ECTS

UNIVERSITY OF PATRAS
DEPARTMENT OF PHARMACY

INFORMATION PACKAGE 2010-11
GENERAL INFORMATION AND STRUCTURE OF THE DEPARTMENT

The Department
The Department of Pharmacy of the University of Patras was founded in 1977. Its first undergraduate students were admitted in 1978. The departmental graduate program, having been in effect since 1994, was revised in 2001 and leads to Graduate Specialization Diplomas in the areas of: Industrial Pharmaceutics and Drug Analysis, Pharmaceutical Chemistry-Natural Products: Design, Synthesis and Analysis of Bioactive Compounds, Molecular Pharmacology – Clinical Pharmacy, Pharmaceutical Biotechnology and Biomedicine, Pharmaceutical Marketing and/or to Doctoral degree.

Since its foundation the Department has been committed to teaching and research of international standards. During the previous academic years the Department was awarded several grants through competitive programs (EPEAEK) financed by the Ministry of Education for the improvement of its academic activities. From the EPEAEK among others were financed the reforming of the undergraduate program and the introduction of the Pharmaceutical Practice through study visits of the senior undergraduate students to pharmaceutical industries. The departmental “Continuous Education” program was also financed as well as the initiation of three more Graduate Specialization Diploma namely the “Medicinal Chemistry”, in co-operation with the Chemistry Department and the Medical School of the University of Patras, the “Isolation and Synthesis of Bioactive Natural Products” in co-operation with the Chemistry Departments of the Universities of Crete, Patras, Athens, Thessaloniki and Ioannina anf the “Bioinformatics in Life Sciences” in co-operation with the Departments of Medicine and Biology.

There are currently 350 students in total following undergraduate studies. Each year the Department accepts 130 fresh undergraduate students and 30 graduate students. The Department has 23 faculty members who supervise the research of about 70 graduate students. The Department of Pharmacy consists of seven laboratories. The ruling bodies in the department include the chairman, the deputy chairman and the general assembly.

Chairman: Professor Paul Kordopatis,
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e-mail: pacord@upatras.gr

Deputy Chairman: Professor Christos Kontoyannis,
Tel. (+30 2610) 997 727
e-mail: kontoyan@upatras.gr

Registrar: Mrs.Zoi Kanellopoulou, Tel. (+30 2610) 997 537

The ECTS Departmental Coordinator:
Assistant Professor Konstantinos Poulas
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STRUCTURE OF THE DEPARTMENT

Laboratories
A. Laboratory of Pharmaceutical Chemistry
B. Laboratory of Pharmaceutical Technology
C. Laboratory of Physical Pharmacy
D. Laboratory of Pharmacokinetics
E. Laboratory of Instrumental Pharmaceutical Analysis
F. Laboratory of Pharmacognocy & Chemistry of Natural Products
G. Laboratory of Molecular Pharmacology
H. Laboratory of Molecular Biology and Immunology

List of Faculty Members of the Department

Professors:
S. Antimisiaris (Ph.D., University of Athens, Greece)
C. Camoutsis (Ph.D., University of Athens, Greece)
P. Cordopatis (Ph.D., University of Patras, Habilitation, University of Patras, Greece)
C. Kontoyannis (Ph.D., Georgetown University, U.S.A)
A. Tsarbopoulos (Ph.D., Michigan State University, USA)
S. Tzartos (Ph.D., Univ. of Athens, Greece)

Associate Professors:
K. Avgoustakis (Ph.D., Chelsea College, London University, United Kingdom)
S. Nikolaropoulos (Ph.D., University of Patras, Greece)
P. Magriotis (Ph.D., SUNY at Stony Brook, USA)
E. Papadimitriou (Ph.D., University of Patras, Greece)
G. Sivolapenko (Ph.D., University of London, UK)
G. Sotiropoulou (Ph.D., University of Thessaloniki, Greece)
G. Spyroulias (Ph.D., University of Crete)

Assistant Professors:
P. Klepetsanis (Ph.D., University of Patras, Greece)
Q. F. Lamari (Ph.D., University of Patras, Greece)
V. Magafa (Ph.D., University of Patras, Greece)
G. Pairas (Ph.D., University of Patras, Greece)
G. Patrinos (Ph.D., University of Athens, Greece)
K. Poulas (Ph.D., University of Athens, Greece)
S. Topouzis (Louis Pasteur University / Strasbourg I, France)

Lecturers:
M. Orkoula (Ph.D., University of Patras, Greece)
E. Fousteris (Ph.D, University of Patras, Greece)
B. Research Activities of the Faculty Members

Sophia G. Antimisiaris  
Phone: + 30 2610 997725  
e-mail: S.Antimisiaris@upatras.gr

Professor  
Ph.D. University of Athens

Current Focus of Research
Biopharmaceutics and Pharmacokinetics: Improving Drug Biodistribution and Pharmacokinetics through Advances Drug Delivery System Design  
Nanomedicines: Liposomal or Nanoparticulate systems for Controlled Drug (or Vaccine)Delivery and/or Targeting.  
Application of novel lipid vesicles (Arsonoliposomes) in Anticancer / Antiparasitic Therapeutics.  
Novel Controlled-(Release)-Drug-Releasing Stents.  
Delivery of Microbicides for prevention of Sexually transmitted HIV.  
Ocular Drug Delivery (intravitreal injection of novel drug delivery systems).  
Drug Delivery Systems for targeting alveolar macrophages after delivery by nebulization  
Liposomal Drugs -in- Polymeric Films for sustained drug release and drug protection.  
Application of Liposomes in Analytical Technique

Selected Publications
Konstantinos Avgoustakis
Phone: + 30 2610 997726
e-mail: avgoust@upatras.gr

Associate Professor
Ph.D. University of Thessaloniki
Ph.D University of London

Current Focus of Research
Synthesis, characterization and medical applications of Biodegradable and Biocompatible polymers

Preparation, physicochemical study and medical applications of polymeric micro/nano-particles and liposomes.

Selected Publications


Charalambos Camoutsis  
Phone: + 30 610 997659  
e-mail: Kamoutsi@upatras.gr  

Professor  
Ph.D. University of Athens  

Current Focus of Research  
Heterocyclic steroids and Heterocyclic aromatic compounds.  
Homo-aza-steroidal esters of carboxylic derivatives of N,N-bis(2-chloroethyl) aniline.  
Antitumor Activity.  

Selected Publications  


Paul Cordopatis
Phone: +30 2610 997721/713
Fax: +30 2610 997714
e-mail: pacord@upatras.gr

Professor
Ph.D., University of Patras (1976)
Habilitation in Organic Chemistry, University of Patras (1981)

Current Focus of Research
Design, synthesis, conformational analysis and pharmacological activities of bioactive peptides. Structure-Activity relationships. Implication for the synthesis of therapeutical useful compounds.

Selected Publications


Manolis Fousteris
Phone: +30 2610 969391
Fax: +30 2610 992776
e-mail: manolisf@upatras.gr

Lecturer
Ph.D., University of Patras (2005)

Current Focus of Research
1. Design and synthesis of small heterocyclic molecules as potential inhibitors of protein kinases.

Recent publications


Pavlos Klepetsanis
Phone: + 30 2610 997712
Fax: + 30 2610 996302
e-mail: klepe@upatras.gr

Assistant Professor
Ph.D. University of Patras, Greece

Current Focus of Research
Study of cyclodextrin/drug inclusion compounds formation.
Solubilization of water insoluble drugs
Physicochemical characterisation of pharmaceutical forms.
Biomineralization and Demineralization.
Physicochemical study of Biopolymers.
Corrosion of metallic implants in biological fluids.

Selected Publications


Christos Kontoyannis  
Phone: + 30 2610 997727  
Fax: +30 2610 997658  
e-mail: cgk@iceht.forth.gr  

Professor  
Ph.D. Georgetown University, USA  

Current Focus of Research  
Development of non-destructive analytical methods using spectroscopic (Raman, IR, XRF) and electrochemical techniques (DPP, Impedance spectroscopy, CV). Applications in bio-ceramics, drugs, urinary stones, bones, liposomes, polymers etc. Development of new biomaterials (synthesis, analysis, physicochemical properties).

