Fourth Edition, Ed. Al. Martin Lea & Febiger Philaddelphia, London 1993.
2. Pharmaceutics – the Science of Dosage Form Design, 2nd Edition, Churchill Livingstone, London 2002.
3. Drug Stability: Principles and practices Ed. C. T. Rodes and J.O. Cartensen, Marcel Dekker: New York. 1990.

BIOTECHNOLOGY OF PHARMACEUTICAL PLANTS

Code number: NP43
Cycle/Study level: Undergraduate
Semester: 8th semester
Course type: Optional

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS):4

Lectures (hours/week): 2

Tutorial (hours/week):2

Laboratory work (hours/week): 2, will not be performed due to lack of auxiliary staff

Course coordinator: Kokkini Stella, Professor

Tutor (s): Kokkini Stella, Professor,
Vlachonasios Konstantinos, Associate Professor,
Pampalakis Georgios, Assistant Professor

Assisting personnel:

Aims of the course: The aim is the students' introduction to the rapidly increasing field of «Biotechnology of Pharmaceutical Plants». During the 7th semester course (Pharmaceutical Biotechnology), the students have obtained general knowledge, the basic principles, technologies, and applications of molecular biotechnology. At the present course, students will have the ability to learn about the importance of secondary metabolism in the production of plant substances with pharmaceutical action, the biosynthetic pathways that lead to the biosynthesis of these substances, the modern experimental approaches of molecular biotechnology that lead to

gene isolation, cloning and genetic modification. Finally, the lectures will cover the latest findings of molecular biotechnology in producing plant substances with pharmaceutical action, using the plants as factories that produce pharmaceutical substances and food.

Skills: Familiarizing with the techniques and approaches that are used in molecular plant biotechnology in order to exploit natural products.

Teaching methods: Lectures and laboratory work.

Contents of the course:

Primary metabolites
Secondary metabolites
Regulation of biosynthesis and metabolism of natural products
- Regulation mechanism of biosynthesis (stable expression, induced expression) at gene level, protein level, substance level
- In relation to function
- Developmentally regulated or
- Induced by external or internal stimuli e.g. salicylic or jasmonic acid

Regulation at enzyme level (feed-back, allosteric interaction, availability of co-factor, phosphorylation)
Regulation at the level of Compartmentalisation (transport by diffusion or active transport)
Biosynthesis of natural products
- Biosynthesis and oxidation of ascorbic acid
- Biosynthesis of terpenes
- Biosynthesis of phenylpropanoids
- Biosynthesis of alkaloids

Approach and methodology of increase of the production of active substances of certain drugs
Metabolic engineering
- Strategies of metabolic engineering in plants
- Metabolic engineering of secondary metabolites biosynthetic pathways
- Differential modulation of multigene family
- Bifurcation and connection of different pathways
- Catabolism of desirable components
- Compartmentalization of plant cell-membrane transporters
- Transport of components differs in various plant systems
- Potentials and challenges in metabolic engineering of transport proteins
- Existence of more than one limiting steps in biosynthesis rate (Rate-Limiting Steps)
- Toxicity, reduced resistance in infective factors-plant viability
- Factors-viability of plant

- Feedback inhibitions
- Potentials in the field of metabolic engineering of plants
  - Multipoint Metabolic Engineering
  - Regulatory genes-transcription factors
  - Cooperation of metabolic engineering with combinatorial biochemistry
  - Down-regulation of genes
  - Functional genomics
  - Development of technology and bioinformatics
  - Metabolic engineering in new metabolic pathways and combinatorial biosynthesis
- Functional genomics or genomic analysis
  - Applications of functional genomics in pharmaceutical and aromatic plants
- Tissue culture of plants (totipotency, somaclonal variability, re-birth)
  - *In vitro* rebirth of pharmaceutical plants
- Genetically engineered pharmaceutical plants
  - Genetic engineering Protocols
  - Production of homozygote plants and control-selection of genetic transformation
- Applications of genetic engineering in pharmaceutical and aromatic plants
  - Production of secondary metabolites and biopharmaceutical substances
  - Production of hairy roots
  - Applications for the production of biopharmaceutical substances

Lecture	Title	Tutor
1-2	General metabolites, secondary metabolites Regulation of biosynthesis and metabolism of natural products	
3-4	**Regulation at the level of enzymes** (Feed-back, allosteric interaction, cofactor availability, phosphorylation) **Regulation at the level of compartmentalization** [transport (diffusion, active transport]	
4-5-6-7	Biosynthesis of Natural Products (Biosynthesis and oxidation of ascorbic acid)	
8-9	Terpene biosynthesis	
10-11	Biosynthesis of phenylpropanoids biosynthesis of alkaloids	
12-13-14-15	Approach and methodology for increase of production of active substances in specific natural drugs Metabolic engineering Strategies for plant metabolic engineering Metabolic engineering of secondary metabolites pathways Differential modulation of multigene family Bifurcation and connection of different pathways Catabolism of desired components Compartmentalization of plant cell - membrane transporters The transport of components varies in different plant systems Prospects and challenges in metabolic engineering of molecular chaperones Existence of several steps that limit the rate (Rate-Limiting Steps) Toxicity, reduction of resistance to contaminants-viability of the plant Reversible inhibition	

16-17	**Prospects in the field of metabolic engineering of plants** Multipoint metabolic engineering (Multipoint Metabolic Engineering), Regulatory genes - transcription factors Cooperation of metabolic engineering and combinatorial biochemistry Genes suppression Functional Genomics Technology development and bioinformatics Metabolic engineering in new metabolic pathways	
18-19	Functional genomics or genomic analysis Applications of functional genomics to medicinal and aromatic plants	
20-21	Plant Tissue culture (totipotency, somaclonal variation, regeneration). Genetically modified medicinal plants and production of secondary metabolites and biopharmaceuticals. Genetic engineering applications in medicinal and aromatic plants	
22-23-24-25	Molecular farming, molecular medical farming (vaccines and edible vaccines, antibodies, proteins, etc.).	
26-27	Bioethics and genetically modified plants and food	

Molecular farming, molecular medical farming (vaccines and edible vaccines, antibodies, proteins etc.)
Bioethics and genetically transformed plants and food

Proposed literature:

In Greek: Βιοτεχνολογία Φυτών, Πολυδεύκης Χατζόπουλος, Εκδόσεις ΕΜΒΡΥΟ, 2001 (Plant Biotechnology, Polydefkis Hatzopoulos, EMBRYO Publishing, 2001)
PowerPoint presentations available at the tutors' website

Educational activities:

Lectures, laboratory exercises, written essays (20% of the total grade)

Evaluation process and methods:

The evaluation includes a written examination at the middle of the semester and written examination at the end of the semester. The final mark is the average of exams for 80% and the written essay for 20%.

Use of ICTs (Information and Communication Technologies) / Electronic distribution of the lectures:

The lectures and the tutorials of this course are performed with the use of ICTs (PowerPoint Presentations, interactive laboratory exercises with the use of PC, videos etc.)

Teaching (Lectures/Laboratory/Tutorials:

Teaching is done through lectures, exercises and bibliographic exercises.

A) **Lectures.** Two-hour lectures take place once a week at the Seminar Room of Pharmacology/Pharmacognosy Unit on the 3rd floor.

CHEMISTRY OF NATURAL PRODUCTS

Code number: NP-44

Cycle: Undergraduate

Semester: 8th

Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 4

Lectures (hours/week): 2

Tutorial (hours/week): -

Laboratory work (hours/week): 2

Course coordinator: Karioti Anastasia Assistant Professor

Tutor (s):

Karioti Anastasia Assistant Professor

Room 317, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: e-mail (akarioti@pharm.auth.gr)

Dr. Gavrieli Chrysi RLT'S

Room 316A, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12.

Communication: e-mail (gabrieli@pharm.auth.gr)

Assisting personnel:

Aims of the course: Understanding by the students of the techniques used for the extraction, isolation and determination of the bioactive constituents of medicinal plants. In order to achieve these objectives, the most recent analytical methods and techniques are presented. Moreover, in the laboratory work the students will know these techniques.

Skills: Familiarity with analytical methods of medicinal plants.

Teaching methods: Lectures & laboratory work.

Contents of the course: Refers to extraction and isolation techniques from plant raw materials, analytical methods and structure elucidation, as well as methods of quality control. The most recent analytical techniques, spectroscopy and spectrometry methods used in the study of bioactive plant constituents are discussed.

LABORATORY WORK:Isolation and analysis of essential oils from aromatic plants. Extraction, isolation, analysis and identification of non-volatile secondary metabolites from plants.

Suggested Literature:

11. European Pharmacopoeia 5.

12. The Medicinal Plant Industry, Ed. by R.O.B. Wijesekera, CRC Press, Boston, London 1991.

13. High Resolution Gas Chromatography, P. Sandra Ed. by K.J. Hyver 3rd Edition Hewlett-Packard 1989.

14. Progress in Essential Oil Research, Ed. by E.J. Brunke, Walter de Gruyter Berlin-N. York 1986.

15. Preparative Chromatography Techniques (Applications in Natural Product Isolation) K. Hostettmann, M. Hostettmann, A. Marston Springer Verlag, Berlin, Heidelberg, N. York 1986.

16. Introduction to Open Tubular Columns, L.S. Ettre, Ed. by Perkin-Elmer, Connecticut 1978.

17. Qualitative Analysis of Flavour and Fragrance Volatiles by Capillary Gas Chromatography, W. Jennings, T. Shibamoto, Academic Press New York 1980

18. Notes distributed by the teacher.

Educational activities: Lectures and laboratory work.

Evaluation process and methods: Written exam at the end of the semester.The examination at the end of the semester is performed at dates, time and place arranged by the department. The duration of the examination is 3 hours.

Use of TIC / Electronic distribution of the lectures

Lectures, notes, statements etc. are presented in the corresponding place of the website of the School of Pharmacy.

Teaching: Teaching of this course is accomplished through lectures and laboratory work.

(A) Lectures. Lectures (in total two hours per week) are given in the lecture room of the 3rd floor of the Biology/Pharmacy building.

Lecture	**Title**	**Tutor**
1	Chromatography.	All Tutors
2	Adsorption chromatography.	All Tutors
3	Partition chromatography.	All Tutors
4	Applications of chromatography with Sephadex LH-20.	All Tutors
5-6	Extraction (general), Methods of extraction.	All Tutors
7	Extraction equipment.	All Tutors
8	Drying of extracts.	All Tutors
9-10	Quality control and analysis of plant extracts.	All Tutors
10-11	Gas chromatography – Mass spectrometry (GC-	All Tutors

	MS).	
12-13	Applications of GC-MS analysis.	All Tutors

B) Laboratory work

Students must perform laboratory work (2 hours per week). Laboratories take place in the Hall of chemistry of natural products of the 3rd floor of the Biology/Pharmacy building.

Laboratory	**Title**	**Tutor**
1-3	Isolation and analysis of essential oils from aromatic plants.	All Tutors
4-7	Extraction and isolation of phenols from plants. Separation (solvent partition).	All Tutors
8-10	Isolation and analysis of plant constituents using different chromatographic techniques (Adsorption, partition and gel filtration)	All Tutors
11-13	Identification of the isolated flavonoids by UV-Vis phasmatophotometry.	All Tutors

PHARMACEUTICAL TECHNOLOGY (elective)

Code number: NP 45
Cycle: Undergraduate
Semester: 8th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2
Tutorial (hours/week): -

Laboratory work (hours/week): 2
Course Coordinator: Fatouros Dimitrios, Associate Professor
Tutors
1)Fatouros Dimitrios, Assosiate Professor

Contact hours with students: every day.

Communication: e-mail : dfatouro@pharm.auth.gr

2)Panagopoulou A, Lecturer

Contact hours with students: every day.

Aims: To introduce the students to the subject of drug formulation.

To establish understanding of laboratory techniques for some of the major branches of pharmaceutical sciences.

To instruct the student on the preparation of laboratory reports, using appropriate statistical and mathematical calculations.

Learning Outcomes: On successful completion of this unit should be, at threshold level,

Demonstrate an understanding of methods employed for the drug formulation.

Perform experiments in the laboratory using the most up-to-date techniques for drug quality control.

Carry out a given set of laboratory instructions, record and manipulate numerical data and to present this information in an appropriate format.

Syllabus outline: Pharmacokinetics, trandsermal delivery, micro/nano encapsulation and powder technology.

Laboratory practical: Assessment of powder properties (weight, humidity, temperature) by means of computer aid sensors. Assessment of skin properties (humidity, transepidermal water loss, temperature, pH)

Learning and Teaching Strategy: The unit will be delivered through a combination of formal lectures and laboratory classes. All laboratory reports will require statistical, computing and mathematical skills. The material is covered by a textbook and a lab note.

Assessment: Two (2) laboratory reports will be submitted within 2 weeks after the final laboratory class and will require analysis and interpretation of experimental data. A successful completion of the unit will be demonstrated by a final written examination at the end of the semester (grade ≥5).

Use of TIC / Electronic distribution of the lectures

Lectures, notes, statements etc. are presented in the corresponding place of the website of the School of Pharmacy.

A.Lectures

Lecture	Title	Tutor
1	Introduction	Fatouros D
2	Introduction for Preformulation I	Fatouros D
3	Introduction for Prefomrulation II	Fatouros D
4	Pharmacokinetic parameters and Bioavailability I	Panagopoulou A
5	Pharmacokinetic Parameters and Bioavailability I	Panagopoulou A.
6	Micro/nanoencapsulation I	Fatouros D
7	Micro/nanoencapsulation I	Fatouros D
8	Bioadhesives	Fatouros D
9	Transdermal delivery I	Fatouros D
10	Transdermal delivery II	Fatouros D
11	Mechanical properties of powders I	Fatouros D
12	Mechanical properties of powders II	Fatouros D
13	Mechanical properties of powders III	Fatouros D

B.Practicals

Lab	Title	Tutors
1	Measurement of temperature, weight and humidity with sensors.	Panagopoulou D
2	Factors affecting transdermal delivery	Fatouros D

Indicative Reading

1. Theoretical and Practical topics in Pharmaceutical Technology. Notes S. Malamataris. Thessaloniki 1985.

ORGANIC PHARMACEUTICAL CHEMISTRY (elective)

Code number: NP46
Cycle: Undergraduate
Semester: 8th semester

Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 4
Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): 2

Course coordinator:
Vasilis Demopoulos, Professor

Tutors:

1) Vassilis Demopoulos, Professor

Room 408A & 409B, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 11-12 am.

Communication: e-mail (vdem@pharm.auth.gr)

2) Eleni Rekka, Professor

Room 409, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: e-mail (rekka@pharm.auth.gr)

3) Ioannis Nicolaou, Assistant Professor

Room 404, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day 12-1 pm.

Communication: e-mail (inikolao@pharm.auth.gr)

Assisting personnel: Dr. Antonios Gavalas RLT'S

Aims of the course:

The course is an expansion and in depth analysis of the required course (code number: ΝΠ-38) of the same semester and its aim is the application of modern aspects of medicinal chemistry in drug design and in the successful confrontation of pathologic conditions using contemporary approaches of medicinal chemistry & chemical biology. Specifically:

- Scaffolds and physicochemical properties of drug-like molecules. Principles of identification, optimization and production of new chemical entities.

- Oxidative stress, antioxidant pharmacotherapy. Oxidative stress and biologic stress in pathologic conditions. Pharmacochemical aspects of biological stress, relations between biological and oxidative stress. Indices of oxidative and biologic stress and their interrelationships. Consequences of oxidative and of biologic stress on health.

Skills:

By the end of this course, the students will have a working knowledge of:

- The three dimensional graphical depiction of compounds using a molecular modeling software.

- The structural energy minimization implementing molecular & quantum mechanism.

- The two dimensional drawing of compounds and the calculation of distribution & partition coefficients.

- The involvement of oxidative stress in pathologic conditions and diseases and the response of the organism to xenobiotics

- The physiologic defensive mechanisms as stress response

Teaching methods:

Lectures and laboratory work. The material is covered by textbook & notes as well as laboratory notes.

Contents of the course:

1) Vassilis Demopoulos

Chemical biology in medicinal chemistry, with focus on:

a) stereo-chemical factors and biological activity (optical isomerism, spatial isomerism, conformational space)
b) physical & chemical properties important in biological activity (lipophilicity, hydrophobicity, ionization, solubility, molecular polar surface area)
c) bioisosterism
d) thermodynamic analysis of ligand-receptor interactions
e) permeability through biological membranes

2) Eleni Rekka

In this course, pharmacochemical aspects of oxidative and biologic stress, their indices and their relationships are analysed. Importance of oxidative and of biologic stress in diseases of the modern society, e.g. Alzheimer's and Parkinson's diseases, development of biologic stress and other pathologic conditions is examined. Xenobiotic toxicity connected to free radical formation, toxic metabolites, antioxidant intervention are presented.

3) Ioannis Nicolaou

Pharmacochemical approach for the management of the lack of selectivity toward tumor cells and low therapeutic index of the antineoplastic agents, via two primary strategies:

a) through the design of targeted anticancer prodrugs for tumor site-specific activation, and
b) through a tumor-targeting drug delivery system which consists of a tumor recognition moiety (as monoclonal antibodies, polyunsaturated fatty acids, folic acid, hyaluronic acid, and oligopeptides) and a cytotoxic warhead connected directly or through a suitable linker to form a conjugate.

Proposed literature:

1) Vassilis Demopoulos

-«Βασικές αρχές σχεδιασμού και ανάπτυξης φαρμάκων» Β. Ι. Δημόπουλος και Α. Τσαντίλη-Κακουλίδου, ISBN: 978-960-603-190-8, 2015. Αθήνα:

Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Διαθέσιμο στο: http://hdl.handle.net/11419/5881. ID **Ευδόξου**: 59303610

- Richard B. Silverman "The Organic Chemistry of Drug Design and Drug Action", Academic Press, 2004, ISBN-10: 0126437327

-Joseph J. Cannon "Pharmacology for Chemists", Oxford University Press, 2007, ISBN-10: 0841239274

- Jonathan M. Goodman "Chemical Applications of Molecular Modelling", The Royal Society of Chemistry, 1998, ISBN: 0854045791

- M. P. Edwards and D. A. Price, "Role of Physicochemical Properties and Ligand Lipophilicity Efficiency in Addressing Drug Safety Risks". *Ann. Rep. Med. Chem.,* 45: 381–391 (2010)

- A. Avdeef, "Physicochemical profiling (solubility, permeability and charge state)", *Curr. Top. Med. Chem.,* 1, 277-351 (2001)

- N. A. Meanwell "Synopsis of Some Recent Tactical Application of Bioisosteres in Drug Design", *J. Med. Chem.,* 54, 2529–2591 (2011)

- J. Clayden, S. R. LaPlante et. al. "The Challenge of Atropisomerism in Drug Discovery" *Angew. Chem. Int. Ed.,* 48, 6398 – 6401 (2009)

2) Eleni Rekka

1. E.A. Rekka, P.N. Kourounakis, "Organic Pharmaceutical Chemistry: Topics in Medicinal Chemistry-Drug Design", F. Hatzipantou, Ed., 2010 (ISBN 978-960-98594-3-1) (in Greek) **(Εύδοξος).**

2. R. Rodrigo, "Oxidative Stress and Antioxidants: Their Role in Human Disease", 2009, Nova Science Pub Inc.

3) Ioannis Nicolaou

- *Journal* of Medicinal *Chemistry* (ACS Publications)
- *Bioorganic & Medicinal Chemistry Letters* - Elsevier
- *Bioorganic & Medicinal Chemistry* (ISSN 0968-0896)

Educational activities:

Lectures, discussion with the students in every lecture, problem solving and practical work in the laboratory.

Evaluation process and methods:

- The evaluation of knowledge and skills which have been acquitted by the students from the course work is attested with written examinations (80% of the final grade + 20% of experimental aptitude) which are conducted in a fixed date. The written examinations have duration of 3.5h, and consist of approximately ten (10) composite questions spherically covering the tough subjects. Grading is proportionally allocated to the tutors.

- The evaluation process is based on questions that the students are asked to answer based on their knowledge obtained from the lectures as well as on the critical thinking and ability to combine, evaluate and handle the acquired knowledge and information.

- During the laboratory work, students hand over a report of their results and are evaluated. Successful termination of the laboratory course permits their participation to the final examination.

Use of TIC / Electronic distribution of the lectures:

Lectures, notes, statements etc. are presented in the corresponding place of the website of the School of Pharmacy or at the website: http://users.auth.gr/vdem/.

Teaching

Teaching of this course is accomplished through lectures, special supportive lectures and laboratory work.

A total of 26 lectures (13 weeks x 2 hours) are given in the lecture room Δ12 implementing power point projection and/or overhead projection, as well as with chalk and a blackboard.

α) Lectures:

Lecture	Title	Tutor
1	Molecular size/shape, optical & geometric isomerism and biological activity	V. Demopoulos

2	Atropoisomerism-conformers and biological activity	V. Demopoulos
3	Quantitative relationships stereo-structure & activity, polar surface area of molecules	V. Demopoulos
4	Lipophilicity & determination of coefficients of distribution	V. Demopoulos
5	Determination of coefficients of partition	V. Demopoulos
6	Permeation through biological membranes	V. Demopoulos
7	Biopharmaceutical classification of new chemical entities	V. Demopoulos
8	Ligand-receptor interactions and physicochemical properties	V. Demopoulos
9	Classical and non classical isosterism	V. Demopoulos
10	Bioisosterism	V. Demopoulos
11-14	Design of targeted anticancer prodrugs for tumor site-specific activation	I. Nicolaou
15-16	Tumor-targeting drug delivery system which consists of a tumor recognition moiety (as monoclonal antibodies, polyunsaturated fatty acids, folic acid, hyaluronic acid, and oligopeptides) and a cytotoxic warhead connected directly or through a suitable linker to form a conjugate	I. Nicolaou
17-18	OXIDATIVE STRESS AND XENOBIOTIC TOXICITY: Ethanol, carbon tetrachloride, polyhalogenated hydrocarbons, dipyridyl compounds, iron and other heavy metal ions, clofibrate, paracetamol	E. Rekka
19-20	OXIDATIVE STRESS AND PATHOLOGIC CONDITIONS: Hypercholosterolemia, Angiopathies, Hypertension, Cardiovascular diseases, Diabetes mellitus complications	E. Rekka
21-22	OXIDATIVE STRESS AND PATHOLOGIC CONDITIONS: Inflammation, Rheumatoid arthritis, Drugs used in inflammatory conditions, Autoimmune diseases	E. Rekka
23-24	OXIDATIVE STRESS AND PATHOLOGIC CONDITIONS: Neuronal degeneration and oxidative stress, Defense of the brain against oxidative insult, Interaction of iron in the brain, Senile dementia - Alzheimer's disease, Pathobiochemistry of Alzheimer's disease, Cellular death, Cellular damage in	E. Rekka

	Alzheimer's disease, Possible causes of Alzheimer's disease, Aspects of rational drug design in Alzheimer's disease, Parkinson's disease, Causes of Parkinson's disease	
25-26	BIOLOGICAL STRESS AND RESPONSE TO DRUGS: Homeostasis, Biological stress, Manifestations and determination of biologic stress, effect of benzodiazepines, Stress and response to drugs and other xenobiotics, Biologic and oxidative stress interrelationships.	E. Rekka

Laboratory Work:

Students are notified on February of each year to enroll for laboratory work. Students who neglect to enroll in time will perform the laboratory work next proper semester.
The laboratory work will be performed in groups, because the aim of this work, with students in an advanced semester, is the accomplishment of collective, complete experimental work, where the interest is stimulated, the initiative is stressed, the routine work is avoided, and, mainly, the idea of a constructive application of acquired knowledge, as well as of new methods and techniques is materialized.

Laboratory	Title	Tutor
1-3	3D structural drawing of apomorphine & three chemical derivatives of apomorphine	V. Demopoulos
4-7	Structural energy minimization invoking molecular mechanism & quantum mechanism subrutines	V. Demopoulos
8-9	Listing of results (energies & intramolecular distances)	V. Demopoulos
10-12	2D structural drawing of apomorphine & three chemical derivatives of apomorphine. Calculation of lipophilicity coefficients	V. Demopoulos
13-14	Conformers & Boltzman's distribution. Calculated structural results & reported *in vivo* activity	V. Demopoulos
15-18	Synthesis and identification of paracetamol	E. Rekka
19-22	Induction of hepatotoxicity to rats by the administration of high doses of	E. Rekka

	paracetamol, study of the effect of compounds with different mechanism of action, aiming to the protection of the organism against oxidative insult	
23-26	Determination of the effect of the above treatments, with analysis of indices in blood and liver of the experimental animals.	E. Rekka

SEMESTER IX

Practical Training

Code number: PA1
Cycle: Undergraduate
Semester: 9th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 30

Lectures (hours/week): 2

Tutorial (hours/week): -

Laboratory work (hours/week): Five days per week 9-2

Course coordinator: Diamanto Lazari Associate Professor

Tutor (s):

Hadjipavlou-Litina Dimitra, Professor

Room 408B, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: 2310997627, e-mail (hadjipav@pharm.auth.gr)

Sklaviadis Theodoros, Professor

Room 310, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: e-mail (sklaviad@pharm.auth.gr)

Kachrimanis Kyriakos Associate Professor

Room 212, 2nd floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: e-mail kgk@pharm.auth.gr)

Lazari Diamanto Associate Professor

Collaboration with students: Every day.

Communication: 2310997617, e-mail (dlazari@pharm.auth.gr)

Assisting personnel:

Aims of the course: The course helps the students of the Pharmacy School to understand and get experienced in a community Pharmacy/a Hospital pharmacy/a pharmaceutical Industry, for the safe and efficient use of drugs by the patients and society, in general.

Skills: By the end of this course, the students should be able to: a) to exert their profession in a community pharmacy or in a hospital pharmacy or in a pharmaceutical industry, b) to communicate with the patient.

Teaching methods: Lectures, lectures by invited eminent scientists (covering all the areas of the pharmaceutical science), case studies.

Contents of the course:

Pharmaceutical praxis in the community pharmacy, facing specific cases in prescriptions, first aids, ethics, safety

Functionality, organization of the hospital pharmacy

Good manufacture in pharmacy, validation process

Proposed literature:

1. National Formulary
2. European Pharmacopoea
3. Hellenic-Greek Pharmacopoea

Educational activities: Lectures, discussion with the students in every lecture, problem solving and practice in the pharmacy.

Evaluation process and methods: Examination of the course can be done by a final oral examination at the end of the semester**.** The evaluation process is based on questions that the students are asked to answer based on their knowledge obtained from the lectures and training in the pharmacy as well as on the critical thinking and ability to combine, evaluate and handle the acquired knowledge and information.

The examination at the end of the semester is performed orally at dates, time and place arranged by the department.

Use of Electronic distribution of the lectures

Teaching: Teaching of this course is accomplished through lectures.

A) **Lectures**. Lectures are given 2 hours per week in the lecture room-auditorium D12 Building of the School of Natural Sciences

Lecture	**Title**	**Tutors**
1-5	Pharmacy in praxis (community pharmacy)	All tutors
6-9	Organization, functionality, action in hospital pharmacy	All tutors
10-11	Good manufacture in Pharmacy	All tutors
12-13	Validation process	All tutors

SEMESTER X

Practical Training

Code number: PA2
Cycle: Undergraduate
Semester: 10th
Course type

	Background/General knowledge
X	Scientific area (pharmacy)

Credit Units (ECTS): 30

Lectures (hours/week): 2
Tutorial (hours/week): -
Laboratory work (hours/week): Five days per week 9-2
Course coordinator: Kachrimanis Kyriakos Associate Professor

Tutor (s):

1)Hadjipavlou-Litina Dimitra, Professor

Room 408B, 4th floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: 2310997627, e-mail (hadjipav@pharm.auth.gr)

2)Sklaviadis Theodoros, Professor

Room 310, 3rd floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: e-mail (sklaviad@pharm.auth.gr)

Kachrimanis Kyriakos Associate Professor

Room 212, 2nd floor Biology/Pharmacy building.

Collaboration with students: Every day.

Communication: e-mail kgk@pharm.auth.gr)

Lazari Diamanto Associate Professor

Collaboration with students: Every day.

Communication: 2310997617, e-mail (dlazari@pharm.auth.gr)

Assisting personnel:

Aims of the course: The course helps the students of the Pharmacy School to understand and get experienced in a community Pharmacy/a Hospital pharmacy/a pharmaceutical Industry, for the safe and efficient use of drugs by the patients and society, in general.

Skills: By the end of this course, the students should be able to: a) to exert their profession in a community pharmacy or in a hospital pharmacy or in a pharmaceutical industry, b) to communicate with the patient.

Teaching methods: Lectures, lectures by invited eminent scientists (covering all the areas of the pharmaceutical science), case studies.

Contents of the course:

Pharmaceutical praxis in the community pharmacy, facing specific cases in prescriptions, first aids, ethics, safety

Functionality, organization of the hospital pharmacy

Good manufacture in pharmacy, validation process

Proposed literature:

4. National Formulary
5. European Pharmacopoea
6. Hellenic-Greek Pharmacopoea

Educational activities: Lectures, discussion with the students in every lecture, problem solving and practice in the pharmacy.

Evaluation process and methods: Examination of the course can be done by a final oral examination at the end of the semester**.** The evaluation process is based on questions that the students are asked to answer based on their knowledge obtained from the lectures and training in the pharmacy as well as on the critical thinking and ability to combine, evaluate and handle the acquired knowledge and information.

The examination at the end of the semester is performed orally at dates, time and place arranged by the department.

Use of ΤΠΕ / Electronic distribution of the lectures

Teaching: Teaching of this course is accomplished through lectures.

B) **Lectures**. Lectures are given 2 hours per week in the lecture room-auditorium D12 Building of the School of Natural Sciences

Lecture	**Title**	**Tutors**
1-5	Pharmacy in praxis (community pharmacy)	All tutors
6-9	Organization, functionality, action in hospital pharmacy	All tutors
10-11	Good manufacture in Pharmacy	All tutors

12-13	Validation process	All tutors

DISSERTATION REGULATIONS
SCHOOL OF PHARMACY – ARISTOTLE UNIVERSITY OF THESSALONIKI
(General Assembly 433/13-03-12)

DISSERTATION : 8 credits

Introduction – Aim

The new Curriculum (2008-) provisions optional pursue of a Dissertation. This Dissertation may be an experimental paper, rather than a paper based on literature, focusing on a specific topic, of a total duration of one (1) semester, with the possibility to extend to two more semesters. The results are submitted for assessment to the supervising professor.

A Dissertation may be pursued upon completion of the 7th semester and students may opt for a Dissertation instead of two electives offered in the 8th semester of studies. Each student is assigned a Dissertation at the beginning of the spring semester. The aim of the Dissertation is to help the student both to systemise and apply the knowledge acquired during his studies and to work in depth on a specific subject area.

Selection – Assignment of topic – Pursue of a Dissertation

For the purposes of selecting students to pursue a Dissertation, the Teaching Faculty of the School of Pharmacy will take into consideration students' academic performance.

Each member of the Teaching Faculty will announce available posts and subject areas, in which students may express their interest to pursue a Dissertation. There is no limit to the number of Dissertations supervised by an individual member of the Teaching Faculty (with the exception of limitations due to availability of laboratory facilities, instruments, materials and financial resources etc.). Each topic may be undertaken by one student.

Following successful selection of students by the Teaching Faculty of the appropriate laboratory/direction, a letter of the student’s acceptance by the Teaching Faculty must be submitted to the Registry using a standard form and indicating the Dissertation topic. A list of student names and the respective supervisors is sent to all Departments by the Registry.

The students pursuing a Dissertation are in regular contact and close cooperation with their supervisor, who monitors progress of their work and approves its printing and examination. It should be noted that if a Dissertation is not completed within three (3) semesters as provisioned, the supervisor is released of this commitment and in such a case, the student is required to select two (2) electives of those offered in the eighth (8th) semester.

It is required that the Dissertation is submitted in (2) hard copies, one of which should be submitted to the supervisor and the other to the Registry of the School. In addition, a digital copy should be submitted to the Registry of the School.

Assessment – Grading – Presentation

Dissertations will be examined by the respective Teaching Faculty member who supervises the Dissertation and will be assessed on the following criteria: a) the extent to which the student has met the requirements of the topic, b) quality of content and presentation, c) literature review on the topic, d) consistency of work and good laboratory practice during pursue of the Dissertation.

The grade is submitted to the Registry of the School in the same procedure as the one followed for all subjects of the Curriculum (printed grading form or electronic submission). Dissertations are examined only during the regular examination sessions of each academic year.

Dissertations are presented and examined in public, during set dates in every examination session, before the supervising member of the Teaching Faculty, other members of the Teaching Faculty, students and anyone else who may be interested. The supervising member of the Teaching Faculty is responsible for organising presentations.

General Provisions

Any issue that may arise from implementing these Regulations, which is not provisioned by these, is settled by the Board of Administration of the School. Lastly, any amendments or additions to these Regulations are determined by the General Assembly of the School.

HELLENIC REPUBLIC
ARISTOTELIO PANEPISTIMIO THESSALONIKIS (ARISTOTLE UNIVERSITY OF THESSALONIKI)
SCHOOL OF PHARMACY
http://www.pharm.auth.gr, Tel. +30 +30 2310997613, Fax +30 +30 2310997612, e-mail: info@pharm.auth.gr, A.U.Th., 54124, THESSALONIKI, Greece.

DIPLOMA SUPPLEMENT

This Diploma Supplement is based on the model developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international 'transparency' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original accompanying qualification to which this supplement is appended. It should be free from any value judgments, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1 Family Name(s):

1.2 Given Name(s) :

1.3 Date of birth (day/month/year), Place, Country of Birth:

1.4 Student identification number or code:

2. INFORMATION IDENTIFYING THE QUALIFICATION

2.1 Name of the qualification and (if applicable) title conferred (in original language):

Ptychio Farmakeftikis (Degree in Pharmacy)

2.2 Main field(s) of study for the qualification:

with specialization field:

2.3 Name and status of awarding institution (in original language):

Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης (Α.Π.Θ.), Δημόσιο Πανεπιστήμιο, Τμήμα Φαρμακευτικής (Aristoteleio Panepistimio Thessalonikis-Aristotle University of Thessaloniki, A.U.Th.), Public University, School of Pharmacy.