Selected Publications  


Fotini N. Lamari
Phone: +30 2610 969335/713
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e-mail: F.Lamari@upatras.gr

Assistant Professor
Ph.D., University of Patras (2000)

Current Focus of Research
Medicinal and Aromatic plants-Natural Products (expertise in Crocus genus and glycosaminoglycans)
Isolation and structural characterization with emphasis on polysaccharides: Structure-function studies of biomolecules
Development of analytical methods (capillary electrophoresis, HPLC) for determination of natural products in biologic samples
In vitro and in vivo evaluation of biologic properties with emphasis on the antioxidant potential

Selected Publications


Vassiliki Magafa
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Assistant Professor
Ph.D. University of Patras

Current Focus of Research
Chemistry of amino acids and peptides
Synthesis in liquid and solid phase analogues of biologically important peptides
Study of structure-activity relationships of biologically active peptides
Synthesis and study of Cysteine - Containing Oligopeptides and their Complexes with heavy metals

Selected Publications


"Synthesis and Biological Evaluation of Oxytocin Analogues Containing L-α-t-butyglycine [Gly(But)] in Positions 8 or 9". M. Fragiadaki, V. Magafa, J. Slaninová and P. Cordopatis Peptides, (2003), 24, 1425-1431


Platon Magriotis  
Phone: + 30 2610 997659  
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Associate Professor  
Ph.D. SUNY at Stony Brook  

Current Focus of Research  
Synthesis of molecules with biological activity  
Synthesis anti-cancer antibiotic natural products  

Synthesis of biologically and pharmacologically relevant molecules such as a- and b-amino acids, b-lactams, piperidines, and piperazines  
Total Synthesis of antitumor, antibiotic Natural Products (Cyclostreptin-(-)-FR182877, Ecteinascidin 743, Saframycin A, and Abyssomicin C).  
New Synthetic Methodology including novel routes to b-lactams and tetrasubstituted olefins (Tamoxifen analogs).  
Catalytic Enantioselective Synthesis of Substituted Piperazines as a general approach for the Construction of the Tetrahydroisoquinoline Antitumor Antibiotics.  

Selected Publications  


Sotiris Nikolaropoulos  
Phone: + 30 2610 997723  
e-mail: snikolar@upatras.gr

Associate Professor  
Ph.D. University of Patras

Current Focus of Research  
Design and synthesis of heterocyclic steroids  
Design, synthesis and pharmacological evaluation of potential antitumor agents  
Measurements of physicochemical parameters via simple HPLC instrumentation  
QSAR

Selected Publications

S. Nikolaropoulos, E.S. Arsenou, A. Papageorgiou and D. Mourelatos: Antitumor and Cytogenetic Effects of Esteric (ASE) and Amidic (ASA) Steroidal Derivative of p-bis(2-Chloroethyl)amino phenylacetic Acid (CAPA). A Comparative Study  

Ch. Camoutsis and S. Nikolaropoulos: Steroidal isoxazoles, isoxazolines and isoxazolidines  

A. Papageorgiou, S. Nikolaropoulos, E.S. Arsenou, E. Karaberis, D. Mourelatos, A. Kotsis, E. Chryssogelou: Synergistic cytogenetic and antineoplastic effects by two esteric steroidal derivatives of nitrogen mustards  

E. Arvanitopoulos, S. Nikolaropoulos, F. Bazoti and N.A. Katsanos: Physicochemical measurements in liquids by simple HPLC instrumentation,  

S. Nikolaropoulos, D. Tsavdaridis, E. Arsenou, A. Papageorgiou, E. Karaberis and D. Mourelatos: Synergistic Antineoplastic and Cytogenetic Effects by the Combined Action of Two Homo-aza-Steroidal Esters of Nitrogen Mustards on P388 and L1210 Leukaemias in Vivo and in Vitro,  
Malvina Orkoula  
Phone: +30 2610 969941  
Fax: +30 2610 997658  
e-mail: malbie@upatras.gr  

Lecturer  
Ph.D. University of Patras, Greece  

Current Focus of Research  
Development of novel non-destructive, non-invasive methodologies for the study of bone and bone diseases.  
Wetting of solids.  

Selected Publications  


George Pairas
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Assistant Professor
Ph.D. University of Patras

Current Focus of Research
Synthesis of ester and amide derivatives of anticancer agents with modified steroids.
Computer aided design - synthesis of new compounds with biological activity.

Selected Publications


Evangelia Papadimitriou  
Phone: + 30 2610 969336  
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Associate Professor  
Ph.D. University of Patras, Greece  

Current Focus of Research  
Angiogenesis and tumor growth in vivo and in vitro. Pharmacological studies on the mechanisms involved, mainly concerning the extracellular matrix, free radicals and growth factors.  
Evaluation of new compounds for their antiangiogenic and anti-tumor activity.  

Selected publications  
Andreas Papapetropoulos  
Phone: + 30 2610 996300  
e-mail: apapapet@upatras.gr

Professor  
Ph.D. Medical College of Georgia, USA

Current Focus of Research  
Vascular biology  
Signaling of endothelial-selective tyrosine kinase receptors  
Protein-protein interactions as drug targets

Selected Publications


Konstantinos Poulas
Phone: +30 2610 969953
E-mail: poulas@upatras.gr,

Assistant Professor
Ph.D. Univ. of Athens, Greece

Current Focus of Research
Monoclonal antibodies against Acetylcholine Receptor
X-Ray Crystallographic analysis of proteins
Construction, expression and purification of recombinant protein fragments
Proteolytic enzymes for myasthenia gravis therapy
Epidemiology of myasthenia gravis

Selected Publications


Gregory Sivolapenko

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Associate Professor
Ph.D. in Medicine, Royal Postgraduate Medical School, University of London, UK

Current Focus of Research
Design of novel anticancer and antiinflammatory agents
Preclinical and clinical studies of bioavailability and pharmacokinetics of new chemical entities
Drug clinical development, design & contact of Phase I-IV clinical trials

Selected Publications


Georgia Sotiropoulou

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FAX: + 30 2610 969940
E-mail: gdsotiro@upatras.gr

Associate Professor

Ph.D. in Biochemistry, Aristotle University of Thessaloniki, Greece

Current Focus of Research


Selected Publications


Georgios A. Spyroulias
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Associate Professor
Ph.D. University of Crete

Current Focus of Research

- Design/Simulation of bioactive molecules of pharmaceutical interest and Conformational Analysis of biomolecules through Nuclear Magnetic Resonance Spectroscopy (NMR).
- Structural Bioinformatics applied in homology modeling of unknown structures of biomolecules, protein-protein/peptide/substrate interaction through molecular dynamics simulation, docking simulation protocols.
- In silico design and development of combinatorial libraries of compounds and virtual screening process towards the quest of lead-molecules with biological activity towards protein/enzyme targets, etc.

Selected Publications


Stavros Topouzis
Assistant Professor
Ph.D., Louis Pasteur University/Starsbourg I, France

Research Focus

- Discovery and characterization of molecular mechanisms contributing to vascular disease
- Interactions of polypeptide ligands with the cognate cell surface receptors that control growth and differentiation of vascular smooth muscle cells
- Molecular signalling mechanisms and differentiation processes affected by PDGF receptors in mesenchymal cells, with emphasis on vascular endothelial and smooth muscle cells

Selected publications


X Zhu, et al (2004) Myostatin signaling through Smad2, Smad3 and Smad4 is regulated by the inhibitory Smad7 by a negative regulatory feedback mechanism Cytokine, 26, 262-272


Antonios Tsarbopoulos
e-mail: atsarbob@upatras.gr and atsarbob@gnhm.gr

Associate Professor
Ph.D. Michigan State University (East Lansing, Michigan)

Current Focus of Research
- Development of Analytical Methodologies, Based on Mass Spectrometric and Chromatographic Techniques, for the Analysis of Complex Biological Systems and the Structural Characterization of Natural Products and Biotechnology-derived Biomolecules.
- Detection of Non-Covalent Complexes by Electrospray Ionization (ESI) and Matrix-Assisted Laser Desorption Ionization (MALDI) Mass Spectrometry.
- Isolation and Structure Determination and Bioavailability Studies of Plants’ Active Substances; Development of New and Innovative Pharmaceuticals and Other Therapeutic Substances thereof.
- Detection, Identification and Monitoring Environmental Estrogens and Food Contaminants; Assessment of the Impact of Environmental Factors in Human Health.

Selected Publications


Socrates Tzartos  
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**Professor**  
Ph.D. Univ. of Athens, Greece  

**Current Focus of Research**  
Nicotinic acetylcholine receptors in muscle and nerve (structure-function relationships, immunogenicity and pathogenicity). Study of myasthenia gravis as a model autoimmune disease. Towards the development of novel therapies.  

**Selected Publications**  


Epidemiological and immunological profile of MuSK myasthenia gravis in Greece.  
**Instrumental facilities of the Department**

Spectrophotometers VIS-UV (Perkin-Elmer)
Spectrometers IR (Perkin-Elmer) & FT-IR (Jasco)
Complete HPLC system (Waters)
Automatic Polarimeter (Schmidt & Haensch)
Elemental Analyzer CHN (Carlo-Erba)
Complete HPLC systems (Waters)
Spectrophotometers VIS-UV (Shimatzu, Pharmacia)
Probe Sonicator (Sonics and Materials)
Fluorescence spectrophotometer (Simatsu)
6-Pot dissolution tester (Pharma-Test)
Basic drug formulation pilot plan production lines (ERWEKA-KORSCH-HOMORX)
Gamma Scintillation spectrometer (Packard)
Viscometer (Brookfield)
Small experimental animal facility
Complete analytical and preparative HPLC systems (Pharmacia)
Fast Protein Liquid Chromatography System (Pharmacia)
Freeze Dryers (Labconco, 4.5lit. and 6lit.)
Water Pro Polishing Station (Labconco)
Automatic Peptide Synthesizer (Advanced ChemTech, Model 90)
Speed-Vac (Labconco)
Centrifuges (Selecta, Ependorf) and Refrigerated Centrifuge (Hellenic Labware)
Complete systems for standard liquid chromatography (LKB, Pharmacia)
HF Apparatus (Multiple Peptide Synthesis Co.)
γ-Counter (LKB)
Microscope (Olympus)
CO2 incubator (Lab-Line)
Laminar Air-Flow
Hood (Holten)
Polarography instrumentation (EG&G)
Eccentric Tableting machine (KORCH)
Multivolume pycnometer (Micromeritics)
PCR machine (Biometra)
Orbital Shaker and incubator (Edmund Dooler)
-80° C Freezer (FORMA 725)
Storage container for liquid N2 (FORMA CMR 8030)
Transilluminator (GIBCO BRL, TFX 20M UV)
Autoclave (Prestige SUPER EXTENDED 2100)
Gel Drier (BioRad)
Horizontal and vertical electrophoresis apparatuses (BioRad)
PROGRAMME OF STUDY

A. Undergraduate Studies
The education system in Greece is based on semesters. There are two semesters per academic year. The first (Fall) semester begins in October 1st and ends in January 31st. Classes for the second (Spring) semester resume the 16th February and last until 10th of June. Students admitted for undergraduates studies need 10 semesters (5 years) in order to graduate, that is to obtain the diploma of Pharmacy (“Ptichion” in Greek). During each semester a student has to follow ca. 5 to 6 courses with a total of around 24-30 hrs attendance per week.

A course can consist of only lectures or lectures and practical work (laboratory). The courses offered in our Department are grouped in semesters (fall and spring semesters). Lectures can be followed by students at will, whereas attendance of laboratories is mandatory. In most courses there is not any formal assessment throughout the semester. In rare cases, lecturers offer partial exams within the semester and the grades obtained at these exams are taken into account in the final mark. However, in the labs the students are constantly examined usually orally on the theory and practice for each experiment they are to perform before or during their lab work and finally have to present written account of their results one week after the end of each exercise. All these are taken into account in the final mark together with the results of the final written examination that is associated with each particular lab. Failure to successfully perform up to 20% of the laboratory sessions results in the obligation for the student to make up the lost sessions by additional laboratory work. In cases in which students missed more than 20% of the laboratory work accompanying a course, they are not allowed to take the final exam of the course. The exam can only be taken after the successful completion of the laboratory work. The laboratory work usually includes four to six laboratory units per semester.

Courses are only offered in the Greek language and the faculty members teach the related material based on Greek textbooks. These textbooks usually are either the exact translation of the English counterparts or are based on them. Thus the content and the level of these Greek textbooks are similar to the corresponding english ones. For an ECTS student whose native language is not greek and his/her greek is not good enough to be able to study from a greek textbook there can always be easily found an english textbook with similar content to that his/her fellow greek students use. These textbooks are offered on loan by our university central library.

During their final year and in addition to the courses they follow the students have to carry out a short research project called Diploma Work under the supervision of a member of the academic staff. At the end of this work, students have to provide a written account of their results and often to present them orally. A grade is then assigned to the student by the supervisor involved reflecting the overall performance of the student. This grade should be at least 5 for a successfully completed Diploma Work. A senior year student is also required to make study visits to both Pharmaceutical Industries and Drug Stores. The duration of the practice period is approximately two semesters. Credit for this activity is given through the courses named Pharmaceutical Practice I & II. The grade assigned for these courses is the average of student performance, student reports and final examination grade.
A course is considered as being successfully passed only when the student has acquired at least the grade 5 out of 10 in the associated exams. The grading scheme, based on a 0 to 10 scale is as follows:

- **EXCELLENT**: 8.5 to 10
- **VERY GOOD**: 6.5 to 8.5 (not included)
- **GOOD**: 5.0 to 6.5
- **UNSATISFACTORY**: 0 to 5.0 (not included)

The minimum passing grade is 5.0 and all the grades are expressed as integers. However a course associated with lab work requires in addition also successful completion of the lab work and for the final mark both the grade in the exam and the lab performance are considered with factors which vary from lab to lab. Exams are offered to the students after the end of each semester and repeat exams in September. However students who have failed in these exams or not participated at all can sit for these exams as many times as they wish in the following exams periods. A student is considered as having completed his/her studies in our Department only when he/she has passed all the exams associated with all courses consisting our curriculum.

Taking into account the Greek higher education system the basic requirements of the ECTS system for 30 credits for each semester was met in the Department by initially assigning for each 1 hr per week per semester of lecture and lab work 1 ECTS credit. Additional ECTS credits were then added to those of the course that are considered as the most hard for the students to be passed that is those requiring higher student workload.

ECTS students who have studied for at least a year in our institution can be considered as candidates to obtain the Diploma (Ptychion) in Pharmacy offered by the Department for undergraduate studies. The ECTS Committee of our Department dealing with the recognition of studies carried out abroad will consider students transcripts of records and their performance at our Department. Courses successfully completed abroad will then correlated to those in Patras. If there is no need for additional courses to be taken by the student in Patras in order to fulfill the requirements imposed by our curriculum this committee will propose the General Assembly of the Department to offer our Diploma (Ptichion) to that particular student. Otherwise, the student will have to attend and successfully pass all those courses that are needed to complete our curriculum.

B. Graduate Studies

Graduate studies in the Department of Pharmacy lead to:

A. Graduate Diploma of Specialization (GDS)

B. Doctorate degree (Ph.D.)

1. GDS

Five specializations are offered: A) *Industrial Pharmaceutics and Drug Analysis*, B) *Pharmaceutical Chemistry-Natural Products: Design, Synthesis and Analysis of Bioactive Compounds*; C) *Molecular Pharmacology – Clinical Pharmacy*; D) *Pharmaceutical Biotechnology and Biomedicine*; E) *Pharmaceutical Marketing*. The GDS involves two years of studies and each graduate student has to take a total of six or eight courses depending on the specialization. Instruction is in Greek or English depending on the class composition. The candidate has to pass the exams associated
with these courses. Exams take place at the end of each semester. The minimum passing grade is 5 out of 10. Repeat exams for both semesters take place in September. During the two years the student carries out a short, novel, research project and presents the results both written and orally. A student who has successfully completed the requirements for GDS can continue his/her studies by pursuing a Ph.D degree.