2.4 Name and status of institution (if different from 2.3) administering studies (in original language) :

As in 2.3.

2.5 Language(s) of instruction/examination: Greek

3. INFORMATION ON THE LEVEL OF THE QUALIFICATION

3.1 Level of qualification: Integrated 1st and 2nd Cycle

3.2 Official length of programme:

10 SEMESTERS, 300 ECTS.
A full academic year is equivalent to 60 ECTS units and each semester to 30 ECTS (European Credits Transfer System) (1 ECTS= 25-30 hours) (according to the Greek Law 1466/13-8-2007, No 5/89656/B3, art. 1,2,3). To each course is given a number of ECTS (>=2) according to the student's work load (contact hours, laboratory work, examination etc) for the full completion of the course.

3.3 Access requirement(s):

Upper secondary degree (six years of studies)- national level examination.

4. INFORMATION ON THE CONTENT AND RESULTS GAINED

4.1 Mode of study:

Full - time

4.2 Programme requirements - aims:

The students complete their studies and obtain the degree in Pharmacy when having succeeded in the anticipated courses (compulsory and elective) and accumulated 300 ECTS. The courses are allocated to eight semesters and the practical training is pursued for 2 semesters (30 ECTS per semester, 4x3 quarters) (9th to 10th) and includes: a)a pharmacy opened to the public (min: 6 months) b)a hospital pharmacy (min: 3 months) c)a pharmaceutical industry (elective)).
The students at the 8th semester must choose one of the two Directions (Direction I-Direction II) and be examined in all the courses of the selected direction. The examination is written/oral or in an assignment form.
The undergraduate study program (USP) provided by the School of Pharmacy aims at training pharmacists to understand the chemical structure and the pharmacological activity of the drugs, their bioavailability, biodegradation, metabolism, the used methods for drugs synthesis as well as the used methods for their evaluation (synthesis and drug formulation).

At the applied level, USP also aims in training and providing the graduates with the nescessary skills related to the sector of drug and health. Specifically, upon successful competition of their studies graduates of the School of Pharmacy based on their courses, diploma and practical training can acquire training and skills closely related to:

a) The chemical and pharmacochemical study of substances of pharmaceutical and of broader biological interest, the chemical and pharmacochemical study of chemical compounds (organic, inorganic, metallo-organic) of broader pharmaceutical-biological interest, Design, synthesis (isolation), separation, properties, control (identification, purity, content) , the chemical and pharmacochemical study (biological response, biodegradation, bioavailability, metabolism, interaction) of the biologically active agents, the structure-activity relationship between molecular structure/action of biologically active agents, the quantitative structure-properties-activities relationships of all the above, the study of chemical principles and methods that support the development of pharmacochemistry and the chemical aspect of immunology.

b) the pharmaceutical practices and legislation (prescription execution and pharmacotechnical tasks at the Pharmacy and the Hospital), the consideration of pharmaceutical agents and preparations and of their application and action systems (physical and physiochemical laws) from a physiopharmaceutical point of view, the basic pharmacotechnical elaborations at semi-industrial and industrial scale of the raw material and pharmaceutical agents, as well as their design, technology and formatting into preparations and cosmetics, the assessment of the quality of medicines, cosmetics and generally of natural products, of preparations and substances by applying control methods (physiochemical, technological, microbiological, in vivo, etc.), the pharmaceutical technology of the preparations and the factors affecting their efficiency during their in vivo implementationand the technological study of factors affecting the obtaining, treatment and control of natural products and of their components.

c) the chemistry of natural products (of vegetative, animal, mineral origin), that is, isolation of active components, identification, control and chemical study,the pharmaceutical study of medicines and aromatic plants (essential oils, alkaloids, etc.: analysis, standards and improvement methods), description of medicines, classification, microscopic control, isolation, identification, control and biogenesis of their natural products , the Biotechnology of Pharmaceutical Plants and the implementation of physiochemical methods used in Pharmacognosy.

d) the pharmacological development of new medicines, the improvement of known pharmaceutical agents and the study of the structure and pharmacological action at biochemical, molecular level (in vitro), as well as in situ (isolated organs) and in vivo (laboratory animals), the pharmacodynamic study of the pharmacological actions, undesirable effects, and interactions between medicines, the analysis of the action of chemotherapeutic agents for microbial infections, parasitic diseases, viruses and neoplasms, the pharmacological analysis and clinical testing of medicines (absorption, distribution, elimination mechanisms of medicines), dosage determination, therapeutic protocols, medicine interactions, the pharmacogenetic study of the idiosyncrasy, metabolism, addiction, psychic and natural dependence and resistance to medicines, the immunopharmacological analysis of allergenic factors, pharmaceutical agents, mechanisms of immunosuppression by medicines and the pharmacological basis of hyperaesthesia phenomena, the toxicological study of medicine undesirable effects mechanisms, of natural products, poisons, teratogens and mutagens in vitro or in vivo, the study of the pharmacological action of micro-molecular factors (vaccines, sera, proteins, hormones, etc.) and of microorganisms' metabolism products, which are prepared with biotechnology methods and the development of therapeutic reagents for neurodegenerative diseases.

Graduates of the School of Pharmacy, further to the basic knowledge of their discipline and profession are able to: 1) apply knowledge in practice, 2) communicate in a foreign language, 3) search, process, analyse and synthesize data and information, use also the necessary technologies, 4) adapt to novel situations and make decisions, 5) work independently or in groups in international and/or interdisciplinary contexts, 6) generate new research ideas and designe and manage projects, 7) respect diversity, multiculturalism and the natural environment, 8) demonstrate social, professional and moral responsibility and sensitivity to gender issues, 9) view themselves as well as others critically, 10) promote free, inductive and deductive thinking.

4.3 Programme details (e.g. modules or units studied and individual grades/marks/credits obtained):

The student has successfully completed practical training of 4 quarters (**60 ECTS**).
Courses that the student has successfully attended, as well as subjects for which the student has received recognition or exemption (COR = Core courses, COM = Compulsory courses belonging to the selected specialization, ELC = Elective courses, ELM=Elective courses belonging to the selected specialization, FL= Foreign Language (Foreign Language is taught from 1 to 6 semesters and contributes as one grade in the Degree), EX = Exchange, DIS = Dissertation):

Code	Courses	Type	ECTS credits	Grade	Examination period	ECTS Grading

			(Student workload)			
1	GENERAL MATHEMATICS	COR	7.0	9.0	JUN 2007	B
2	GENERAL PHYSICS	COR	7.0	9.0	JUN 2007	B
3	GENERAL CHEMISTRY	COR	7.0	8.0	JUN 2007	A
4	QUALITATIVE ANALYTICAL CHEMISTRY	COR	6.5	9.0	JUN 2007	B
10	MICROBIOLOGY	COR	4.0	5.0	JUN 2007	D
11	QUANTITATIVE ANALYTICAL CHEMISTRY	COR	6.5	7.0	JUN 2007	B
7	BOTANY	COR	4.0	8.0	JUN 2007	B
8	GEN. ORGANIC CHEMISTRY	COR	9.0	6.0	JUN 2007	B
9	CELL BIOLOGY	COR	6.0	7.0	JUN 2007	B
20	INORGANIC PHARMACEUTICAL CHEMISTRY	COR	6.0	7.0	FEB 2008	B
21	BIOCHEMISTRY I	COR	4.0	8.0	FEB 2008	B
22	SPECIFIC ORGANIC CHEMISTRY	COR	7.0	8.0	FEB 2008	B
23	PHARMACEUTICAL ANALYSIS I	COR	6.5	7.0	FEB 2008	B
24	PHYSICAL CHEMISTRY	COR	4.0	10.0	FEB 2008	A
31	BIOCHEMISTRY II	COR	4.0	9.0	JUN 2008	A
33	PHARMACEUTICAL ANALYSIS II	COR	7.0	7.0	JUN 2008	B
34	PHARMACEUTICAL CHEMISTRY (ORGANOMETALLICS AND HORMONES)	COR	6.5	8.0	JUN 2008	A
35	PHYSIOLOGY	COR	4.0	10.0	JUN 2008	A
46	GENERAL PHARMACEUTICAL TECHNOLOGY	COR	6.0	10.0	JUN 2008	A
32	DISPENSING	COR	6.0	10.0	FEB 2009	A
47	GENERAL PHARMACOGNOSY	COR	6.5	8.0	FEB 2009	B
48	ORGANIC PHARMACEUTICAL CHEMISTRY I	COR	6.5	8.0	FEB 2009	A
49	PHARMACOLOGY I	COR	6.5	7.0	FEB 2009	B
50	PHYSICAL PHARMACY	COR	4.0	7.0	FEB 2009	B
51	BIOPHARMACEUTICS	COR	5.5	9.0	JUN 2009	A
52	SPECIFIC PHARMACEUTICAL TECHNOLOGY I	COR	6.0	9.0	JUN 2009	A
53	APPLIED PHARMACOGNOSY I	COR	6.0	9.0	JUN 2009	A
54	ORGANIC PHARMACEUTICAL CHEMISTRY II	COR	6.0	10.0	JUN 2009	A
55	PHARMACOLOGY II	COR	6.0	6.0	JUN 2009	C
66	SPECIFIC PHARMACEUTICAL TECHNOLOGY II	COR	6.0	9.0	FEB 2010	A
67	EMERGENCY MEDICAL TREATMENT	COR	2.0	10.0	FEB 2010	B
68	APPLIED PHARMACOGNOSY II	COR	6.0	9.0	FEB 2010	A
69	DRUG QUALITY CONTROL I	COR	4.0	7.0	FEB 2010	B
70	ORGANIC PHARMACEUTICAL CHEMISTRY III	COR	7.0	9.0	FEB 2010	A
71	TOXICOLOGY	COR	5.0	9.0	FEB 2010	A
5	INTRODUCTION TO PHARMACEUTICAL SCIENCES & LEGISLATION	ELC	2.0	5.0	JUN 2007	D
84	MOLECULAR BIOLOGY	ELC	2.0	9.0	FEB 2008	B
41	HYGIENE	ELC	2.0	6.0	JUN 2008	D
12	ENGLISH LANGUAGE I	FL	0.5	8.0	JUN 2007	C
16	ENGLISH LANGUAGE II	FL	0.5	8.0	JUN 2007	C
25	ENGLISH LANGUAGE III	FL	0.5	5.0	FEB 2008	D
36	ENGLISH LANGUAGE IV	FL	0.5	8.0	JUN 2008	B
56	ENGLISH LANGUAGE V	FL	0.5	7.0	FEB 2009	C
61	ENGLISH LANGUAGE VI	FL	0.5	6.0	JUN 2009	C
78	APPLIED PHARMACOLOGY AND THERAPEUTICS	COM	6.0	9.0	JUN 2010	A
79	CLINICAL PHARMACOKINETICS	COM	6.0	9.0	JUN 2010	A
80	CLINICAL CHEMISTRY	COM	4.0	10.0	JUN 2010	A
81	RADIOPHARMACEUTICAL CHEMISTRY	COM	5.0	9.0	JUN 2010	A
82	DISPENSING (OVER THE COUNTER MEDICATIONS)	COM	5.0	9.0	JUN 2010	A
83	HEALTHY FOOD AND DIET PRODUCTS	COM	4.0	10.0	JUN 2010	A
TOTAL ECTS			**240.0**			

The Degree is awarded according to the required minimum local credit units (167.0) and the student may be examined in two more optional courses(Ministerial Decision no Φ.1231/Β1/425, art. 60 section 3, Hellenic Government Gazette no 1099/2000/Β)

ECTS grading (A=10%, B=25%, C=30%, D=25%, E=10%) is based on a sample of a minimum of 100 students. If the sample is

not sufficient then nothing is noted (according to the Ministerial Decision no Φ.5/89656/Β3, art. 4, Hellenic Government Gazette no 1466/2007/B). The ECTS grading system is based on the Annex 3 of the ECTS Guide, 2009, and on Crocker, L., & Algina, J. (1986). Introduction to classical and modern test theory. New York: Harcourt Brace Jovanovich College Publishers.

Dissertations or/and Internship projects as well are considered as individual projects and they are not graded based on a previous sample. The same stands for the Erasmus courses for which we accept the grading of the receiving institution and we convert it to the local grade accordingly.

4.4 Grading scheme, and if available, grade distribution guidance :

A. A scale of 1 to 10 applies to the marks of each subject in the Hellenic higher education. The grading scheme is as follows in the qualification Ptychion (according to the regulation 1099/5-9-2000/B, art. 60):
Άριστα (Arista) Excellent : 8.50-10.00
Λίαν Καλώς (Lian Kalos) Very Good : 6.50-8.49
Καλώς (Kalos) Good : 5.00-6.49
Minimum passing grade : 5

4.5 Overall classification of the qualification (in original language):

"Λίαν Καλώς" (Very Good): 8.24

5. INFORMATION ON THE FUNCTION OF THE QUALIFICATION

5.1 Access to further study:

The qualification is a terminal award and allows access to postgraduate studies.

5.2 Professional status (if applicable):

Professional licence is required to establish and manage pharmacy retail bussiness, to serve as a pharmacist in a state hospital or to serve in a state health service.

6. ADDITIONAL INFORMATION

6.1 Additional information:

6.2 Further information sources

School of Pharmacy: http://www.pharm.auth.gr
Aristotle University of Thessaloniki: http://www.auth.gr
Ministry of Education and Religious Affairs, Culture and Sports: http://www.minedu.gov.gr
European Union Educational Issues: http://www.europa.eu
Eurydice: http://eacea.ec.europa.eu/education/eurydice

7. CERTIFICATION OF THE SUPPLEMENT

7.1 Date:

7.2 Name and Signature:

7.3 Capacity: President of the School

7.4 Official Stamp or seal:

This certificate is issued for foreign authorities and is signed by the President of the School according to the regulation No. 49923/2008 (Hellenic Government Gazette no 873/2008/B).

8. INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM

Pursuant to the Constitution (article 16, paragraph 5), Greek Tertiary Education is public and gratis. Furthermore, according to the legal framework, it is divided into:

(a) the University sector (A.E.I.): Universities, Technical Universities, Fine Arts School, etc., and
(b) the Technological sector (T.E.I.): Technological Education Institutions and the School of Pedagogic and Technological Education.

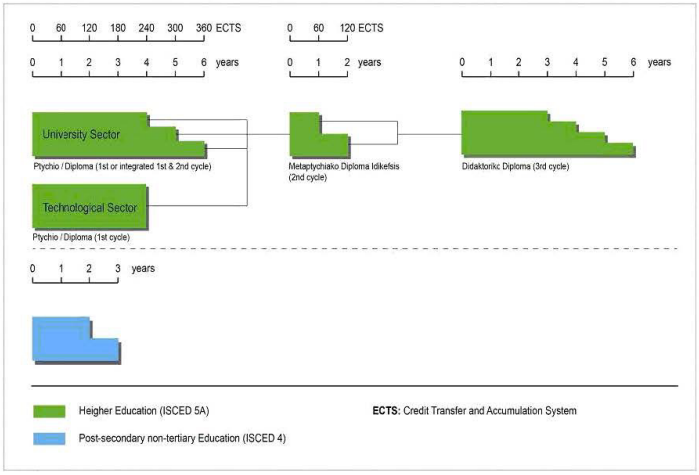
Part of the University sector is also, since 1998, the Greek Open University, which provides open and distance -undergraduate and postgraduate- education and training.
There are also state post-secondary non-tertiary Institutions offering vocationally oriented courses of shorter duration (2 to 3 years), which operate under the authority of other Ministries.

All graduates of secondary education (Geniko and Epagelmatiko Lykeio) can be admitted to Higher Education Institutions, depending on the general score obtained in national examinations that take place at the end of the final year of Lyceum. The admission system is based on the number of available places (numerus clausus), the candidates' performance, and the candidates' ranked preferences of Schools. Admission to particular schools may also require a special examination (eg drawing for Architecture, etc.).

Study programmes in Higher Education Institutions last from four to six years, depending on the subject area. Students who successfully complete their studies are awarded a Ptychio / Diploma, which permits employment or further studies at post-graduate level leading to a Metaptychiako Diploma Eidikefsis (2nd cycle) - equivalent to the Master's degree- and to the doctorate degree (3d cycle), Didaktoriko Diploma.
Legislation on quality assurance in Higher Education, the Credit Transfer and Accumulation System (ECTS) and the Diploma Supplement defines the framework and the criteria for the evaluation of Higher Education Institutions, and for the certification of programmes of studies. These measures aim, among others, at promoting student mobility and contributing to the creation of the European Higher Education Area.

A detailed description of the Greek Education System is offered in:

- EURYDICE (<http://www.eurydice.org>) database of the European Education Systems.
- <http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/122EN.pdf> (pages 82,83)



GRADUATE STUDIES

GRADUATE STUDIES PROGRAM

Ministerial Decision B7/160663 (FEK 2754 / 15–10–2014)

Article 1

General provisions

The Department of Pharmacy Faculty of Health Sciences will operate from the academic year 2014-2015 under the reformed Graduate Programme (PSP) entitled "Pharmacy", according to the provisions of this decision and the provisions of N.3685 / 2008 (Government Gazette 148 A) as amended.