2. **Doctorate Degree**
For the doctorate degree a supervisory committee of three members is assigned upon the approval of the Department and the student conducts research under the direction of the chairman of the supervisory committee. The average time required for a Ph.D degree is four years. During the first two years a graduate student has to successfully take 4 core courses and 4 electives regardless of the specialization under which they are offered.
<p>| PDU - 111  | General and Inorganic Chemistry                  |
| PDU - 112  | Physics                                            |
| PDU - 113  | Informatics                                        |
| PDU - 114  | Applied Mathematics                                |
| PDU - 115  | General Botanics                                   |
| PDU - 116  | Introduction to Pharmaceutical Science             |
| PDU - 117  | Foreign Language I                                 |
| PDU - 121  | Analytical Chemistry                               |
| PDU - 122  | Organic Chemistry                                  |
| PDU - 123  | Biochemistry I                                     |
| PDU - 124  | Cell Biology                                       |
| PDU - 125  | Morphology of Human Body                           |
| PDU - 126  | Foreign Language II                                |
| PDU - 211  | Synthetic Organic Chemistry                        |
| PDU - 212  | Biochemistry II                                    |
| PDU - 213  | Physiology I                                       |
| PDU - 214  | Physical Chemistry                                 |
| PDU - 215  | Laboratory of General and Analytical Chemistry     |
| PDU - 216  | Foreign Language III                               |
| PDU - 221  | Pharmaceutical Chemistry I                         |
| PDU - 222  | Pharmaceutical Microbiology                        |
| PDU - 223  | Physical Pharmacy                                  |
| PDU - 224  | Molecular Biology - Genetics                       |
| PDU - 225  | Physiology II                                      |
| PDU - 226  | Foreign Language IV                                |
| PDU - 311  | Pharmaceutical Chemistry II                        |
| PDU - 312  | Pharmacology I                                     |
| PDU - 313  | Chemistry of Natural Products                      |
| PDU - 314  | Instrumental Analysis I - Separation Techniques -  |
|            | Electrochemical Analysis                           |
| PDU - 315  | Pharmaceutical Immunology                          |
| PDU - 321  | Pharmacognosy I                                    |
| PDU - 322  | Pharmaceutical Chemistry III                       |
|            | Drugs against Infectious Diseases-Inorganic Drugs  |
| PDU - 323  | Instrumental Analysis II - Organic Spectroscopy and |
|            | Spectrometry                                       |
| PDU - 324  | Pharmaceutical Technology I                        |
| PDU - 325  | Pharmacology II                                    |
| PDU - 412  | Pharmacognosy II                                   |
| PDU - 413  | Pharmaceutical Chemistry IV                        |
| PDU - 414  | Pharmaceutical Biotechnology                       |
| PDU - 415  | Clinical Pharmacy                                  |
| PDU - 416  | Pharmaceutical Technology II                       |
| PDU - 421  | Toxicology                                          |
| PDU - 424  | Biopharmaceutics and Pharmacokinetics              |
| PDU - 426  | Molecular Pharmacology                             |
| PDU - 428  | Bioinorganic Chemistry and Molecular Simulations   |
| PDU - 429  | Pathology – First Aids                             |
| PDU - 511  | Bioethics and Law                                  |
| PDU - 512  | Pharmaceutical Practice I                          |
| PDU - 513  | Diploma Work I (Laboratory)                        |
| PDU – 514  | Diploma Work I (Bibliography)                      |
| PDU – 515  | Chemistry and technology of Cosmetics              |</p>
<table>
<thead>
<tr>
<th>PDU</th>
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<tbody>
<tr>
<td>516</td>
<td>Research Methodology I</td>
</tr>
<tr>
<td>521</td>
<td>Basics on Physics of Nuclear Pharmacy and Radiopharmacy</td>
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<tr>
<td>522</td>
<td>Pharmaceutical Practice II</td>
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<tr>
<td>523</td>
<td>Diploma Work II (Laboratory)</td>
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<td>Diploma Work II (Bibliography)</td>
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<td>525</td>
<td>Pharmacoeconomy</td>
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<td>526</td>
<td>Research Methodology II</td>
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</table>
PROGRAMME PLAN

Undergraduate studies
The three numerals following each course code number indicate lecture hours, laboratory hours and ECTS credits respectively.

COURSE SUMMARY TABLE

<table>
<thead>
<tr>
<th>COURSE CODE</th>
<th>SEMESTER I</th>
<th>SEMESTER II</th>
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<tbody>
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## FIFTH YEAR

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*Each student has to select either PDU-513, 516, 523, 526 or PDU-514, -515, -524, -525
DESCRIPTION OF UNDERGRADUATE COURSE UNITS

The following courses are offered by the Department of Pharmaceutical arranged as appear in the program plan. The prefix for all undergraduate courses is PDU (Pharmaceutical Department Undergraduate). The first numeral of the course unit number indicates the Academic year and the second numeral indicates the period (1 for Fall and 2 for Spring).

ECTS Course code : PDU-111
Title : General and Inorganic Chemistry
Lecturer : V. Magafe
Type : Lectures (4h/w)
Period : Fall
ECTS credits : 6

Content :

ECTS Course code : PDU-112
Title : Physics
Lecturer : G. Kagadis; E. Kostaridou; A. Bezerianos
Type : Lectures (3h/w)
Period : Fall
ECTS credits : 3

Contents :

ECTS Course code : PDU-113
Title : Informatics
Lecturer : P. Klepetsanis and G. Spyroulias
Type : Lectures (3h/w) ; Laboratory (4h/w)
Period : Fall
ECTS credits : 5
ECTS Course code : PDU-114
Title : Applied Mathematics
Lecturer : V. Piperigou; E. Petropoulou; F. Zafeiropoulou
Type : Lectures (3h/w)
Period : Fall
ECTS credits : 4

Contents :
One variable functions, derivative and rules of differentiation, study of real functions (limits, inflection points, continuity, asymptotics and graphical presentation), differential calculus, indefinite (derivative and calculation methods) and definite integrals.

ECTS Course code : PDU-115
Title : General Botanics
Lecturer : D. Tzanoudakis, D. Christodoulakis
Type : Lectures (4h/w) and laboratory (3h/w)
Period : Fall
ECTS credits : 6

Contents :

ECTS Course code : PDU-116
Title : Introduction to Pharmaceutical Sciences
Lecturer : K. Avgoustakis; G. Pairas; E. Papadimitriou
Type : Lectures (2h/w) and laboratory (3h/w)
Period : Fall
ECTS credits : 5

Contents :
History of pharmacy. Studies at the Department of Pharmacy, University of Patras. Professional possibilities for pharmacists. Development of new drugs – Pharmacopoeias.

Laboratory course: 

35
### Foreign Language I

**ECTS Course code**: PDU-117  
**Title**: Foreign Language I  
**Lecturer**: Staff  
**Type**: Lectures (3h/w)  
**Period**: Fall  
**ECTS credits**: 2

**Contents**:  
Basics of a foreign language (English, German, Italian, French, Russian).

### Analytical Chemistry

**ECTS Course code**: PDU-121  
**Title**: Analytical Chemistry  
**Lecturer**: F. Lamari and G. Pairas  
**Type**: Lectures (4h/w)  
**Period**: Spring  
**ECTS credits**: 6

**Contents**:  
Qualitative Inorganic analysis: I, II, III and IV cation groups, anions, buffers and complex ions. Quantitative Inorganic analysis: sampling, sample treatment accuracy and precision, gravimetric analysis, titrimetric analysis, analytical and volumetric instruments, techniques and reagents.

### Organic Chemistry

**ECTS Course code**: PDU-122  
**Title**: Organic Chemistry  
**Lecturer**: P. Cordopatis, P. Magriotis and S. Nikolaropoulos  
**Type**: Lectures (4h/w)  
**Period**: Spring  
**ECTS credits**: 6

**Contents**:  

### Biochemistry I

**ECTS Course code**: PDU-123  
**Title**: Biochemistry I  
**Lecturers**: F. Lamari; G. Spyroulias; S. Tzartos and K. Poulas  
**Type**: Lectures (4h/w) and laboratory (3h/w)  
**Period**: Spring  
**ECTS credits**: 6

**Contents**:  


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<tr>
<td>Title</td>
<td>Cell Biology</td>
</tr>
<tr>
<td>Lecturer</td>
<td>G. Patrinos and G. Sotiropoulou</td>
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<td>Type</td>
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<td>Period</td>
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Contents:
Cellular structure and function (origin of life, viruses, prokaryotic cells, eucaryotic cells).
Macromolecules of the cells (proteins, nucleic acids, carbohydrates, lipids).
How cells are studied (microscopy, cell culture, purification of macromolecules).
Plasma membrane (lipid bilayer, membrane proteins and carbohydrates, membrane transport of micro and macro molecules).
Cell to cell interactions (cell junctions, cell-cell recognition and adhesion).
Genetic code and proteins (DNA replication, DNA repair, transcription, translation, ribosomes and protein synthesis).
Endoplasmic reticulum, Golgi apparatus, ribosomes, post translational modifications of proteins, secretion).
Degradation of macromolecules (lysosomes, peroxisomes).
Cytoskeleton and cell movements (organization of the cytoskeleton, microtubules, microfilaments, intermediate filaments, ciliary movement).
Mitochondria and chloroplasts (structure, functions, evolution).
Organization of nucleic acids (DNA organization in viruses, prokaryotic and eucaryotic cells).
Cell growth and division (cell cycle, cell division, mechanics of cell division, cell death).