Article 2

Purpose

The aim of PSP is to promote scientific knowledge and to satisfy the educational, research and development needs of the country in the field of Pharmaceutical Sciences. It aims at linking research effort to the production process and the specific needs related to operational planning and development of pharmaceuticals. Furthermore, the PSP will contribute to the upgrading of studies in specialties of Pharmacy, the creation of new professional outlets and to limit leakage to other countries of our best students.

The proposed program is a continuation of PSP Department of Pharmacy which occurs since 2002 to today and has already contributed, and will strongly contribute to the upgrading and modernization of education, research and development of pharmaceutical sciences.

Object of PSP It is education leading to a Master of Science (M.Sc.) focusing on specific sectors of Pharmacy.

Article 3

Postgraduate Titles

The Master of Pharmacy Department Program awards M.Sc. (M.Sc.) in Pharmacy in the following directions:

1. Pharmaceutical chemistry, development of pharmaceutical compounds.

2. Pharmaceutical Technology (including formatting and quality control of therapeutic and cosmetic formulations from a technological, physical, analytical and biopharmaceutical view).

3. Pharmaceutical Biotechnology-Molecular Diagnostics.

4. Pharmacology and Therapeutics.

5. Pharmacognosy-Herbal Medicinal Products.

Article 4

Graduates Categories

On PSP accepts graduates of Pharmacy Departments, Chemistry, Biology, Medicine, Dentistry, Veterinary Medicine, Agriculture, Chemical Engineering or related departments from universities in Greece or congener recognized institutions abroad and degree holders TEI related subject.

Article 5

Duration

The duration for the award of the MSc degree (M.Sc.) is four (4) semesters.

Article 6

COURSES OF THE GRADUATE STUDIES PROGRAM

Area of Specialization: MEDICINAL CHEMISTRY, DEVELOPMENT OF PHARMACEUTICAL COMPOUNDS

Course title	Semester	ECTS
1. Chemistry of compounds of pharmaceutical interest	A	10
2. Structure Elucidation of Pharmaceutical Compounds	A	10
3. Advanced Topics in the Metabolism of Xenobiotics	A	10
4. Methods of Drug Synthesis with Emphasis to Heterocyclic Medicinal Chemistry	B	10
5. Specific Topics of advanced Medicinal Chemistry	B	10
6. Advanced pharmaceutical chemistry	B	10
7. Planning, organization and writing of the proposal for the dissertation	Γ	10
8. Post-graduate laboratory research	Γ	20
9. Post-graduate laboratory research	Δ	20
10. Writing and presentation of the graduate dissertation	Δ	10
Total		**120**

Area of Specialization: PHARMACEUTICAL TECHNOLOGY

α/α	Course title	Semester	ECTS
1.	Design, Development and Production of Dosage Forms	A	10
2.	Computer Applications in Pharmaceutical Technology	A	10
3.	Drug Quality Control – Sustained Delivery Systems	A	10
4.	Advanced Pharmaceutical Analysis	B	10
5.	Advanced Topics in Physical Pharmacy	B	10
6.	Technology and Quality Control of Natural Products – Preparation of Cosmetics from Natural Products	B	10
7.	Planning, organization and writing of the proposal for the dissertation	Γ	10
8.	Post-graduate laboratory research	Γ	20
9.	Post-graduate laboratory research	Δ	20
10.	Writing and presentation of the graduate dissertation	Δ	10
Total			**120**

Area of Specialization: BIOTECHNOLOGY–MOLECULAR DIAGNOSTICS

α/α	Course title	Semester	ECTS
1.	Molecular Pharmacology and Pharmacogenetics	A	10
2.	Molecular biology	A	10
3.	Bioinformatics / Computer Applications in Molecular Biology and Biotechnology	A	10
4.	Biotechnology of Pharmaceutical Plants	B	10
5.	Pharmaceutical Biotechnology I (Molecular Techniques for the analysis of macromolecules)	B	10
1.	Pharmaceutical Biotechnology II / Technologies for the Production of Pharmaceuticaland Diagnostic Substances through Genetic Engineering	B	10
2.	Planning, organization and writing of the proposal for the dissertation	Γ	10
8.	Post-graduate laboratory research	Γ	20
9.	Post-graduate laboratory research	Δ	20
10.	Writing and presentation of the graduate dissertation	Δ	10
Total			**120**

Area of Specialization: PHARMACOLOGY AND THERAPEUTICS

α/α	Course title	Semester	ECTS
1.	Molecular Pharmacology and Pharmacogenetics	A	10
2.	Bioinformatics / Applications of computer sciences in Molecular Biology and Biotechnology	A	10
3.	Pharmacokinetics	A	10
4.	Drug-Drug interactions	B	10
5.	Physiology -Pathophysiology	B	10
6.	Pharmaceutical Biotechnology I (Molecular Techniques for the Analysis of Macromolecules)	B	10
7.	Planning, organization and writing of the proposal for the dissertation	Γ	10
8.	Post-graduate laboratory research	Γ	20
9.	Post-graduate laboratory research	Δ	20
10.	Writing and presentation of the graduate dissertation	Δ	10
Total			**120**

Area of Specialization: PHARMACOGNOSY – PLANT PHARMACEUTICAL PRODUCTS

α/α	Course title	Semester	ECTS
1.	Terpenoids and derivatives. Spectroscopic Methods for Structure Elucidation of Terpenoids	A	10
2.	Phenolic Compounds and Derivatives. Spectroscopic Methods for Structure Elucidation of Phenolic	A	10
3.	Designing Semisynthetic Modifications	A	10
4.	Pharmacological Methods of Phytotherapy Evaluation	B	10
4.	Modern Techniques of Bioactivity Control	B	10
5.	Alkaloids and Derivatives. Spectroscopic Methods Used for Structure Elucidation of Alkaloids	B	10
7.	Planning, organization and writing of the proposal for the dissertation	Γ	10
8.	Post-graduate laboratory research	Γ	20
9.	Post-graduate laboratory research	Δ	20
10.	Writing and presentation of the graduate dissertation	Δ	10
Total			**120**

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3. Advanced Topics in the Metabolism of Xenobiotics	A	10
4. Methods of Drug Synthesis with Emphasis to Heterocyclic Medicinal Chemistry	B	10
5. Specific Topics of advanced Medicinal Chemistry	B	10
6. Advanced pharmaceutical chemistry	B	10
7. Planning, organization and writing of the proposal for the dissertation	Γ	10
8. Post-graduate laboratory research	Γ	20
9. Post-graduate laboratory research	Δ	20
10. Writing and presentation of the graduate dissertation	Δ	10
Total		**120**

Area of Specialization: PHARMACEUTICAL TECHNOLOGY

α/α	Course title	Semester	ECTS
2.	Design, Development and Production of Dosage Forms	A	10
2.	Computer Applications in Pharmaceutical Technology	A	10
3.	Drug Quality Control – Sustained Delivery Systems	A	10
4.	Advanced Pharmaceutical Analysis	B	10
5.	Advanced Topics in Physical Pharmacy	B	10
6.	Technology and Quality Control of Natural Products – Preparation of Cosmetics from Natural Products	B	10
7.	Planning, organization and writing of the proposal for the dissertation	Γ	10
8.	Post-graduate laboratory research	Γ	20
9.	Post-graduate laboratory research	Δ	20
10.	Writing and presentation of the graduate dissertation	Δ	10
Total			**120**

Area of Specialization: BIOTECHNOLOGY–MOLECULAR DIAGNOSTICS

α/α	Course title	Semester	ECTS
1.	Molecular Pharmacology and Pharmacogenetics	A	10
2.	Molecular biology	A	10
3.	Bioinformatics / Computer Applications in Molecular Biology and Biotechnology	A	10
4.	Biotechnology of Pharmaceutical Plants	B	10
5.	Pharmaceutical Biotechnology I (Molecular Techniques for the analysis of macromolecules)	B	10
3.	Pharmaceutical Biotechnology II / Technologies for the Production of Pharmaceuticaland Diagnostic Substances through Genetic Engineering	B	10
4.	Planning, organization and writing of the proposal for the dissertation	Γ	10
8.	Post-graduate laboratory research	Γ	20
9.	Post-graduate laboratory research	Δ	20
10.	Writing and presentation of the graduate dissertation	Δ	10

Total	**120**

Area of Specialization: PHARMACOLOGY AND THERAPEUTICS

α/α	**Course title**	**Semester**	**ECTS**
1.	Molecular Pharmacology and Pharmacogenetics	A	10
2.	Bioinformatics / Applications of computer sciences in Molecular Biology and Biotechnology	A	10
3.	Pharmacokinetics	A	10
4.	Drug-Drug interactions	B	10
5.	Physiology -Pathophysiology	B	10
6.	Pharmaceutical Biotechnology I (Molecular Techniques for the Analysis of Macromolecules)	B	10
7.	Planning, organization and writing of the proposal for the dissertation	Γ	10
8.	Post-graduate laboratory research	Γ	20
9.	Post-graduate laboratory research	Δ	20
10.	Writing and presentation of the graduate		

dissertation	Δ	10
Total		**120**

Area of Specialization: PHARMACOGNOSY – PLANT PHARMACEUTICAL PRODUCTS

α/α	Course title	Semester	ECTS
3.	Terpenoids and derivatives. Spectroscopic Methods for Structure Elucidation of Terpenoids	A	10
4.	Phenolic Compounds and Derivatives. Spectroscopic Methods for Structure Elucidation of Phenolic	A	10
3.	Designing Semisynthetic Modifications	A	10
4.	Pharmacological Methods of Phytotherapy Evaluation	B	10
4.	Modern Techniques of Bioactivity Control	B	10
5.	Alkaloids and Derivatives. Spectroscopic Methods Used for Structure Elucidation of Alkaloids	B	10
7.	Planning, organization and writing of the proposal for the dissertation	Γ	10
8.	Post-graduate laboratory research	Γ	20
9.	Post-graduate laboratory research	Δ	20
10.	Writing and presentation of the graduate		

dissertation	Δ	10
Total		**120**

Semester courses, which are divided into two (2) semesters (A and B), are specialization courses and are taught in accordance with the timetable in Greek.

Article 7

Number of Students

The number of admitted graduate students is set at a maximum of fifteen (15) per year.

Article 8

Staff

On PSP will work Faculty members of the Pharmacy Department of the Faculty of Health Sciences and other Departments of AUTH or other universities domestically, as well as other categories of teachers in accordance with the provisions of Article 5 of Law. 3685/2008 (GG 148 A), as amended.

Article 9

Infrastructure

The School of Pharmacy has sufficient infrastructure to meet the operational needs of the PSP.

Article 10

Duration of Operation

The PSP will work until the academic year 2021-2022, subject to the provisions of article 80 par. 11 of Law. 4009/2011 (Government Gazette A 195) as amended and in force.

Article 11

Operating cost

The annual cost of operating PSP on operational costs amounts to 45,000 € and broken down into categories of expenses as follows:

EXPENSES CATEGORY	Ποσό (€)
Supply - equipment maintenance - software	15.000
Supplies (materials, printing paper, chemicals and reagents, etc.)	25.000
Human resources - outworkers	2.500
Transportation costs	2.500
TOTAL	**45.000**

Part of the aforementioned cost of operating PSP is covered by the budget of the University and the rest from research programs, community programs and grants.

Article 12

Transitional provisions

Graduate students who are accepted to the program until the academic year 2013-2014 will complete their studies in accordance with the provisions of the previous Ministerial Decision.

All matters not regulated in this Decision shall be regulated by the Regulation of Postgraduate Studies and the competent bodies in accordance with applicable law.

The decision shall be published in the Government Gazette.

Maroussi, October 6, 2014

THE MINISTER

ANDREAS. LOVERDOS

INTERNAL REGULATION OF THE GRADUATE STUDIES PROGRAM OF THE DEPARTMENT OF PHARMACY AUTH

With the decision No. 192 / 01.04.2015 of the General Assembly of Special Composition (G.S.E.S.) of the Department of the Aristotle University of Pharmacy this Regulation replaces the precedent that was set by Decision 118 / 02.25.2010 of G.S.E.S., and supplements what is not provided by the legislation (Laws 1268 to 1282, 2083/92, 3685/2008 , 3794/2009, GG 2754 / 10/15/2014 Replacing the yp3 no. B7 / 564, 111 ee / 28.12.2001 (Government Gazette 53 B 24.01.2002) Ministerial decision of the Department of the PSP Pharmacy, Aristotle University of Thessaloniki - Reform Program) establishment and operation of the program graduate of Pharmacy Department, and the rules of procedure of the Aristotle University of Thessaloniki on postgraduate studies at the Pharmacy Faculty of AUTh.

POSTGRADUATE BODIES

The bodies responsible for the organization and operation of the Postgraduate Program (PMS) of the Department of the Aristotle University of Pharmacy are the following:

1. General Assembly Special Synthesis (G.S.E.S.) of the Department is responsible for the specialization of the Department's policy on postgraduate matters, but also for administrative and organization of P.M.S. G.S.E.S. is responsible for the preparation and / or modification of curricula within the PMS.

2. Steering Committee (S.E.) of PSP which is responsible for monitoring, supervision and coordination of all activities of the Department graduate. H S.E. It consists of 5 (five) members DEP, from professor, associate professor and assistant professor elected by the GASC and serves for two (2) years. In S.E. representing all Faculties of the Department and all postgraduate directions. The Director of Postgraduate Studies (BMI) is responsible for the administrative, organizational and operational management of the M.Sc., chairing the CC, as specified by the G.S.E.S of Department for two (2) renewable terms. The Director belongs to the rank of Professor or Assoc. Professor. The Director proposes to GASC any matter relating to effective implementation of PSP. S.E. is convened by the Director of Graduate Studies in regular meetings every two months, at a minimum, and in emergency.

3. Head of the postgraduate directions (Y.M.K.) who are members of the CC and defined by G.S.E.S . Each Y.M.K. oversees the proper functioning of postgraduate direction of commissioned and updates the CC for the course of graduate students at regular intervals (at least once a year). The term of the DMK lasts as long as the term of office of the Director of Graduate Studies.

Job announcement-candidate selection

1. The total number of candidates for the M.Sc. leading to M.Sc. and admitted per year can not exceed 15. Each PSP in excess of the number of places accepted, one (1) scholarship and one (1) foreign scholar of the Greek State, in each direction are also accepted. By decision of G.S.E.S the number of fellows can be increased.

2. Excluded from the above numerical limitation candidates PhD (including foreign scholars) who admitted in excess. Candidates are automatically included in the program, following a concurring opinion of S.E. to G.S.E.S., provided that there is a consistent opinion of a member of D.E.P.from the Department to assume the duties of the supervisor.

3. Announcing of the position is done by the Department of Communications, during the months of April and May, in national circulation newspapers and on the Internet (Internet). The applications of the candidates are accepted by the Secretariat of the Department of Pharmacy from 1 July to 31 August.

The candidate selection process follows the following schedule:

- till September 15 to select candidates for M.Sc. from the selection committee.

- Until September 20 meeting and proposal of CC to GASC

- Until October 5 the GASC meets for the final selection of candidates

4. Candidates must declare on their application only one of the directions of M.D.E. Required documents are:

a) A certified transcript (for university graduates from abroad it must be recognized by DOATAP), b) official statement that the candidate is not registered in another PMS c) Short CV and d) Certificate of satisfactory proficiency in a foreign language (preferably English). Also, candidates can submit and any certificates, any scientific papers, evidence and letters thought to enhance their candidacy.

5. Selection of candidates, as mentioned above, is made from G.S.E.S. by 5 October after the proposal from the S.E.

A. Evaluation of candidates for M.Sc. It is a three-member Panel of any scientific direction separately. The three-membered committee appointed by the Head of Graduate Direction (Y.M.K.) who participates in it. The evaluation of candidates is made by consideration of the following criteria:

5a) General degree grade ("Very Good"), except in exceptional cases where the proper documentation will be submitted.

5b) Grades in undergraduate courses on the subject-matter of the M.D.E.

5c) Performance in undergraduate thesis.

5d) Possibly existing research activities or professional activity in a field related to that of the under vacancy position.

5e) Good knowledge of a foreign language, preferably English, to be found after an interview with two members D.E.P.

5f) The overall personality of the candidate, as judged by the number of letters and oral interview of the candidate by the selection committee.

B. The evaluation of candidates for MA holders M.Sc. of other departments except Pharmacy is made from SE at the request of the candidate who will propose the supervisor, in the presence of the interested supervisor Professor.

6. Require basic knowledge

All prospective postgraduate students for M.Sc. or DD must have knowledge of the subject of three, more relevant to the MDE or scientific object of DD, undergraduate courses. The courses, in each direction, are validated by G.S.E.S., upon the recommendation of S.E. and suggestion of each Section and listed in the study guide of the Department. These courses can be renewed annually upon the recommendation of Y.M.K. The monitoring of the specific program with mandatory attendance and associated laboratories will be done during the first two semesters of M.D.E. and examination of students will take place simultaneously and under the same conditions, with examinations of undergraduate students. In case of failure the candidate repeats the exam once the next examination period. If they fail for a second time the students lose the status of graduate students and are deleted from P.M.S.

7. Foreign PhD candidates scholarship holders or other funding, that do not know the Greek language, are firstly admitted by the GASC upon their request to the competent Sector and proposition of GASC to the C. This is to enable the candidate to get a scholarship from his country and be able to come to Greece and get a residence permit for learning the Greek language. The Department should consider the criteria laid down in section 5A of this article, investigate for the existence of a scholarship and equivalency of the University of origin (recognition of the title of DOATAP). Additionally, the responsible Department must inform the SE for a faculty member of the Sector to be commited as supervisor Professor. The PhD candidate should study for a year at the School of Modern Greek Language and graduate with good proficiency of the language.

If the latter does not happen, then acceptance of doctoral candidates as postgraduate student for DD is negated.

ORGANIZATION OF THE GRADUATE STUDIES

A. M.Sc.

1. For each graduate student who entered in P.M.S. leading to M.D.E. it defined exclusively in the second half from the G.S.E.S., a member D.E.P. from the corresponding field of knowledge of P.M.S. as a supervisor and two other members D.E.P., proposed from SE after the proposal by the supervisor and authenticated by the GASC for the evaluation and examination of dissertation at all stages (according to Law 3685/2008 Article 5, paragraph 4). Supervisor is appointed by the G.S.E.S. after the proposal from S.E. at the request of the graduate student and agreement with the proposed member D.E.P. The above selection is made after a brief meeting of members D.E.P. who teach in the corresponding direction of MDE, with students. Supervisor, together with the CC, are responsible for the monitoring and control of the course of the postgraduate student and the physical presence in the workshop. Supervisors of graduate students for M.Sc. can be all members D.E.P. from the Department of Pharmacy teaching in the graduate program. Each supervisor can drive up to four (4) students within the PSP leading to M.Sc.

2. At the beginning of the academic semester, within time limits to be defined by the S.E., each graduate student enters the Department and declares the courses to attend in this semester. The graduate courses of the winter semester start in October, the latest in spring in the second week of February. The examination period of the Postgraduate Course is

preceding the start of the courses. Monitoring of the courses, workshops and laboratory experiments as well as participation in the respective semester exams **are compulsory**. An incomplete or inadequate monitoring combined with failure in exams, as outlined below, leads to mandatory suspension and deletion studies of the graduate student from the program. The specific gravity of the course units is expressed in ECTS. The courses should cover at least thirty (30) ECTS credits per semester. Part of the course can be in the form of seminars, laboratory exercises and tutoring. The detailed program of the courses, their contents and lecturers are appointed by the G.S.E.S. after proposals of S.E. and GA of the Sectors, and are listed in the study guide. The GASC also provides, on a proposal by Sector by CC, a member of the Faculty Department of Pharmacy as responsible for a graduate course. The member is responsible for organizing (academic and administrative) of the course and for sending the grades of the exams to the Secretariat Department of the Department. The responsible Faculty member of each graduate course mentioned in the study guide.

3. The way of examining postgraduate courses is determined by the faculty and the final examination, where this is necessary, is at the end of each semester. The examination period is defined after the end of each semester. The score is defined in an integer scale of 0 to 10, with six (6) being the minimum grade of passing. In case of failure, the examination is repeated only once within the next two semesters. In case of failure a second time or failure in two subjects of the same semester, the student loses the status of graduate student and is deleted from P.M.S.

4. The duration of P.M.S. leading to a M.D.E. may not be less than four (4) semesters and greater than six (6) semesters. In exceptional cases, upon reasoned request of the applicant to the SE and proposal of S.E. to the G.S.E.S. they may adopt temporary interruption of M.D.E. up to three additional semesters. The time of pause is not counted in the above limits. After the exhaustion of these limits, the student loses the status of graduate student and is removed from the PSP.

5. A prerequisite for taking M.D.E. is the planning, organization and writing research proposal thesis (10 ECTS), laboratory postgraduate research (20 + 20 ECTS for the C and D half) and the writing and presentation of the dissertation (10 ECTS). The planning, organizing and writing a research thesis proposal is made exclusively in the second semester of studies after consultation between the graduate student and the designated supervisor.

6. The work is presented in public by the student and judged and scored by a three-member committee involving the supervisor and two other

members D.E.P., proposed by S.E. as proposal by the supervisor and authenticated by the G.S.E.S. The grade of the dissertation is a whole number from 0 to 10 with a minimum passing grade 6. If dissertation scores less than 6, presentation of the corrected thesis will be repeated after two months.

7. In case of disagreement between raters, both in lessons and in the thesis a new judge is defined by the S.E. who rates irrevocably after examination (written or oral) of the candidate.

8. Tasked with teaching in P.M.S. are Professors, Associate Professors, Assistant Professors and Lecturers of Pharmacy Department or other departments of AUTh or other universities, renowned scientists from research institutions in the country or abroad and academic institutions abroad, such as the Law 3685/2008 Article 5 par. 1 states. The instructors are certified by the G.S.E.S. following the proposals made from the General Assembly of the Sectors to S.E. At least 50% of the hours of teaching in each of the directions of P.M.S., should be covered by members of the DEP from the Pharmacy Department of AUTH. Each member D.E.P. from the Department, except for undergraduate teaching obligations, may teach in PSP as many courses as assigned by the GASC.

9. The graduate students are required to engage in postgraduate program (courses, tutorials, laboratory exercises and postgraduate research work) with daily presentation. Responsible for monitoring the above is the scientific coordinator of each master direction in consultation with the supervisor (if any) and teachers of undergraduate and postgraduate courses, and updates the CC. Non-compliance of the above obligations results in the removal of the student from the PSP on a reasoned proposal from the SE and by decision of the GASC.

10. The degree of MSc degree is determined by the grades of the courses of the program and the degree of the thesis. Specifically, the grade of each course (or dissertation) is multiplied by the number of credits of the course and the sum is divided by the total number of credits. Three ceremonies of postgraduate are determined every year (following the respective calendar dates of the undergraduate students), conferring at the same time MSc according to the following standard.

11. Before the ceremony can be granted to students who have met all their obligations under the M.D.E. a certificate indicating the degree and direction of M.D.E. at the following standard:

GREEK REPUBLIC

ARISTOTLE UNIVERSITY OF THESSALONIKI

DEPARTMENT OF PHARMACY

POSTGRADUATE PROGRAMME

Cert. No _____

COPY OF DEGREE

IT IS CERTIFIED THAT:

The / The {NAME} of {NAME} FATHER

Place of birth: {...}

after obtaining the required courses, the dissertation and obtained the required number of credits, deemed worthy of

the Post Graduate Degree

of the Department of Pharmacy

towards: {...}

Grade _____

_____ on {date} _____

The certificate shall be issued for any lawful use.

Thessaloniki .... 200 ....

The Secretariat of the Department

Certificate Type of the Postgraduate Degree

B. Ph.D.

1.The PhD student chooses the supervisor from the members D.E.P. of three senior grades. The candidate's application for membership selection of a D.E.P. member as supervisor is subjected to S.E., along with the acceptance as well as the proposition from the proposed as supervisor for the other two members of the Advisory Committee. Of the remaining two members of the Advisory Committee one may be a member of academic staff of another Department or other Universities with research activity in the subject of the PhD thesis. Also a member of the Advisory Board may be recognized researcher in a Research Centre or Institute (relevant PhD with sufficient scientific and research activity and authorial presence in the scientific field of the thesis) as stipulated by Law 3685/2008 in Article 9 Fri. 2. S.E. determines the issue and proposes it to the G.S.E.S.

2. Each member D.E.P. of three higher levels can supervise up to five (5) doctoral candidates. If the three-member advisory committee adopts and communicates to the S.E., the starting of the thesis writing of the doctoral candidate, the supervisor can accept another candidate in place.

3. The three-member Advisory Commission, within at least two months from the definition of the GSEs, upon recommendation of the supervisor, in cooperation with the candidate determines the topic of the dissertation, which shall be notified to S.E. under the responsibility of the supervising professor. The candidate has the obligation within a period not exceeding six (6) months to prepare, in cooperation with the supervisor, the work plan which will be followed, the approach of the DD theme and present it in a three-member Advisory Committee. Modification of the title of MD can exist in the first year with the approval of G.S.E.S following a joint recommendation of the doctoral candidate and the Advisory Committee to the CC. The PhD students are required to meet with the members of the Advisory Committee at least twice a year and present in the form of seminar the overall progress of work per year, in the presence of all of the Department's graduate students.

4. Non presentation of seminars from a doctoral candidate for two consecutive years implies stopping the development of the DD by decision of GSES, upon the recommendation of S.E. If it is determined that a doctoral candidate has left the drafting of his thesis, then the supervisor or the Director of SE convene the advisory committee which prepares and forwards through SE, relevant report to G.S.E.S. for decommissioning of developing DD and deleting the doctoral candidate.

5. The thesis must be original research work. The originality and scientific value are documented through publication (or posts) of the results in scientific journals as well as presentations of the results at conferences.

6. The duration of a PhD can not be less than three (3) calendar years from the date of appointment of the tripartite Advisory Committee and not more than six (6) years. After documented recommendation of the tripartite Advisory Committee may be extended by the GASC upon the recommendation of the CC up to two more years. In cases where the G.S.E.S. approved the temporary interruption of developing MD, the time of the interruption is not counted in the above limits.

7. The doctoral candidates are obliged, upon request, to provide educational services to the Department (laboratory exercises and surveys) for no more than six (6) hours per week.

8. The Advisory Committee allows the start of writing the thesis, after evaluation of the research work of the candidate and informs the S.E. The further procedure and the final judgment is processed by a seven-member Board, as required by law. The seven-member selection board is gathered after the submission of the thesis to the Department Secretariat. The selection committee consists of three members of the Advisory Committee and the other members are appointed by the G.S.E.S. upon the recommendation of the tripartite committee. The recommendation of the advisory committee is also disclosed, before the debate in G.S.E.S. in S.E. The members of the examining committee should be in the same or related scientific field with this thesis preparation. Four (4) at least members of the examining committee must be members of academic staff, of which at least two (2) should belong to the Faculty of Pharmacy (Law 3685/2008 Article 9, paragraph 4).

9. The procedure in paragraph 8 of this subparagraph shall not exceed a total period of two months from the filing date of the thesis in the Department of Justice, otherwise the Department Chairman is obliged to convene G.S.E.S. defining the examining committee.

10. The candidate develops within a reasonable time his thesis publicly, infront of the Examining Board, which then examines the candidate and

considers the original thesis, quality and its contribution to the advancement of science. Clarifying questions but not questions intended to check the candidate's knowledge, can be made from the audience after the public presentation before the hearing begins. Then the nominee leaves and the committee deliberates and makes its final judgment. For the approval of MD it is required the assent of five (5) members of the examining committee.

11. The seven-member Selection Committee, under the responsibility of the supervising professor, prepares minutes, which includes the proposal of the advisory committee, the descriptive rating ("Good", "Very Good" or "Excellent"), and any information the members of the Committee consider necessary. The report which contains a recommendation from his / her supervisor and justification of the voting of the members of the seven-member committee is signed by all members of the committee and forwarded to the GASC along with five copies of the thesis approved and sworn statement that the candidate has not submitted his thesis for judgment to another university of the country or abroad. The proclamation and inauguration of doctoral candidates, and the type of doctoral degree, occurs in accordance with the Interior Rules of Operation of the AUTH. To PhD candidates can be given by the Secretariat of the Department certificate for the successful completion of the process. The type of the certificate is described below.

GREEK REPUBLIC

ARISTOTLE UNIVERSITY OF THESSALONIKI

DEPARTMENT OF PHARMACY

POSTGRADUATE PROGRAMME

Cert. No _____

COPY OF DEGREE

IT IS CERTIFIED THAT:

…….…..

from ……

after testing his doctorate as specified by the law, it deemed worthy ... of this diploma and received his PhD in the Department of Pharmacy,

on …….

with grade ……..

The certificate that was asked by the interested ... . was given for any legal use.The certificate shall be issued for any lawful use.

Thessaloniki .... 200 ....

The Secretariat of the Department

Certificate Type of the PhD Degree

12. On the back of the certifate copies will be the initials of first and middle name of the candidate, the surname of the words PhD Diploma and the year of thesis presentation in the seven-member selection committee. The copies of the thesis to be printed with the care of Epetiridas of the Department and will have a cover as shown below.

ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ

ARISTOTLE UNIVERSITY OF THESSALONIKI

DEPARTMENT OF PHARMACY

DIVISION {NAME OF THE DIVISION}

{NAME SURNAME}

GRADUATE {TITLE OF UNDERGRADUATE DEGREE}

{THESIS TITLE}

DOCTORAL THESIS

THESSALONIKI

{YEAR}

The cover of the thesis will have the following format:

{NAME SURNAME}

{THESIS TITLE**}**

DOCTORAL THESIS

Submitted to the Department of Pharmacy,

DIVISION {DIVISION NAME}

Date of Oral Examination: Date. Month. Year

Examination Committee

Title	Name	Supervisor
Title,	Name	Member of the three-member advisory Commission
Title	Name	Member of the three-member advisory Commission

Professor {First Name & Surname} Examiner

Professor {First Name & Surname} Examiner

Professor {First Name & Surname} Examiner

Professor {First Name & Surname} Examiner

Dissertation Cover

On the first page of the thesis the following information should be included:

ARISTOTLE UNIVERSITY OF THESSALONIKI

DEPARTMENT OF PHARMACY

{NAME SURNAME}

{PHARMASIST}

{TITLE}

PhD THESIS

conducted in Laboratory {Name Laboratory, Division and Department {Name or University Laboratory and Research Center}

SEVEN-MEMBER EXAMINING COMMITTEE

TITLE	NAME SURNAME-SUPERVISOR
TITLE	NAME SURNAME -(Member of the advisory Committee)
TITLE	NAME SURNAME -(Member of the advisory Committee)
TITLE	NAME SURNAME -(University ….)
TITLE	NAME SURNAME -(University ….)
TITLE	NAME SURNAME -(University ….)
TITLE	NAME SURNAME -(University ….)

On the second page of the thesis the following should be included:

The seven-member selection committee appointed to judge the Dissertation of { Name-Surname }, { Pharmacist }, convened a meeting in Aristotle University of Thessaloniki on the {Date}, where he/she supported the thesis titled {Title}. The Committee decided unanimously (or by a vote in favor ... . Against) that the thesis is original and is an essential contribution to the advancement of Science.

SEVEN-MEMBER EXAMINING COMMITTEE

TITLE	NAME SURNAME	Signature
TITLE	NAME SURNAME	Signature
TITLE	NAME SURNAME	Signature
TITLE	NAME SURNAME	Signature
TITLE	NAME SURNAME	Signature
TITLE	NAME SURNAME	Signature
TITLE	NAME SURNAME	Signature

On the fourth page of the thesis the following should be included:

{TITLE OF DISSERTATION}

{ISBN}

13. In exceptional cases, both the supervisor and the candidate would be enable to withdraw from supervising the doctoral dissertation, ot to change supervisor respectively. This is done when the following conditions are met: a) There is the part of the supervisor or the candidate that cooperation is not possible, b) establishes non-originality of the thesis topic. In such cases the agreement of the advisory committee makes a recommendation to the S.E. in order to establish or not a new committee or to stop the development of the PhD thesis process. The issue is tranfered to G.S.E.S. which shall make a final decision. In case of setting a new supervisor, the candidate can continue the previous research topic only after written permission from the previous supervisor.

OBLIGATIONS OF THE SUPERVISOR

a) The supervisor has the main responsibility for the originality of the topic and the course of the investigation of DD.

b) The supervisor must ensure the right conditions for the proper conduction of the investigation of the applicant and be available to the candidate to resolve any questions and problems that arise during the work. Also to guide him consistently in further research work.

c) He must ensure the completion of the research work of the candidate and writing the thesis within a reasonable time after the end of the third year from the definition of the three-member advisory committee. The above applies provided that the candidate has specialized in the preparation of his doctoral thesis and has worked full-time hours during the above period.

d) He/she must accept or make observations of a net-written copy of the thesis within three months, excluding legal holidays and the months of July and August, from the day that he/she receives it from the candidates.

e) He/she can not publish all or part of the results, or submit a patent application, without including as co-author the candidate.

CANDIDATE OBLIGATIONS

a) The applicants shall follow the guidelines laid down by the supervisor.

b) Should constantly update and regularly inform the supervisor.

c) They must perform or repeat experiments in the presence of the supervisor, if requested by the latter.

d) It is essential to deal with the preparation of his doctoral thesis with full-time working hours.

e) They must keep a detailed book of experiments and results that will remain in the laboratory and after the withdrawal of the candidate.

f) It is required to find and report on the progress of the thesis regularly (at least once per semester) with members of the Advisory Committee. Also presents the results of research in open seminars at least once a year.

g) The PhD student has the obligation to respect the safety regulations during the handling and disposal of chemical or biological materials. He/she also has the obligation to respect the rules of ethical conduct for the animals (where used) and to have it in their best possible living and less painful during carrying out experiments.

h) It is required to act within the framework of ethics and good conduct rules and contribute to the proper functioning of the area where he/she works. In cases where there are allegations or evidence of misconduct of the candidate (eg, altering or suppressing effects, plagiarism, inappropriate behavior toward academics etc.) the CC has the right to propose to the GASC disciplinary action, which may reach (depending on the severity of the offense) to suspension of the academic status for a specified period or even expulsion from the P.M.S.