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<td>Title</td>
<td>Morphology of Human body</td>
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<tr>
<td>Lecturer</td>
<td>M. Assimakopoulou; K. Gyftopoulou; E. Petrou; G. Sotiropoulou-Bonikou and I. Varakis</td>
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<tr>
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Contents:
Human anatomy, description of cells and tissues and general Embryology.
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<td>Type</td>
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<td><strong>Contents:</strong></td>
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<td>Lectures (4h/w) and laboratory (4h/w)</td>
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<tr>
<td>Lecturer</td>
<td>F. Aggelatou, G. Kostopoulos, G. Voukelatou, A. Mitsakos</td>
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<tr>
<td>Type</td>
<td>Lectures (5h/w) and laboratory (2h/w)</td>
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<tr>
<td><strong>Contents:</strong></td>
<td>General physiology. Physiology of blood. Physiology of circulating and breathing systems.</td>
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ECTS Course code : PDU-214
Title : Physical Chemistry
Lecturer : C. Kontoyannis, P. Klepetsanis, and M. Orkoula
Type : Lectures (4h/w) and laboratory (3h/w)
Period : Fall
ECTS credits : 6

Contents :

ECTS Course code : PDU-215
Title : Laboratory of Analytical Chemistry
Lecturer : G. Pairas, G. Spyroulias and T. Zafeiropoulos.
Type : Lectures (1h/w) and laboratory (4h/w)
Period : Fall
ECTS credits : 4

Contents :
Quantitative Inorganic analysis: I,II,III and IV cation groups, anions, buffers and complex ions. Quantitative Inorganic analysis: sampling, sample treatment accuracy and precision, gravimetric analysis, titrimetric analysis, analytical and volumetric instruments, techniques and reagents.

ECTS Course code : PDU-216
Title : Foreign Language III
Lecturer : Staff
Type : Lectures (3h/w)
Period : Fall
ECTS credits : 2

Contents :
Basics of a foreign language (English, German, Italian, French, Russian).

ECTS Course code : PDU-221
Title : Pharmaceutical Chemistry I
Lecturer : E. Fousteris and S. Nikolaropoulos
Type : Lectures (4h/w) and laboratory (4h/w)
Period : Spring  
ECTS credits : 7

Contents :  

ECTS Course code : PDU – 222  
Title : Pharmaceutical Microbiology  
Lecturer : S. Tzartos and K. Poulas  
Type : Lectures (2h/w) and laboratory (3h/w)  
Period : Spring  
ECTS credits : 4

Contents :  

ECTS Course code : PDU – 223  
Title : Physical Pharmacy  
Lecturer : P. Klepetsanis  
Type : Lectures (4h/w) and laboratory (3h/w)  
Period : Spring  
ECTS credits : 6

Contents :  

ECTS Course code : PDU-224  
Title : Molecular Biology - Genetics  
Lecturer : G. Patrinos  
Type : Lectures (3h/w) and laboratory (3h/w)  
Period : Spring  
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<td>Synthesis, uses, doses and pharmacological activity of organic and heterocyclic drugs. Analgesics, Antipyretics, Antihistaminics, Acridines, Anticoagulants (Cumarins and chromones), Barbiturates, Benzodiazepines, Benzo-1,2,4-thiadiazine dioxides, Benzofurans, Benzimidazoles, Dibenzocycloheptadienes, Dibenzothiazepines, Dibenoxazepines, Dibenzapines, Dihydrobenzo-1,2,4-thiadiazine dioxides, indoles, Phenothiazines, Quinolines, Synthetic Sweetening Agents (Saccharin), Sympathomimetic Amines, Sulfonamides, Thioxanthenes, Thyroid Hormones.</td>
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<td>PDU-312</td>
<td>Pharmacology I</td>
<td>E. Papadimitriou; A. Papapetropoulos and S. Topouzis</td>
<td>Lectures (4h/w) and laboratory (2h/w)</td>
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Contents:
Introduction to pharmacology. General principles of drug action (introduction to pharmacodynamics, receptors, agonist-antagonists). Dose-response curves. Essential pharmacokinetics: absorption, distribution, metabolism and excretion of drugs. Guidelines for the selection of appropriate dosing regimens. Basic and clinical evaluation of new drugs. Drugs of the autonomic nervous system. Local and General anesthetics. Drugs that affect the central nervous system: sedatives, hypnotics, anti-epileptic medication, anxiolytics, anti-depressants, drugs used to treat psychosis, mood-affecting medications, opioids, drugs used to treat Parkinson’s disease.

ECTS Course code : PDU-313
Title : Chemistry of Natural Products
Lecturer : P. Cordopatis
Type : Lectures (4h/w)
Period : Fall
ECTS credits : 5

Contents:

ECTS Course code : PDU-314
Title : Separation Techniques and Electrochemical Analysis
Lecturer : C. Kontoyannis; A. Tsarbopoulos and M. Orkoula
Type : Lectures (4h/w) and laboratory (3h/w)
Period : Fall
ECTS credits : 7

Contents:
Chromatographic Techniques: Introduction to chromatographic techniques, gas and liquid chromatography, capillary electrophoresis. Methods of detection and applications in pharmaceutical analysis.
Introduction to electroanalytical techniques, Potentiometry (reference electrodes, ion selective and enzyme electrodes, direct potentiometric measurements, potentiometric titrations), Coulometry, Voltammetry (Instrumentation, Polarography, Cyclic Voltametry), Amperometric techniques.
Laboratory practice on the analysis of active pharmaceutical ingredients employing electrochemical and chromatographic techniques.

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<td>Pharmaceutical Immunology</td>
<td>K. Poulas; S. Tzartos and G. Sivolapenko.</td>
<td>Lectures (3h/w) and laboratory (2h/w)</td>
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<tr>
<td>PDU-321</td>
<td>Pharmacognosy I</td>
<td>P. Cordopatis; F. Lamari and V. Magafa</td>
<td>Lectures (4h/w) and laboratory (4h/w)</td>
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Contents:

Laboratory courses:
ECTS Course code: PDU-322
Title: Pharmaceutical Chemistry III
Lecturer: P. Magriotis
Type: Lectures (4h/w) and laboratory (3h/w)
Period: Spring
ECTS credits: 6

Contents:

ECTS Course code: PDU-323
Title: Organic Spectroscopy and Mass Spectrometry
Lecturer: C. Kontoyannis; M. Orkoula; G. Spyroulias and A. Tsarbopoulos
Type: Lectures (4h/w) and laboratory (3h/w)
Period: Spring
ECTS credits: 6

Contents:
Atomic spectroscopy: Introduction to spectroscopic methods, components of optical instruments, introduction to optical atomic spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy, atomic mass spectrometry.
Molecular spectroscopy: Introduction to ultraviolet/visible molecular absorption spectroscopy, Application of UV/Vis molecular absorption spectroscopy, molecular luminescence spectroscopy, infrared spectroscopy, Raman spectroscopy, Nuclear magnetic resonance spectroscopy (spectra assignment and structure determination).
Mass spectrometry: Introduction, methods of ionization and applications in pharmaceutical analysis.

Laboratory practice on the analysis of active pharmaceutical ingredients employing spectroscopic techniques.

ECTS Course code: PDU-324
Title: Pharmaceutical Technology I
Lecturer: S. Antimisiaris and K. Avgoustakis
Type: Lectures (5h/w) and laboratory (3h/w)
Period: Spring
ECTS credits: 6
Contents:

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<tr>
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<td>E. Papadimitriou; A. Papapetropoulos and S. Topouzis</td>
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Contents:
Mechanisms of action, pharmacokinetics, adverse effects and drug-drug interactions for drugs used to treat all major diseases. Drugs for the treatment of cardiovascular diseases (drugs for the treatment of congestive heart failure and angina, anti-arythmics, anti-hypertensives, diuretics, anticoagulants, thrombolytics, inhibitors of platelets, drugs used for the treatment of hyperlipidemia), drugs used in the treatment pulmonary (asthma, COPD) and GI tract disorders (ulcers, nausea, and motility disorders), chemotherapeutic agents (anti-tumor, beta-lactam antibiotics & other inhibitors of cell wall synthesis, chloramphenicol, tetracyclines, macrolides, aminoglycosides, sulfonamides, quinolones disinfectants, antiseptics, antiprotozal, anti-mycobacterial, anti-fungal, anti-viral, anti-parasitic drugs), non-steroidal anti-inflammatory drugs, corticosteroids, medications used for endocrine disorders (diabetes, replacement therapy for the thyroid gland and other endocrine organs), contraceptives, immunopharmacology, vitamins.

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<td>Period</td>
<td>Fall</td>
</tr>
<tr>
<td>ECTS credits</td>
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</table>

Contents:
ECTS Course code : PDU-413
Title : Pharmaceutical Chemistry IV
Lecturer : G. Pairas ; C. Camoutsis ; M. Fousteris ; S. Nikolaropoulos ; P. Magriotis
Type : Lectures (4h/w) and laboratory (4h/w)
Period : Fall
ECTS credits : 6

ECTS Course code : PDU-414
Title : Pharmaceutical Biotechnology
Lecturer : G. Sotiropoulou
Type : Lectures (3h/w) and Laboratory (3h/w)
Period : Fall
ECTS Credits : 6

Contents :
Laboratory Course:

1. Manipulating DNA (Video, E. J. Wood)
3. Isolation and analysis of human genomic DNA.
5. Genetic engineering II: isolation, purification and quantitation of plasmid DNA.
6. Polymerase Chain Reaction, PCR: application for site-directed mutagenesis of recombinant proteins.
7. Polymerase Chain Reaction, PCR: application for the detection of polymorphisms in human DNA.

ECTS Course code : PDU-415
Title : Clinical Pharmacy
Lecturer : G. Sivolapenko Assoc. Professor
Type : Lectures (3h/w)
Period : Fall
ECTS Credits : 3

Contents :

ECTS Course code : PDU-416
Title : Pharmaceutical Technology II
Lecturer : G.S.Antimisiaris and K. Avgoustakis
Type : Lectures (5h/w) and Laboratory (4h/w)
Period : Fall
ECTS credits : 8
Recommended reading: H.C. Ansel, Introduction to Pharmaceutical Dosage Forms; Remmighton Pharmacopeia

Contents:

ECTS Course code : PDU-421
Title : Toxicology
Lecturer : E. Giannopoulou and S. Topouzis
Type : Lectures (3h/w)
Period : Spring
ECTS credits : 4

Contents:

ECTS Course code : PDU-424
Title : Biopharmaceutics and Pharmacokinetics
Lecturer : G. Sivolapenko
Type : Lectures (4h/w) and Laboratory (4h/w)
Period : Spring
ECTS Credits : 7
Recommended reading: Wagner, Biopharmaceutics; M. Gibaldi, Biopharmaceutics and Clinical Pharmacokinetics

Contents:
ECTS Course code : PDU-511
Title : Molecular Pharmacology
Lecturers : E. Papadimitriou and A. Papapetropoulos
Type : Lectures (4h/w) and laboratory (4h/w)
Period : Fall
ECTS credits : 8

Contents :
Introduction to Molecular Pharmacology: Importance and scope.
Mechanisms of action of drugs. Classification of drug receptors and binding of drugs.
Dose-response studies.
Receptors for neurotransmitters and hormones. Receptors that are linked to ion channels and receptors that are coupled to G proteins. Signal transduction mechanisms.
Drug tolerance and dependence.
Quantitative analysis of drug-receptor interactions. Analysis and information derived from signal transduction studies.

Examples of drugs from several groups, such as drugs of the cardiovascular and nervous systems, antinflammatory and drugs that affect blood functions. Emphasis is given on the mechanisms of actions and the adverse effects of these drugs.

Laboratory course:
Tissue and cell isolation and use in pharmacological studies. Dose-response curves.
Isolation of cell membranes, in order to use them in binding studies of drugs to their receptor.
Tissue homogenization and membrane isolation, in order to use them in binding studies of drugs to their receptor.
Total protein determination.
Binding studies of labeled ligand to the corresponding receptor in vitro. Specific and non specific binding. Determination of the chemical affinity.
Scatchard analysis. Determination of the dissosiation constant and the number of receptors.

ECTS Course Code : PDG-512
Title : Practical Pharmacy I
Lecturers : S. Nikolaropoulos, Assist. Professor; G. Pairas, Assist. Professor; K. Avgoustakis, Assist. Professor
Type : Laboratory (10h/w)
Period : Fall
ECTS credits : 10

Courses and training in selected open to the public pharmacies (locally), hospital pharmacies (city of Patras) and pharmaceutical industries (Athens area). Lectures are supported by members of the department and specialists from the above fields.
<table>
<thead>
<tr>
<th>ECTS Course Code : PDU-513</th>
<th>Title : Diploma Work I</th>
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<tbody>
<tr>
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</table>

**Content:**
Students will select a faculty member and under his guidance they will work on a small research project.

<table>
<thead>
<tr>
<th>ECTS Course Code : PDU-515</th>
<th>Title : Chemistry and Technology of Cosmetics</th>
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<tbody>
<tr>
<td>Lecturer : K. Avgoustakis</td>
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<tr>
<td>Type : Lectures (2h/w)</td>
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**Contents :**

<table>
<thead>
<tr>
<th>ECTS Course Code : PDU-521</th>
<th>Title : Radiopharmaceuticals</th>
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<tbody>
<tr>
<td>Lecturer : Antimissiaris, Assoc. Professor; K. Avgoustakis, Assist. Professor; P. Klepetsanis, Assist. Professor</td>
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<tr>
<td>Type : Lectures (5h/w)</td>
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<tr>
<td>Period : Spring</td>
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<td>ECTS Credits : 5</td>
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</table>

**Contents :**
Basic science of Nuclear Medicine : Basic Physics, Radioactive Decay, Measurements and Instrumentation, Radiation and Biology, Radiation dosimetry, protection and regulations. Fundamentals of Nuclear Pharmacy : Production of radionuclides, Radionuclide generators, Design of new pharmaceuticals, quality control of radiopharmaceuticals, Radiolabeling of compounds, characteristics of specific radiopharmaceuticals and uses of pharmaceuticals in Nuclear Medicine.

| ECTS Course Code : PDG-522 | Title : Practical Pharmacy II |
Courses and training in selected open to the public pharmacies (locally), hospital pharmacies (city of Patras) and pharmaceutical industries (Athens area). Lectures are supported by members of the department and specialists from the above fields.

ECTS Course code: PDU-523
Title: Diploma Work II
Lecturer: Faculty Member
Type: Laboratory
Period: Spring
ECTS credits: 12

Content:
Continuation of the Diploma work I.
GRADUATE STUDIES PROGRAMME

Specializations Offered

A. Industrial Pharmaceutics and Drug Analysis (PDG-A)
B. Pharmaceutical Chemistry-Natural Products: Design, Synthesis and Analysis of Bioactive Compounds (PDG-B)
C. Molecular Pharmacology – Clinical Pharmacy (PDG-C)
D. Pharmaceutical Biotechnology and Biomedicine/Biomedical Sciences (PDG-D)
E. Pharmaceutical Marketing (PDG-E)

List of Graduate Courses

A. Industrial Pharmaceutics and Drug Analysis

PDG-A01 Pharmaceutical Technology
PDG-A02 Industrial Pharmaceutics
PDG-A03 Physical Pharmacy
PDG-A04 Biopharmaceutics and Pharmacokinetics
PDG-A05 Advanced Industrial Pharmaceutics
PDG-A06 Systems of Controlled Administration and Targeting of Drugs
PDG-A07 Immunological and Molecular Methods of Diagnosis
PDG-A08 Quality Control in Pharmaceutical Technology
PDG-A09 Determination of Drugs in Biological Fluids
PDG-A10 Advanced Technology of Solid Form Drugs
PDG-A11 Advanced Technology of Liquid Form Drugs
PDG-A12 Advanced Technology of Semi-Solids Form Drugs and Systems of Dispersion
PDG-A13 Clinical Pharmacokinetics
PDG-A14 Statistical Methods in Pharmaceutics
PDG-A15 Laws and Regulations of Production, Advertisement and Vending of Drugs, Diagnostics and other Health Products
PDG-B13 Analytical Spectroscopy
PDG-B14 Electroanalytical Techniques
PDG-B16 Modern Techniques in Instrumental Analysis
PDG-D09 Conformation studies of Macromolecules