OBLIGATIONS OF THE ADVISORY COMMITTEE

a) To monitor the evolution of the candidate participating in seminars to evaluate the progress of his work, at least once a year and to meet with the candidate at least once every six months.

b) To discuss with the supervisor and the candidate and express their views on the best progress of the thesis. To offer their help when asked by the candidate or the supervisor.

c) As in paragraph d) of the commitments or supervisor within 40 days after the correction of the thesis by the supervisor.

RIGHTS OF THE SUPERVISOR

a) He/she is entitled to request the execution or repeating any experiments in their presence.

b) He/she is entitled to participate as a co-author in all publications resulting from the thesis, or as co-beneficiary to any patents resulting therefrom.

RIGHTS OF THE PhD CANDIDATE

In addition to the rights stemming from the obligations of the supervisor and the members of the Advisory Committee is the following:

a) In case of disagreement with the supervisor for the thesis course has the right to request the convening of the Advisory Committee, which shall make a final decision by majority.

b) He/she has the right to publish or disclose the results of their thesis only in cooperation with the supervisor. If he does not wish to participate as a co-writer, then he is obliged to give the applicant written permission when requested, with a copy to and from S.E. If so, the candidate is entitled to announce the results of, or send for publication, six months after receiving his doctorate.

c) Has the right to get a copy of the book of the experiments and the results.

RIGHTS OF THE ADVISORY COMMITTEE

a) Have the right to request the execution or repeating of the experiments in their presence after the agreement of the supervisor.

b) The right to participate as co-authors in publications resulting from the thesis, since their participation in the respective phases of the study was essential and both the supervisor and the candidate agree.

This Regulation is subject to change upon the recommendation of the Chairman of the Department or S.E., or 1/3 of the members of G.S.E.S. and final decision G.S.E.S.

Area of Specialization: MEDICINAL CHEMISTRY, DEVELOPMENT OF PHARMACEUTICAL COMPOUNDS

Course title	Semester	ECTS
1. Chemistry of compounds of pharmaceutical interest	A	10
2. Structure Elucidation of Pharmaceutical Compounds Applications of Computer Technology in Pharmacochemistry	A	10
3. Advanced Topics in the Metabolism of Xenobiotics	A	10
4. Methods of Drug Synthesis with Emphasis to Heterocyclic Medicinal Chemistry	B	10
5. Specific Topics of advanced Medicinal Chemistry	B	10
6. Advanced pharmaceutical chemistry	B	10
7. Planning, organization and writing of the proposal for the dissertation	Γ	10
8. Post-graduate laboratory research	Γ	20
9. Post-graduate laboratory research	Δ	20
10. Writing and presentation of the graduate dissertation	Δ	10
Total		**120**

Area of Specialization: PHARMACEUTICAL TECHNOLOGY

Course title	Semester	ECTS
1. Design, Development and Production of Dosage Forms	A	10
2. Computer Applications in Pharmaceutical Technology	A	10
3. Drug Quality Control – Sustained Delivery Systems	A	10
4. Advanced Pharmaceutical Analysis	B	10
5. Advanced Topics in Physical Pharmacy	B	10
6. Technology and Quality Control of Natural Products – Preparation of Cosmetics from Natural Products	B	10
7. Planning, organization and writing of the proposal for the dissertation	Γ	10
8. Post-graduate laboratory research	Γ	20
9. Post-graduate laboratory research	Δ	20
10. Writing and presentation of the graduate dissertation	Δ	10
Total		**120**

Area of Specialization: BIOTECHNOLOGY–MOLECULAR DIAGNOSTICS

Course title	Semester	ECTS
1. Molecular Pharmacology and Pharmacogenetics	A	10
2. Molecular biology	A	10
3. Bioinformatics / Computer Applications in Molecular Biology and Biotechnology	A	10
4. Biotechnology of Pharmaceutical Plants	B	10
5. Pharmaceutical Biotechnology I (Molecular Techniques for the analysis of macromolecules)	B	10
5. Pharmaceutical Biotechnology II / Technologies for the Production of Pharmaceuticaland Diagnostic Substances through Genetic Engineering	B	10
6. Planning, organization and writing of the proposal for the dissertation	Γ	10
8. Post-graduate laboratory research	Γ	20
9. Post-graduate laboratory research	Δ	20
10. Writing and presentation of the graduate dissertation	Δ	10

Total	**120**

Area of Specialization: PHARMACOLOGY AND THERAPEUTICS

Course title	**Semester**	**ECTS**
1. Molecular Pharmacology and Pharmacogenetics	A	10
2. Bioinformatics / Applications of computer sciences in Molecular Biology and Biotechnology	A	10
3. Pharmacokinetics	A	10
4. Drug-Drug interactions	B	10
5. Physiology -Pathophysiology	B	10
6. Pharmaceutical Biotechnology I (Molecular Techniques for the Analysis of Macromolecules)	B	10
7. Planning, organization and writing of the proposal for the dissertation	Γ	10
8. Post-graduate laboratory research	Γ	20
9. Post-graduate laboratory research	Δ	20
10. Writing and presentation of the graduate dissertation	Δ	10

Total	**120**

Area of Specialization: PHARMACOGNOSY – PLANT PHARMACEUTICAL PRODUCTS

α/α	**Course title**	**Semester**	**ECTS**
2.	Terpenoids and derivatives. Spectroscopic Methods for Structure Elucidation of Terpenoids	A	10
3.	Phenolic Compounds and Derivatives. Spectroscopic Methods for Structure Elucidation of Phenolic	A	10
3.	Designing Semisynthetic Modifications	A	10
4.	Pharmacological Methods of Phytotherapy Evaluation	B	10
4.	Modern Techniques of Bioactivity Control	B	10
5.	Alkaloids and Derivatives. Spectroscopic Methods Used for Structure Elucidation of Alkaloids	B	10
7.	Planning, organization and writing of the proposal for the dissertation	Γ	10
8.	Post-graduate laboratory research	Γ	20
9.	Post-graduate laboratory research	Δ	20
10.	Writing and presentation of the graduate dissertation	Δ	10

Total	**120**

Semester courses, which are divided into two (2) semesters (A and B), are specialization courses and are taught in accordance with the timetable in Greek.

Postgraduate Courses- ECTS Credits

a. The MSc thesis will be prepared in semesters C and D, will be credited with a total of 60 ECTS credits and will be higher-level research work of the dissertation of the undergraduate course.

b. To obtain the M.Sc. it is required:
   i) Duration of study of at least four (4) semesters.

   ii) Completion of at least 120 points ECTS (60 ECTS credits of graduate courses and 60 ECTS credits from the thesis).

   iii) The preparation of the master thesis is done under the supervision of a faculty member and examined by a three-member committee appointed.

c. The final degree of M.Sc. is the average of both the grade resulting from the average of the grades of courses and also the degree thesis. The thesis will be graded by the three-member committee upon recommendation of the supervisor. The graduation thesis is a whole number in the range 0-10 with a minimum passing grade six (6).

ε. The thesis is typed in five (5) copies, one of which is filed in the departmental library for archiving.

Area of Specialization A. MEDICINAL CHEMISTRY, DEVELOPMENT OF PHARMACEUTICAL COMPOUNDS

Relevant undergraduate courses: Pharmaceutical Chemistry (Hormones-Organometallics)

Organic Pharmaceutical Chemistry II

Organic Pharmaceutical Chemistry III

The aim of the direction is the transfer of knowledge for the further and deeper scientific background in the field of Medicinal Chemistry[1], of drug development and the pharmacochemical study of bioactive compounds, such as additive agents, food-cosmetic additives, environmental pollutant.Graduates of this direction acquire contemporary knowledge and experience in order to actively contribute in drug and health matters in society, Pharmaceutical industry, hospitals, state health offiicies, national and European drug authorities, educational and research institutions.

[1]IUPAC definition: Medicinal chemistry is a chemistry-based discipline, also involving aspects of biological, medical and pharmaceutical sciences. It is concerned with the invention, discovery, design, identification and preparation of biologically active compounds, the study of their metabolism, the interpretation of their mode of action at the molecular level and the construction of structure-activity relationships.

1. CHEMISTRY OF COMPOUNDS OF PHARMACEUTICAL INTEREST (A-Fall semester)

Instructors: V. Demopoulos, A. Geronikaki (Emeritus Professor) , D. Hadjipavlou, D. Papagiannopoulou (A-Fall semester)

a) Synthetic methods of pharmaceutically interesting compounds (classical and retrosynthetic methods) .

b) Study of the chemical properties related to the structure (analysis of the functional groups) of drug molecules, their identification, determination and investigation of their action.

c) Exaples of radiopharmaceutical compounds of major pharmaceutical interest.

2. Structure Elucidation of Pharmaceutical Compounds – Applications of Computer Technology in Pharmacochemistry

Instructors: A. Geronikaki (Emeritus Professor), V. Demopoulos (A-Fall semester)

Includes:

a) Application of spectroscopic, chromatographic and other method for structure elucidation or isolation of pharmaceutically interesting compounds.

3. Advanced Topics in the Metabolism of Xenobiotics

Instructors: E. Rekka, P. Kourounakis(Emeritus Professor), (A-Fall semester)

a) Fate of the drugs in the organism (absorption, distribution, metabolism, excretion) – Sites of loss

b) Chemical mechanisms followed in the biotransformation of xenobiotics. Purpose, phase, enzyme inducers and inhibitors, biiodetoxication-biotoxication.

c) Specific categories of drugs (pro-drugs, soft drugs, hard drugs, chemical delivery systems).

4. Methods of Drug Synthesis with Emphasis to Heterocyclic Medicinal Chemistry

Instructors: A. Geronikaki(Emeritus Professor), I. Nikolaou (B-Spring semester)

a) Industrial production of starting or intermediate compounds in drug synthesis.

b) Synthetic methods used in synthesis of the most important groups of bioactive compounds.

c) Medicinal Chemistry of heterocyclic compounds with one or more heteroatoms

5. Specific Topics of advanced Medicinal Chemistry

Instructors: E. Rekka D. Papagiannopoulou I. Nikolaou (B-Spring semester)

a) Chemical bonds and drug action. G-protein-coupled receptors.
b) Radiodignostic drugs. Radiotherapeutic pharmaceutical compounds (Diagnosis of neurological disorders, Diagnosis-Therapy of cancer)
c) Inflammation and Anti-Inflammatory Drugs _ Introduction to Immunochemistry
d) .Pharmaceutical aspects of addition to drugs and other compounds. Drug and Ethics.

6. Advanced Medicinal Chemistry: Drug Design, Selected Drug Synthesis

Instructors: E. Rekka, D. Hadjipavlou, P. Kourounakis (Emeritus Professor)

(B-Spring semester)

a) Introduction to the use of computer in topics concerning applications in medicinal Chemistry.
b) Relationships between structure and physicochemical properties and biological activity (SAR). Quantitative structure-activity relationships (QSAR).
c) Medicinal Chemistry of free radicals (chemistry action and significance, consequences and protection)
d) Pharmacochemical approaches in thetreatment of contemporary diseases. Methods for the application of biotransformations in Pharmacy. Environment friendly Pharmaceutical Industry. Chemistry manipulation of drugs.

7. Planning, organization and writing of the proposal for the dissertation

The supervisor in collaboration with the graduate student plan and discuss the topic of the thesis, the design of which the organization and configuration with literature review and support, the candidate writes and submits to examination and grading to the three-member committee.

8. Post-graduate laboratory research

The candidate is involved in the laboratory performing the postgraduate diploma work, which is evaluated and graded by the three-member committee.

9. Post-graduate laboratory research

The candidate is involved in the laboratory performing the postgraduate diploma work, which is evaluated and graded by the three-member committee.

10. Writing and presentation of the graduate dissertation

The candidate graduate student after completing laboratory graduate survey, collects, collates, evaluates and writes his work, which presents to the Committee for evaluation and grading.

Area of Specialization B. PHARMACEUTICAL TECHNOLOGY

Related undergraduate courses: Special Pharmaceutical Technology I

Drug Quality Control

Pharmaceutical Analysis I

1. Design, Development and Production of Dosage Forms

Instructors: S. Malamataris(Emeritus Professor), K. Kachrimanis και I. Nikolakakis (A-Fall semester)

a) Preformulation tests and selection of excipients and dosage form.
b) Characterization of raw materials for the production of dosage forms.
c) Principles, mechanisms, and variables affecting the quality of the end products during pharmaceutical unit operations.
d) Specific formulation aspects of solid dosage forms (powders, capsules, tablets, pellets, inhalations).
e) Design, development and production of liquid dosage forms.
f) Production of sterile dosage forms.
g) Industrial Pharmaceutical Microbiology.
h) Controlled (programmed release) dosage forms. Recent research and development trends in pharmaceutical formulation.
i) Production of biotechnological pharmaceutical materials (peptides and proteins). Preformulation stages, selection of the dosage forms

and the excipients involved. Stability assessment and prediction of the biotechnological products.

2. Computer Applications in Pharmaceutical Technology

Instructors: I. Nikolakakis, K. Kachrimanis (A-Fall semester)

Acquisition, processing and analysis of data through computers.

A. Data acquisition: Transducers, interfacing with signal acquisition and processing systems.

B. Processing and analysis of data:

a) Experimental designs and data analysis software. Types and choice of factorial design. Multiple linear regression and evaluation of model fitting to data (statistical interferology). Analysis of variance for more than one dependent variables (MANOVA) and methods of grouping variables. Response surface designs and methods for process optimization. Application in Pharmaceutical Technology using statistical and graphical software programs: SPSS, EXCEL, SIGMAPLOT.

b) Analysis of data using Artificial Neural Networks. Theoretical considerations. Types of neural networks. Computer programs available for neural networks simulation.

c) Exploratory data analysis. Methods for analysis based on graphical representation of data (Data Visualization). Static representation of data – modern techniques. Interactive dynamic graphics.

3. Advanced Pharmaceutical Analysis

Instructors: I. Koundourellis(Emeritus Professor), C. Markopoulou (B-Spring semester)

a) Statistics for Pharmaceutical Analysis.
Analytical Problems. (Types of error, random and systematic errors in classical analysis. Mean and standard deviation. Confidence limits of the mean). Significance tests (Comparison of an experimental mean with a known value. Paired t-test. F-test for the comparison of standard deviation. Analysis of variance). Errors in instrumental analysis – regression and correlation. (Calibration curves in instrumental analysis. Errors in the slope and intercept of the regression line. Calculation of a concentration. Limits of detection. The method of standard addition).

b) Derivative Spectrophotometry.

Development of the derivative method. Theoretical considerations (Peak-peak method. Peak-tangent method. Peak zero method. Peak-peak ratio method. Differentiation-integration method. Partial least squares method. Filtering smoothing and averaging).

c) Chromatography
Chomatographic theory. Bonded phase chromatography. Liquid-Liquid chromatography. High Performance Liquid chromatography. (Essential features. Column packing, characteristics. The partitioning phases. Other separation variables. Applications). Liquid-solid chromatography. Ion-exchange chromatography. Ion pair chromatography. Size-exclusion chromatography.Gradient Elution and related procedures.

d) Mass Spectrometry.
Basic principles. Instrumentation of mass spectroscopy. Isotope abundance. The molecular analysis of mixtures. Mass spectroscopy problems.

e) Flame emission and atomic absorption spectroscopy.
Introduction. Emission and absorption in flames. Atomization and Ionization. Flames. Burners and nebulizers. Nonflame atomization. Radiation sources and optical systems. Quantitative analysis. Typical applications.

f) FT- Raman Spectroscopy
Basic principles.

4. Advanced Topics in Physical Pharmacy

Instructors: I. Nikolakakis, K. Kachrimanis (B-Spring semester)

a) The design of experiments for the study of pharmaceutical phenomena.
b) Estimation of experimental results through mathematical methods.
c) Methods of measurement of drug physicochemical properties (pH, refraction index, viscosity, surface tension, zeta potential, particle size, etc.).
d) Preparation of new dispersion systems for pharmaceutical use.
e) Incorporation of pharmaceutical substances into dispersion systems.
f) Study of the release of pharmaceutical substances from dispersion systems.

g) Study of the permeation of membranes by pharmaceutical substances.

5. Drug Quality Control – Sustained Delivery Systems

Instructors: D. Fatouros (A-Fall semester)

a) Advanced topics in Drug Quality Control
b) GMP.
c) Introduction to sustained drug delivery systems.
d) Effect of the route of administration and the properties of the drugs on sustained drug delivery systems.
e) Polymers and their use in sustained drug delivery systems.
f) Routes of administration (*per os*, transdermal, ocular, parenteral, implanted)
g) Liposomes – nanospheres
h) New chemical aspects for sustained delivery

6. Technology and Quality Control of Natural Products – Preparation of Cosmetics from Natural Products

Instructor: D. Fatouros (B-Spring semester)

a) Naturally occurring raw materials.

b) Physical procedures and technology of processes applied on various plant materials.

c) Processing units for plant materials.

d) Processes of obtaining secondary products of high added value.

e) Quality control – analysis – of raw materials and final products.

f) Application of special analytical methods.

g) Formulation and uses of secondary products.

h) Cosmetic preparations from natural products.

7. Planning, organization and writing of the proposal for the dissertation

The supervisor in collaboration with the graduate student plan and discuss the topic of the thesis, the design of which the organization and configuration with literature review and support, the candidate writes and submits to examination and grading to the three-member committee.

8. Post-graduate laboratory research

The candidate is involved in the laboratory performing the postgraduate diploma work, which is evaluated and graded by the three-member committee.

9. Post-graduate laboratory research

The candidate is involved in the laboratory performing the postgraduate diploma work, which is evaluated and graded by the three-member committee.

10. Writing and presentation of the graduate dissertation

The candidate graduate student after completing laboratory graduate survey, collects, collates, evaluates and writes his work, which presents to the Committee for evaluation and grading.

Area of Specialization C. BIOTECHNOLOGY–MOLECULAR DIAGNOSTICS

(It's not available for 2017-2018)

Related undergraduate courses: Pharmacology I

Pharmacology II

Introduction to Biotechnology

1. Molecular Pharmacology and Pharmacogenetics

Instructors: A. Tsiftsoglou((Emeritus Professor) (A-Fall semester)

a) Molecular mechanisms of drug-receptor binding
b) Molecular mechanisms of drug resistance.
c) Biotechnology of protein drugs.
d) The application of pharmacogenetic-pharmacogenomic principles in personalized medicine and clinical practice.
e) Pharmacology of the Central Nervous System (CNS) and Psychopharmacology.
f) Chemotherapy of viral, bacterial and parasitic infections.
g) Pharmacology of the hematopoietic and immune system.
h) Pharmacology of neoplastic diseases.

2. Molecular Biology

Instructors: C. Panagiotidis, T. Sklaviadis, M. Arsenakis (B-Fall semester)

a) Gene and chromosome structure (from the bacterial operons to the structure of the eucaryotic spliced genes. Functional remodeling of the DNA structure, chromatin structure and function).
b) DNA replication (General aspects, enzymology, replicons, viral replication), DNA repair and DNA recombination.
c) Cell cycle control, checkpoints and carcinogenesis.
d) Transcription initiation regulation in procaryotic and eucaryotic cells (RNA polymerases, transcription factors, regulatory sequences). Transcription termination and mRNA maturation. Transcription and maturation of tRNAs and rRNAs.
e) Translational control of gene expresssion (Regulation of translation initiation, elongation and release, and factors involved).
f) Posttranslational protein modifications, protein folding and chaperon proteins.
g) Resctriction enzymes, principles of gene cloning. Cloning and expression vectors. Construction of gene libraries, library screening for the presence or expression of genes and clone analysis.
h) Protein expression, gene walking, mutagenesis, gene knockouts.
i) Epigenetics (gene dosage effects, gene imprinting, genetic reprogramming and evolution).

3. Biotechnology of Pharmaceutical Plants

Instructors: A. Kanellis(Emeritus Professor) (B-Spring semester)

a) Cell and tissue culture.
b) Plant genetic modification (GM technology).
c) Genetic modification of pharmaceutical and aromatic plants.
d) Screening of plant GM.
e) Analysis of gene expression.
f) Gene silencing.
g) Production of pharmaceutical substances and aromatic compounds via genetic engineering.
h) Bioethics.

4. Pharmaceutical Biotechnology I (Molecular Techniques for the Analysis of Macromolecules)

Instructors: C. Panagiotidis, T. Sklaviadis, T. Laliaris (B-Spring semester)

a) Basic principles of nucleic acid analysis - Enzymes, electrophoresis, DNA and RNA blots, nucleic acid sequencing.
b) DNA cloning, cloning vectors, subcloning, DNA libraries, Basic principles of PCR (polymerase chain reaction).
c) Genome organization and mapping techniques, consequences of genome sequencing projects.
d) Functional characterization of genes and genetic analysis (use of cloned genes, RNA and protein structure analysis, expression levels).
e) Use of recombinant DNA techniques for molecular diagnosis.
f) Nucleic acid isolation from tissues or biological fluids, nucleic acid hybridization techniques, and PCR application for the diagnosis of infectious diseases, hereditary defects, Genetically Modified Organisms etc.).
g) Electrophoretic analysis of proteins and western blotting. Applications of immunoelectrophoretic methods in molecular diagnosis.
h) Applications of immunodiagnostic techniques for the identification of infectious agents, levels of biomolecules in biological fluids etc.

5. Pharmaceutical Biotechnology II / Technologies for the Production of Pharmaceuticaland Diagnostic Substances through Genetic Engineering

Instructors: A. Tsiftsoglou(Emeritus Professor), L. Papadopoulou, A. Kanellis(Emeritus Professor) (B-Fall semester)

a) Molecular mechanisms of gene expression in eukaryotic cells.
b) Cloning expression systems and PCR technology.
c) Development of recombinant proteins from GMOs and quality control.
d) cDNA microarrays and genotyping analysis.
e) Somatic cell cloning biotechnologies and therapeutic cloning (Embryonic Stem Cells).
f) Intracellular delivery of peptides-proteins.
g) RNA interference.
h) Hybridoma technology and genetically modified vaccines.
i) Bioreactors and microbial production of secondary metabolites.
j) Enzyme engineering and chemical/catalytic processes.
k) Biochemical/metabolic engineering.
l) Biotechnology of natural food products.
m) Molecular medicine and agriculture: Pharmaceuticals and dietary products.
n) Edible vaccines.

6. Bioinformatics / Computer Applications in Molecular Biology and Biotechnology

Instructors: L. Papadopoulou (B-Spring semester)

a) Computer Science applications in Molecular Biology and Biotechnology.
b) Introduction to Bioinformatics.
c) Use of electronic resourses (Internet, NCBI, EXPASY) for Molecular Biology and Genomics/Proteomics.
d) Comparative study of DNA, RNA and protein sequences through databases.
e) Gene mapping – Polymorphic SNPs and mutations.
f) Analysis of gene regulatory elements.
g) Prediction of protein-protein interactions and protein function.
h) From genomics to drugs through computing.

7. Planning, organization and writing of the proposal for the dissertation

The supervisor in collaboration with the graduate student plan and discuss the topic of the thesis, the design of which the organization and configuration with literature review and support, the candidate writes and submits to examination and grading to the three-member committee.

8. Post-graduate laboratory research

The candidate is involved in the laboratory performing the postgraduate diploma work, which is evaluated and graded by the three-member committee.

9. Post-graduate laboratory research

The candidate is involved in the laboratory performing the postgraduate diploma work, which is evaluated and graded by the three-member committee.

10. Writing and presentation of the graduate dissertation

The candidate graduate student after completing laboratory graduate survey, collects, collates, evaluates and writes his work, which presents to the Committee for evaluation and grading.

Area of Specialization D. PHARMACOLOGY AND THERAPEUTICS

Related undergraduate courses: Pharmacology I

Pharmacology II

Introduction to Biotechnology

1. Molecular Pharmacology and Pharmacogenetics

Instructors: A. Tsiftsoglou((Emeritus Professor), I. Bizirianakis (A-Fall semester)

i) Molecular mechanisms of drug-receptor binding

j) Molecular mechanisms of drug resistance.
k) Biotechnology of protein drugs.
l) The application of pharmacogenetic-pharmacogenomic principles in personalized medicine and clinical practice.
m) Pharmacology of the Central Nervous System (CNS) and Psychopharmacology.
n) Chemotherapy of viral, bacterial and parasitic infections.
o) Pharmacology of the hematopoietic and immune system.

Pharmacology of neoplastic diseases.

Pharmacokinetics

Instructor: I. Niopas (Emeritus Professor), (A-Fall semester)

a) Metabolite pharmacokinetics.
b) Pharmacokinetics during disease states.
c) Nonlinear pharmacokinetics.
d) Multiple compartments.
e) Intermittent IV infusions.
f) Physiological approach to clearance.
g) Kinetics of the pharmacological effect.
h) Therapeutic drug monitoring.
i) Variability of pharmacokinetic parameters.
j) Dosage regimens.
k) Pharmacokinetic simulations.
l) Pharmacokinetic/Pharmacodynamic simulations.
m) Dose-dependent and time-dependent pharmacokinetics.
n) Bioequivalence studies.

2. Bioinformatics / Applications of computer sciences in Molecular Biology and Biotechnology

Instructor: L.Papadopoulou (A-Fall semester)

a) Introduction to Bioinformatics
b) Use of websites (INTERNET) in Molecular Biology and Biotechnology
c) Comparison of DNA sequences, RNA and protein with databases
d) Mapping genes polymorphisms (SNPs) and mutations
e) Analysis of functional elements of genes

f) Study of the structure and function of proteins

g) Correlation of genes with disease
h) Prediction of protein interaction by computational methods
i) Genome analysis using computer analysis

4. Pharmaceutical Biotechnology I (Molecular Techniques for the Analysis of Macromolecules)

Instructors:C.Panagiotidis, E.Nikolakaki, T. Laliaris (B-Spring semester)

a) Basic principles of nucleic acid analysis - Enzymes, electrophoresis, DNA and RNA blots, nucleic acid sequencing.
b) DNA cloning, cloning vectors, subcloning, DNA libraries, Basic principles of PCR (polymerase chain reaction).
c) Genome organization and mapping techniques, consequences of genome sequencing projects.
d) Functional characterization of genes and genetic analysis (use of cloned genes, RNA and protein structure analysis, expression levels).
e) Use of recombinant DNA techniques for molecular diagnosis.
f) Nucleic acid isolation from tissues or biological fluids, nucleic acid hybridization techniques, and PCR application for the diagnosis of infectious diseases, hereditary defects, Genetically Modified Organisms etc.).
g) Electrophoretic analysis of proteins and western blotting. Applications of immunoelectrophoretic methods in molecular diagnosis.
h) Applications of immunodiagnostic techniques for the identification of infectious agents, levels of biomolecules in biological fluids etc.

5. Drug-Drug Interactions

Instructors: Bizirianakis I. (B-Spring semester)

a) Drug-drug interactions in clinical practice.
b) Pharmacodynamic and pharmacokinetic drug-drug interactions.

c) Adverse drug reactions (ADRs) and drug-drug interactions.
d) Drug-nutrient interactions and pharmaceutical care.
e) Mechanisms involved in drug-drug and drug-nutrient interactions (P-glycoprotein; P-gp; enteric metabolism; hepatic metabolism).
f) Genetic polymorphism of genes involved in drug action and pharmaceutical care (e.g. CYP isoforms, G-protein coupled receptors, lipoxygenase, apolipoprotein E4, UGTs, NATs).
g) Personalized drug therapy and pharmacogenomics.
h) New drug discovery and development technologies in current drug delivery.
i) Pharmaceutical biotechnology, biotechnology-based drugs and drug-drug ineractions.
j) Drug prescribing, medical errors and drug-drug interactions.
k) Evidence-based learning and web-based learning for improving the education of health care providers in drug-drug interactions.
l) Pregnancy and drug-drug interactions.
m) Drug-drug ineractions in the elderly.

6. Physiology - Pathophysiology

Instructor:E. Blachaki, L. Boutis(Emeritus Professor), C. Zamboulis (Emeritus Professor, (B-Spring semester)

a) Physiology of various sytems (nervous, gastrointestinal, hemopoietic, urinary, cardiovascular)
b) Pathophysiology of various cardiovascular system diseases (high blood pressure, cardiac failure, myocardial infraction, etc.) and
c) Pathophysiology of various neoplasias (breast, prostate, liver, lungs, skin, gastrointestinal and pangreatic melanomas, acute leukaemia, pediatric tumors).

7. Planning, organization and writing of the proposal for the dissertation

The supervisor in collaboration with the graduate student plan and discuss the topic of the thesis, the design of which the organization and configuration with literature review and support, the candidate writes and submits to examination and grading to the three-member committee.

8. Post-graduate laboratory research

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9. Post-graduate laboratory research

The candidate is involved in the laboratory performing the postgraduate diploma work, which is evaluated and graded by the three-member committee.

10. Writing and presentation of the graduate dissertation

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Area of Specialization E. PHARMACOGNOSY – PLANT PHARMACEUTICAL PRODUCTS

Related undergraduate courses: Pharmacognosy I

Pharmacognosy II

Chemistry of Natural Products

1. Terpenoids and derivatives. Spectroscopic Methods for Structure Elucidation of Terpenoids

Instructor: E. Kokkalou (Emeritus Professor), D. Lazari, A.Karioti (A-Fall semester)

a) Introduction: Biogenetic generalities.
b) Monoterpenes of a regular chemical structure, iridoids, sesquiterpenes, essential oils, definition, localization, distribution, physicochemical properties, function, chemical structures, factors affecting polarity, chemical profile, pharmacological action and toxicity.
c) Pyrethrines, sesquiterpene lactones – Allergies and toxicities.
d) Diterpenes, chemical structure (toxic and bioactive compounds).

e) Triterpenes and steroids, biological and pharmacological properties, raw materials for the hemi-synthetic production of steroids. "Adaptogenic" triterpenic compounds. Cardiac glycosides, other steroids and triterpenes (cucurbitacines, quasinoids, limonoids).
f) Tetraterpenes, distribution, function and uses.
g) Modern techniques of extraction and characterization. Quantitative determination for every group of chemically homogenous compounds. Spectrometric techniques for their structure elucidation (UV-Vis, IR, 1H NMR, 13C NMR, MS-CI, LC-MS, FAB, GC/MS).
h) Analytical techniques at a qualitative and a quantitative level.
i) Applicable analytical techniques for the isolation of the compounds of the above groups (TLC, CC, GC, HPLC).

2. Phenolic Compounds and Derivatives. Spectroscopic Methods for Structure Elucidation of Phenolic Compounds

Instructor: E. Kokkalou(Emeritus Professor), D. Lazari, A.Karioti (A-Fall semester)

The study of these includes:

a) Some of the hundreds of known phenolic compounds present Farmakognostiko-Pharmacological interest and which will be the subject of teaching. They are: simple phenols, flavonoids and quinone-anthraquinones.
b) The study of these involves the study of their structure, the types of these compounds, biological-pharmacological properties, the physical-chemical properties, their biosynthesis, their pharmaceutical, industrial applications.
c) Methods for isolating phenolic compounds from medicinal plants, their separation by chromatographic methods, clarification of their structure by spectroscopic methods.

3. Designing Semisynthetic Modifications

Instructor: V. Demopoulos (B-Fall semester)

In this course the graduate students will become familiar with the concept of synthon (i.e. structural unit which is part of a molecule and is related to possible synthetic processes) as a major "working tool" in the preparation of organic molecules of pharmacological interest. The

examples which will be used in the course are of pharmaceutical interest derived from international published data.

4. Alkaloids and Derivatives. Spectroscopic Methods Used for Structure Elucidation of Alkaloids

Instructor: E. Kokkalou (Emeritus Professor), D. Lazari, A.Karioti (A-Fall semester)

a) Definition, physicochemical properties, distribution, detection and characterization, general methods of isolation, quantification of the alkaloids of the extracts.
b) Pseudoalkaloids and protoalkaloids.
c) Tropane alkaloids (tropanoles, alkaloids, formation of the tropane ring, official plants, qualitative control and toxicity control). Pyrrolizidine alkaloids (chemical structures, structure-toxicity, plant-derived industrial raw materials).Quinolizidine alkaloids (chemical structures, structure, activity, toxicity). Indolizidine alkaloids (chemical structures, structure-toxicity, pharmacodynamics). Piperidine alkaloids (chemical structures). Alkaloids, derivatives of the nicotinic acid (structure, raw materials for the collection, dynamic activity-structure). Alkaloids, derivatives of phenylalanine and thyrosine (structure and activities).
d) Phenylathylamines (structures, activities). Isokinoleic alkaloids. Introduction – Oxidative coupling. Benzylisokinoleines. Dibenzyltetrahydroisokinoleines, courares and other structures of natural origin, aporfinoids, protoberberines and derivatives, morfinanes. Dynamic properties. Phenylethylisokinoleines, structures, pharmacological properties. Calvolines and hallucinogenic indolic derivatives. Properties. Ergolines, chemical structures, qualitative controls, dynamic activity, hemi synthetic and hydrogenated derivatives, structure – activity correlation.
e) Indolomonoperpenic alkaloids: Major chemical structures (coryanthreanes, strynchnanes, natural and hemi synthetic derivatives) and their pharmacological properties. Natural raw materials, Quinoleines, Akridones, Quinazolines, imidazoles, terpenic alkaloids of several structures. Chemical structure – action – toxicity, natural raw materials. Purinic bases. Natural raw materials, structures and pharmacological properties.

f) Applicable extraction methods (industry and laboratory) for all the above given alkaloid groups.
g) The applicable analytical or preparative techniques and testing of general qualitative control of the raw materials.
h) The physicochemical characteristics and spectroscopic methods used for structural elucidation at least for the pattern molecules of each group.