B. Pharmaceutical Chemistry-Natural Products: Design, Synthesis and Analysis of Bioactive Compounds

PDG-B01 Organic Chemistry: Organic Reactions Mechanisms - Stereochemistry
PDG-B02 Organic Chemistry: Protective Groups – Combinatorial Chemistry
PDG-B03 Isolation and Identification of Natural Products
PDG-B04 Chemistry of Aminoacids, Peptides and Proteins
PDG-B05 Current Approaches in Pharmaceutical Chemistry
PDG-B06 Total Synthesis of Natural Products
PDG-B07 Drug Design
PDG-B08 Bioinorganic Chemistry
PDG-B12 Computer Applications in Pharmacy
PDG-B13 Analytical Spectroscopy
PDG-B14 Electroanalytical Techniques
PDG-B15 Separation Techniques
PDG-B16 New Techniques in Instrumental Analysis
PDG-D09 Conformational study of Macromolecules

C. Molecular Pharmacology – Clinical Pharmacy
PDG-C01 General Principles in Pharmacology
PDG-C02 Biochemical Basis of Drug Action
PDG-C03 Advanced Molecular Pharmacology
PDG-C04 In vivo and in vitro studies on the mechanism of drug action
PDG-C05 Pathophysiology and pharmacology of angiogenesis
PDG-C06 Approaches for the development of new drugs
PDG-C07 Signal transduction mechanisms in the CNS
PDG-C08 Molecular basis of behavior
PDG-C09 Clinical Pharmacy I
PDG-C10 Clinical Pharmacy II
PDG-C11 Introduction to Pathology

D. Pharmaceutical Biotechnology and Biomedicine
PDG-D01 Pharmaceutical Biotechnology
PDG-D02 Advanced Molecular Biotechnology
PDG-D03 Laboratory Training in Molecular Biology-Biotechnology Techniques
PDG-D04 Molecular Diagnostics
PDG-D05 Advanced Immunobiology
PDG-D06 Molecular Biology of Cancer
PDG-D07 Introduction into Biomedical Research
PDG-D08 Bioinformatics
PDG-D09 Conformational studies of Macromolecules
PDG-D10 Protein Biochemistry

E. Pharmaceutical Marketing
PDG-E01 Research and Development in Pharmaceutical Industry
PDG-E02 Design of Marketing Strategies
PDG-E03 Communication Strategies
PDG-E04 Management in Finance
PDG-E05 Principles of Business Administration
PDG-E06 Introduction into Financial Studies
PDG-E07 Sales
PDG-E08 Pharmacoeconomy
PDG-E11 Pharmaceutical Technology
PDG-E12 General principles of Pharmacology
PDG-E13 Drug Design and Development
PDG-E14 Pharmaceutical Marketing Diploma Research

Diploma Research Credits (for Specializations A-D)
PDG-Y01 Diploma Research I
PDG-Y02 Diploma Research II
PDG-Y03 Diploma Research III
PDG-Y04 Diploma Research IV
COURSE SUMMARY TABLE

A. Industrial Pharmaceutics and Drug Analysis
First year graduate students must select four of the following offered courses during the first two semesters and research projects -Y01 and -Y02. Second year students must attend two more courses and research projects -Y03 and -Y04. Total credits per semester are 30.

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<tr>
<td>PDG-Y03 20</td>
<td>PDG-Y04 20</td>
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</tbody>
</table>

B. Pharmaceutical Chemistry-Natural Products: Design, Synthesis and Analysis of Bioactive Compounds
First year graduate students must select four courses during the first two semesters and research projects -Y01 and -Y02. Second year students must attend two more courses and research projects -Y03 and -Y04. Out of the total six courses four must be selected from the following courses and two from any other specialization. Total credits per semester are 30.

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<tr>
<td>PDG-Y03 20</td>
<td>PDG-Y04 20</td>
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</tbody>
</table>
C. Molecular Pharmacology – Clinical Pharmacy
First year graduate students must select four courses during the first two semesters and research projects -Y01 and -Y02. Second year students must attend two courses and research projects -Y03 and -Y04. Out of the total six courses four must be selected from the following courses and two from any other specialization. Total credits per semester are 30.

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<td>PDG-Y02 10</td>
</tr>
<tr>
<td>PDG-Y03 20</td>
<td>PDG-Y04 20</td>
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</tbody>
</table>

D. Pharmaceutical Biotechnology and Biomedicine
First year graduate students must select four courses during the first two semesters and research projects -Y01 and -Y02. Second year students must attend two courses and research projects -Y03 and -Y04. Out of the total six courses four must be selected from the following courses and two from any other specialization. Total credits per semester are 30.

<table>
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<tr>
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</tr>
<tr>
<td>PDG-Y03 20</td>
<td>PDG-Y04 20</td>
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</tbody>
</table>
E. Pharmaceutical Marketing
Graduate students must attend all offered courses and in addition three more graduate courses offered in any of the other specializations offered by the Department of Pharmacy. Total credits per semester are 30.
ECTS Course Code : PDG-A01
Title : Pharmaceutical Technology
Lecturer : K. Avgoustakis
Type : Lectures (3 h/w)
Period : Fall
ECTS credits : 10
Recommended reading: H.C. Ansel, Introduction to Pharmaceutical Dosage Forms; Remmington Pharmacopeia

Content:
- Basic definitions and concepts on drug delivery systems, Biopharmaceutics, Quality control
- Solid dosage forms: powders, granules, tablets, capsules, microcapsules
- Semisolid dosage forms: suppositories, ointments, pastes, creams, gels
- Liquid dosage forms: solutions, suspensions, emulsions, injectable liquid forms
- Inhaled dosage forms: aerosols

ECTS Course Code : PDG-A02
Title : Industrial Pharmacy
Lecturer : K. Avgoustakis
Type : Lectures (3 h/w)
Period : Spring
ECTS credits : 10

Content:
- Principles of Pharmaceutical Processing: mixing, milling, drying, clarification and filtration
- Powder Technology: powder flow, compression and consolidation
- Sterilization, Design and Operation of Clean Rooms
- Packaging of Pharmaceuticals
- Quality Control and Assurance

ECTS Course Code : PDG-A03
Title : Physical Pharmacy
Lecturer : P. Klepetsanis
Type : Lectures (3 h/w)
Period : Fall
ECTS credits : 10

Content:
Chemical kinetics in multicomponent systems. Colloid and Surface chemistry. Physicochemical analysis of techniques used in characterization of pharmaceutical forms.
**Course Code**: PDG-A04  
**Title**: Biopharmaceutics and Pharmacokinetics  
**Lecturer**: G. Sivolapenko  
**Type**: Lectures (3 h/w)  
**Period**: Spring  
**ECTS credits**: 10  
**Recommended reading**: Wagner, Biopharmaceutics; M. Gibaldi, Biopharmaceutics and Clinical Pharmacokinetics

**Content:**  

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**ECTS Course Code**: PDG-A05  
**Title**: Advanced Industrial Pharmacy  
**Lecturer**: S. Antimissiaris, K. Avgoustakis, P. Klepetsanis  
**Type**: Lectures (3 h/w)  
**Period**: Spring  
**ECTS credits**: 10  
**Recommended reading**: Relevant current bibliography and handouts of invited lecturers

**Content:**  
- Invited lectures from specialists from Pharmaceutical Industry on the Industrial production, evaluation and packaging of pharmaceuticals

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**ECTS Course Code**: PDG-A06  
**Title**: Controlled Drug delivery and Drug Targeting Systems  
**Lecturer**: K. Avgoustakis  
**Type**: Lectures (3 h/w)  
**Period**: Spring  
**ECTS credits**: 10

**Content:**  
- Fundamentals of controlled drug delivery.  
- Design and fabrication of controlled release drug delivery systems.  
- Biochemical and molecular biology approaches to controlled drug delivery.  
- Fundamentals of drug targeting/site specific drug delivery. Drug targeting/site specific drug delivery systems.
<table>
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<tr>
<th>ECTS Course Code</th>
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<tbody>
<tr>
<td>Title</td>
<td>Determination of Drugs in Biological Fluids</td>
</tr>
<tr>
<td>Lecturer</td>
<td>S. Antimisiaris</td>
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<tr>
<td>Type</td>
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<td>Period</td>
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<tr>
<td>Recommended reading</td>
<td>The analysis of drugs in Biological Fluids, by J. Chamberlain</td>
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**Content:**