5. Pharmacological Methods of Phytotherapy Evaluation

Instructor: I. Niopas(Emeritus Professor), (B-Spring semester)

a) Presentation of results.
b) Preparation of plant material.
c) Pharmacological methods and evaluation of phytomedicines.
d) Phytotherapeutic systems. Principles of phytotherapy.
e) Pharmaceutical preparations of phytomedicines.
f) Dosage and dosage forms of phytomedicines.
g) Phytotherapeutic approach to pathological states and system dysfunction.
h) Central nervous system. Cardiovascular system. Respiratory system. Digestive system. Liver and bile. Urinary system. Joint diseases. Skin diseases. Agents that increase resistance to diseases.

6. Modern Techniques of Bioactivity Control

Instructor: D. Hadjipavlou (B-Spring semester)

a) Content and objective of the course is the more wide use of computers, international databases through the Internet and various computer packages in teaching and laboratory work of graduate students.
b) Students become familiar with the concepts of Computational Chemistry (theory and "tools") and quantitative structure-activity relationships.
c) Literature data concerning the biological responses of active compounds in various dragees are processed and utilized towards the export of general equations and practical conclusions that will help in the theoretical approach of the activity of other structurally similar compounds whose action has not been determined experimentally.

7. Planning, organization and writing of the proposal for the dissertation

The supervisor in collaboration with the graduate student plan and discuss the topic of the thesis, the design of which the organization and configuration with literature review and support, the candidate writes and submits to examination and grading to the three-member committee.

8. Post-graduate laboratory research

The candidate is involved in the laboratory performing the postgraduate diploma work, which is evaluated and graded by the three-member committee.

9. Post-graduate laboratory research

The candidate is involved in the laboratory performing the postgraduate diploma work, which is evaluated and graded by the three-member committee.

10. Writing and presentation of the graduate dissertation

The candidate graduate student after completing laboratory graduate survey, collects, collates, evaluates and writes his work, which presents to the Committee for evaluation and grading.

DIPLOMA SUPPLEMENT

GRADUATE STUDIES

DEPARTMENT OF PHARMACY AUTH

The following type of Diploma Supplement is given to graduates of the Department introduced until the academic year 2011-2012.

HELLENIC REPUBLIC
ARISTOTELIO PANEPISTIMIO THESSALONIKIS (ARISTOTLE UNIVERSITY OF THESSALONIKI)
SCHOOL OF PHARMACY
http://www.pharm.auth.gr, Tel. +30 +30 2310997613, Fax +30 +30 2310997612, e-mail: info@pharm.auth.gr, A.U.Th., 54124, THESSALONIKI, Greece.

DIPLOMA SUPPLEMENT

This Diploma Supplement is based on the model developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international 'transparency' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original accompanying qualification to which this supplement is appended. It should be free from any value judgments, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1 Family Name(s):

1.2 Given Name(s) :

1.3 Date of birth (day/month/year), Place, Country of Birth:

1.4 Student identification number or code:

2. INFORMATION IDENTIFYING THE QUALIFICATION

2.1 Name of the qualification and (if applicable) title conferred (in original language):

Μεταπτυχιακό Δίπλωμα Ειδίκευσης, Μ.Δ.Ε. (Metaptychiako Diploma Eidikefsis-Postgraduate Degree of Specialisation).

2.2 Main field(s) of study for the qualification:

PHARMACOLOGY AND THERAPEUTICS.

2.3 Name and status of awarding institution (in original language):

Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης (Α.Π.Θ.), Δημόσιο Πανεπιστήμιο, Τμήμα Φαρμακευτικής (Aristoteleio Panepistimio Thessalonikis-Aristotle University of Thessaloniki, A.U.Th.), Public University, School of Pharmacy.

2.4 Name and status of institution (if different from 2.3) administering studies (in original language) :

As in 2.3.

2.5 Language(s) of instruction/examination: Greek

3. INFORMATION ON THE LEVEL OF THE QUALIFICATION

3.1 Level of qualification: 2nd Cycle

3.2 Official length of programme:

4 SEMESTERS, 120 ECTS.
A full academic year is equivalent to 60 ECTS units and each semester to 30 ECTS (European Credits Transfer System) (1 ECTS= 25-30 hours) (according to the Greek Law 1466/13-8-2007, No 5/89656/B3, art. 1,2,3). To each course is given a number of ECTS (>=2) according to the student's work load (contact hours, laboratory work, examination etc) for the full completion of the course.

3.3 Access requirement(s):

PTYCHIO (Degree from a University in Greece or from a recognized foreign institution of equivalent status (Schools of Pharmacy, Chemistry, Biology, Medicine, Dentistry, Veterinary, Agricultural, Chemical Engineering and similar) or from a Technological Education Institute).
Language Certificate (English preferred).

4. INFORMATION ON THE CONTENT AND RESULTS GAINED

4.1 Mode of study:

Full - time

4.2 Programme requirements - aims:

To obtain their qualification from the postgraduate studies programme (PSP) "Post Graduate Studies Program in Pharmaceutical sciences" of the Schools of Pharmacy, Chemistry, Biology,Medicine, Dentistry, Veterinary, Agricultural, Chemical Engineering and similar, students have to complete successfully the 4 semesters that correspond to 120 ECTS (according to the Greek Law 1466/13-8-2007, No 5/89656/B3, art. 1,2,3). They have to attend and complete successfully the exams of the 1st-3rd semesters courses (basic knowledge, scientific area, skill development) that correspond to 90 ECTS. During the 4th semester, they have to submit a Master Thesis which they defend in public (30 ECTS).
The programme aims at providing high quality postgraduate studies and qualifies pharmacists for the development of pharmaceutical compounds, for Pharmaceutical Technology, drugs synthesis and drug s formulation, their bioavailability, biodegradation, metabolism, Biotechnology, Molecular Diagnostics, Pharmacocnosy, Plant pharmaceutical products.
The programme is organised to promote an interdisciplinary approach and produce skilled scientific personnel for research, public service and private sector protection as well as the social and economic development framework of Greece. The programme involves theoretical, laboratory and internship in a systemic approach and concern of drug, social health and sustainable development in terms of humanity.
The postgraduates of the IPSP are capable of handling Data bases (MS Access), bibliographic bases (e.g. Refworks), logistic platforms like Blackboard, remote sensing, simulation models, analyses, univariate, and multivariate analyses.
Upon completion in addition to the basic knowledge of their discipline and profession graduates are also able to: 1) apply knowledge in practice, 2) communicate in a second foreign language 3) search, process, analyse and synthesize data and information, use also the necessary technologies, 4) adapt to novel situations and make decisions, 5) work independently or in groups in international and/or interdisciplinary contexts, 6) generate new research ideas and design and manage projects, 7) respect diversity, multiculturalism and the natural environment, 8) demonstrate social, professional and moral responsibility and sensitivity to gender issues, 9) reflect on themselves and on others critically, 10) promote free, inductive and deductive thinking.

4.3 Programme details (e.g. modules or units studied and individual grades/marks/credits obtained):

Courses that the student has successfully attended, as well as subjects for which the student has received recognition or exemption (COR = Core courses, COM = Compulsory courses belonging to the selected specialization, ELC = Elective courses, ELM=Elective courses belonging to the selected specialization, FL= Foreign Language (Foreign Language is taught from 1 to 6 semesters and contributes as one grade in the Degree), EX = Exchange, DIS = Dissertation):

Code	Courses	Type	ECTS credits (Student workload)	Grade	Examination period	Percentile rank
ΦΘ0001	PHARMACODYNAMICS AND CHEMOTHERAPY	COR	15.0	7.0	FEB 2009	33.33
ΦΘ0003	PHYSIOLOGY-PATHOPHYSIOLOGY	COR	15.0	9.0	FEB 2009	66.67
ΦΘ0002	DRUG-DRUG INTERACTIONS	COR	15.0	9.0	JUN 2009	100.00
ΦΘ0004	PHARMACEUTICAL BIOTECHNOLOGY I-MOLECULAR TECHNIQUES FOR THE ANALYSIS OF MACROMOLECULES	COR	15.0	9.0	JUN 2009	100.00
ΦΘ0005	PHARMACEUTICAL ANALYSIS	COR	15.0	9.0	JUN 2009	100.00
ΦΘ0006	PHARMACOKINETICS	COR	15.0	7.0	FEB 2010	33.33
PROJECT						
	Master Thesis:		30.0	9		
TOTAL ECTS			**120.0**			

Master Thesis: « »

ECTS grading (A=10%, B=25%, C=30%, D=25%, E=10%) is based on a sample of a minimum of 100 students (according to the Ministerial Decision no Φ.5/89656/B3, art. 4, Hellenic Government Gazette no 1466/2007/B). If the sample is not sufficient then it appears the percentile rank of a score in its frequency distribution (the percentage of scores that are the same or lower than it in a specific exam period). Percentile ranks are not on an equal-interval scale.

Dissertations or/and Internship projects as well are considered as individual projects and they are not graded based on a previous sample.

4.4 Grading scheme, and if available, grade distribution guidance :

A. A scale of 1 to 10 applies to the marks of each subject in the Hellenic higher education. The grading scheme is as follows in the qualification Ptychion (according to the regulation 1099/5-9-2000/B, art. 60):
ΑΡΙΣΤΑ (Arista) Excellent : 8.50-10.00
ΛΙΑΝ ΚΑΛΩΣ (Lian Kalos) Very Good : 6.50-8.49
ΚΑΛΩΣ (Kalos) Good : 5.00-6.49
Minimum passing grade : 6

4.5 Overall classification of the qualification (in original language):

"Άριστα" (Excellent): 8.52

5. INFORMATION ON THE FUNCTION OF THE QUALIFICATION

5.1 Access to further study:

The qualification is a terminal award and allows access to doctoral studies.

5.2 Professional status (if applicable):

No professional qualification is necessary to be employed in the Public or Private sector for the graduates of the Postgraduate Study Program.

6. ADDITIONAL INFORMATION

6.1 Additional information:

6.2 Further information sources

School of Pharmacy: http://www.pharm.auth.gr
Aristotle University of Thessaloniki: http://www.pharm.auth.gr
Ministry of Education and Religious Affairs, Culture and Sports: http://www.minedu.gov.gr
European Union Educational Issues: http://www.europa.eu
Eurydice: http://eacea.ec.europa.eu/education/eurydice

7. CERTIFICATION OF THE SUPPLEMENT

7.1 Date:

7.2 Name and Signature:

7.3 Capacity: President of the School

7.4 Official Stamp or seal:

This certificate is issued for foreign authorities and is signed by the President of the School according to the regulation No. 49923/2008 (Hellenic Government Gazette no 873/2008/B).

8. INFORMATION ON THE NATIONAL HIGHER EDUCATION SYSTEM

Pursuant to the Constitution (article 16, paragraph 5), Greek Tertiary Education is public and gratis. Furthermore, according to the legal framework, it is divided into:

(a) the University sector (A.E.I.): Universities, Technical Universities, Fine Arts School, etc., and
(b) the Technological sector (T.E.I.): Technological Education Institutions and the School of Pedagogic and Technological Education.

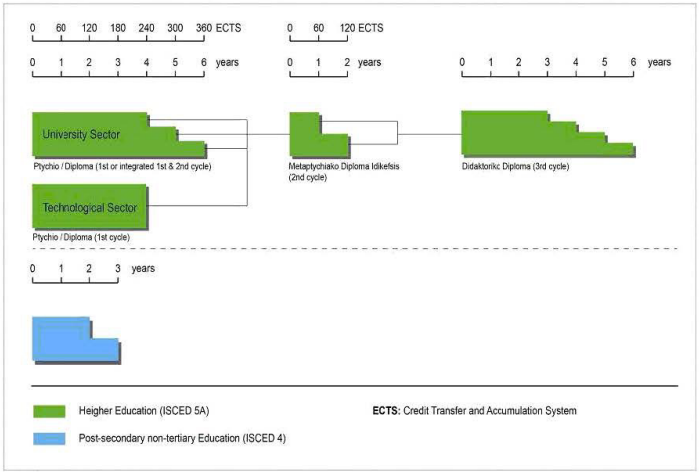
Part of the University sector is also, since 1998, the Greek Open University, which provides open and distance -undergraduate and postgraduate- education and training.
There are also state post-secondary non-tertiary Institutions offering vocationally oriented courses of shorter duration (2 to 3 years), which operate under the authority of other Ministries.

All graduates of secondary education (Geniko and Epagelmatiko Lykeio) can be admitted to Higher Education Institutions, depending on the general score obtained in national examinations that take place at the end of the final year of Lyceum. The admission system is based on the number of available places (numerus clausus), the candidates' performance, and the candidates' ranked preferences of Schools. Admission to particular schools may also require a special examination (eg drawing for Architecture, etc.).

Study programmes in Higher Education Institutions last from four to six years, depending on the subject area. Students who successfully complete their studies are awarded a Ptychio / Diploma, which permits employment or further studies at post-graduate level leading to a Metaptychiako Diploma Eidikefsis (2nd cycle) - equivalent to the Master's degree- and to the doctorate degree (3d cycle), Didaktoriko Diploma.
Legislation on quality assurance in Higher Education, the Credit Transfer and Accumulation System (ECTS) and the Diploma Supplement defines the framework and the criteria for the evaluation of Higher Education Institutions, and for the certification of programmes of studies. These measures aim, among others, at promoting student mobility and contributing to the creation of the European Higher Education Area.

A detailed description of the Greek Education System is offered in:

- EURYDICE (<http://www.eurydice.org>) database of the European Education Systems.
- <http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/122EN.pdf> (pages 82,83)



USEFUL AUTH SERVICES FOR STUDENTS

All students of AUTH are able to ask for assistance for specific reason, of expert Services of the University in order to assist them in problems during their studies or even become themselves volunteers offering their services to colleagues / classmates that are in need.

SOCIAL POLICY & HEALTH COMMITTEE OF AUTH

The Social Affairs and Health, aims to create conditions that will make the University area accessible to all members of the university community with particular emphasis on access for the disabled, where the difficulty of accessibility in space makes difficult the accessibility to knowledge.

For this reason, students with visual impairments are trained by qualified faculty members to use electronic equipment in some of the University libraries are printers Braille. Also it takes care - as far as possible, to facilitate the administration of books with voice output.

It provides bus for the Disabled for the best possible service to students with disabilities to facilitate their movement during the academic year and during the examination period. Self Help Promoting Program AUTH, which features a group of volunteers, who mostly are students also participates to this service. email: selfhelp@auth.gr

Also, the Social Affairs and Health has established in Aristotle the institution of Voluntary Blood Donation and as result the creation of a Blood Bank in AHEPA. Since May 2007 Blood Bank was founded in Physical Education of Serres in collaboration with EKPY and General Hospital of Serres. Voluntary blood donation takes place twice a year during the months of November and April, in the Ceremony Hall of AUTH aiming the blood needs to be covered through voluntary blood donation, which currently covers around 40% of total needs. Participation in blood donation, which is a safe procedure without complications, can be every person over 18 who do not have special health problems.

Email: socialcom@ad.auth.gr

fititikiline@ad.auth.gr

Website: http://spc.web.auth.gr

Τηλ/ Fax: 2310 995386

2310 995360

CONSULTATIVE COMMITTEE AND PSYCHOLOGICAL SUPPORT

The Commission Counseling and Psychological Support aims to improve the organization and operation of the structures that provide psychological assistance and counseling to the students of Aristotle through the Centre of Counselling and Psychological Support (KE.SY.PSY.) operating at the University.

The services of KE.SY.PSY are provided not only to undergraduate students of Aristotle, but the staff of the University.

It works closely with other related Committees and organizes dialogue workshops with students / female students, as with the administrative and other staff of the university community.

Among the immediate objectives of KE.SY.PSY. is the possibility of commissioning hotline at the University, in order to direct assistance to people in crisis and people with personal difficulties, which at first could feel safer to talk about their problems in anonymity and the absence of visual contact.

The KE.SY.PSY. Located on the ground floor of Lower University Student Club, in the area of Sanitary Service, in offices 5 & 8.

Email: vpapadot@ad.auth.gr

Τηλ.: 2310 992643 & 2310992621

Fax: 2310 992607 & 210992621

Volunteer Committee

The Volunteer Committee has as its main objective to promote to the members of the university community the idea of volunteering and fostering this as a modern request.

With this aim, the Volunteer Committee having as motivation to improve the daily life of everyone at Aristotle University - students, professors and employees - with small but significant steps in areas such as student affairs, environment and social contribution, encourage all members of the university community to take the initiative by submitting ideas and suggestions starting from simple, small and achievable.

For this purpose they have already been created Volunteer Networks by Department / School first by a faculty member and a student, so that through information events to create body of volunteers in each Department / School of AUTH.

Email: vrect-ac-secretary@auth.gr

Τηλ: 2310996713, 996708

Fax: 2310996729

LIST OF TELEPHONE NUMBERS AND ELECTRONIC ADDRESSES OF THE STAFF OF THE SCHOOL OF PHARMACY

WEB ADDRESS: www.pharm.auth.gr

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