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<th>ECTS Course Code</th>
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<tbody>
<tr>
<td>Title</td>
<td>Advanced Technology of Solid Dosage Forms</td>
</tr>
<tr>
<td>Lecturer</td>
<td>S. Antimissiaris, K. Avgoustakis, P. Klepetsanis</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3 h/w)</td>
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<tr>
<td>Period</td>
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<td>ECTS credits</td>
<td>10</td>
</tr>
<tr>
<td>Recommended reading</td>
<td>Relevant current bibliography and handouts of invited lecturers</td>
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</table>

**Content:**
Advanced lectures on the production and evaluation of solid dosage forms.

<table>
<thead>
<tr>
<th>ECTS Course Code</th>
<th>PDG-A11</th>
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<tbody>
<tr>
<td>Title</td>
<td>Advanced Technology of Liquid Dosage Forms</td>
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<tr>
<td>Lecturer</td>
<td>S. Antimissiaris, K. Avgoustakis, P. Klepetsanis</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3 h/w)</td>
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<td>ECTS credits</td>
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<tr>
<td>Recommended reading</td>
<td>Relevant current bibliography and handouts of invited lecturers</td>
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</table>

**Content:**
Advanced lectures on the production and evaluation of liquid dosage forms.

<table>
<thead>
<tr>
<th>ECTS Course Code</th>
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<tr>
<td>Title</td>
<td>Advanced Technology of semisolid Dosage Forms and Dispersion Systems</td>
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<tr>
<td>Lecturer</td>
<td>S. Antimissiaris, K. Avgoustakis, P. Klepetsanis</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3 h/w)</td>
</tr>
</tbody>
</table>
**ECTS Course Code**: PDG-A13  
**Title**: Clinical Pharmacokinetics  
**Lecturer**: G. Sivolapenko  
**Type**: Lectures (3 h/w)  
**Period**: Fall  
**ECTS credits**: 10  
**Recommended Readings**: Pharmacokinetics, by Milo Gibaldi, Basic Clinical Pharmacokinetics by M.E. Winter

**Content:**

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**ECTS Course Code**: PDG-A14  
**Title**: Pharmaceutical Statistics  
**Lecturer**: S. Antimissiaris, K. Avgoustakis  
**Type**: Lectures (3 h/w)  
**Period**: Spring  
**ECTS credits**: 10  
**Recommended reading**: Pharmaceutical Statistics by David S. Jones (Editor); **Applied Statistics in the Pharmaceutical Industry** -- by Steven P. Millard (Editor), Andreas Krause (Editor);

**Content:**
- Introduction to Probability: the Binomial and Normal distribution  
- Statistical Inference: estimation and hypothesis testing  
- Sample Size and Power  
- Linear Regression and Correlation  
- Analysis of Variance  
- Factorial Designs  
- Transformation and Outliers  
- Experimental Design in Clinical Trials  
- Quality Control  
- Validation  
- Nonparametric Methods  
- Optimization techniques
ECTS Course Code : PDG-A15  
Title : Laws and Regulations of Production, Advertisement and Vending of Drugs, Diagnostics and other Health Products  
Lecturer : S. Antimissiaris, K. Avgoustakis, P. Klepetsanis  
Type : Lectures (3 h/w)  
Period : Spring  
ECTS credits : 10  

Content:  
- Invited lectures from specialists from Pharmaceutical Industry and Regulatory Organizations on the laws and regulations governing the manufacturing, evaluation, and marketing of pharmaceuticals and diagnostics

ECTS Course Code : PDG-B01  
Title : Organic Chemistry: Organic Reactions Mechanisms - Stereochemistry  
Lecturer : G. Pairas, P. Magriotis and S. Nikolaropoulos  
Type : Lectures (3 h/w)  
Period : Fall  
ECTS credits : 10  

Content:  
Structure and reactivity, Energetics, kinetics and the investigation of mechanism, Stereochemistry, Optical activity and chirality, Methods of determining configuration, Asymmetric synthesis, Conformational analysis, Strain, Carbocations, Electron-deficient N and O atoms, Carbanions, Radicals, Symmetry controlled reactions, Rearrangements, Linear free energy relationships

ECTS Course Code : PDG-B02  
Title : Organic Chemistry: Protective Groups - Combinatorial Chemistry  
Lecturer : P. Cordopatis, M. Fousteris and S. Nikolaropoulos  
Type : Lectures (3 h/w)  
Period : Spring  
ECTS credits : 10  

Content:  
The role of the protective groups, Protection for the Hydroxyl group, for the phenols and catechols, for the carbonyl group, for the carboxyl group, for the thiol group, for the amino group, for the phosphate group, for the alkyne-CH, General aspects for the combinatorial chemistry, theory and examples.
ECTS Course Code : PDG-B04
Title : Chemistry of Aminoacids, Peptides and Proteins
Lecturer : P. Cordopatis, V. Magafa, G. Spyroulias
Type : Lectures (3 h/w)
Period : Spring
ECTS credits : 10

Content:

ECTS Course Code : PDG-B05
Title : Current Approaches in Pharmaceutical Chemistry
Lecturer : C. Camoutsis
Type : Lectures (3 h/w)
Period : Spring
ECTS credits : 10

Content:
Anti-inflammatory steroids in preclinical trials. Pharmacologically active, heterocycle bearing steroids. Antiestrogens, antiandrogens as progestogenes antagonists, mineralocorticoids, adrenocorticoids.

ECTS Course Code : PDG-B06
Title : Total Synthesis of Natural Products
Lecturer : P. Cordopatis, S. Nikolaropoulos, V. Magafa,
Type : Lectures (3 h/w)
Period : Spring
ECTS credits : 10

Content:

ECTS Course Code : PDG-B07
Title : Drug Design
Lecturer : P. Cordopatis, M. Fousteris, S. Nikolaropoulos, G. Pairas, G. Spyroulias
Type : Lectures (3 h/w)
Period : Spring
Content:
Stages of drug design, Strategic issues in drug discovery, Approaches to new drug
discovery, Pharmacomodulation, Enzymes as targets of drug design, Chemistry,
Computer aided Drug Design, Bioinformatics and Computational Biology,
Combinatorial chemistry.

ECTS Course Code : PDG-B08
Title : Bioinorganic Chemistry
Lecturer : E. Manessi-Zoupa
Type : Lectures (3 h/w)
Period : Spring
ECTS credits : 10

Content:
The Alkali Metal and Alkline Earth Cations Non-Redox Metalloenzymes. Oxygen
Carriers and Oxygen Transport Proteins and Copper Proteins in Redox Reactions,
Vitamin B₁₂, Nitrogen Fixation and Iron-Sulphur Proteins. Metal Ion Transport and
Storage. Metal Pollution. Inorganic Drugs.

ECTS Course Code : PDG-B13
Title : Analytical Spectroscopy
Lecturer : M. Orkoula
Type : Lectures (3 h/w)
Period : Spring
ECTS credits : 10

Content:
Atomic Absorption and Atomic Emission Spectroscopy, X-ray Spectroscopy
(Diffraction and Fluorescence), Utraviolet and Visible Spectroscopy, Fluorescence
Spectroscopy, Infrared Spectroscopy, Raman Spectroscopy. Analysis of actine
pharmaceutical ingredients employing combination of spectroscopic techniques.

ECTS Course Code : PDG-B14
Title : Electroanalytical Techniques
Lecturer : C. Kontoyannis
Type : Lectures (3 h/w)
Period : Fall
ECTS credits : 10

Content:
Introduction to the fundamental concepts of electrochemistry. Steady state and

<table>
<thead>
<tr>
<th>ECTS Course code</th>
<th>PDG-B15</th>
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<tbody>
<tr>
<td>Title</td>
<td>Separation Techniques</td>
</tr>
<tr>
<td>Lecturer</td>
<td>A. Tsarbopoulos</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3 h/w)</td>
</tr>
<tr>
<td>Period</td>
<td>Spring</td>
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<td>ECTS credits</td>
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**Content:**
Application of separation techniques in pharmaceutical science: Chromatographic techniques, modern techniques in mass spectrometry (Secondary ion M.S., continuous-flow fast atom bombardment M.S, Tandem καπτ), techniques based in electrophoresis, combination of separation techniques.

<table>
<thead>
<tr>
<th>ECTS Course code</th>
<th>PDG-B16</th>
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<tbody>
<tr>
<td>Title</td>
<td>New Techniques in Instrumental Analysis</td>
</tr>
<tr>
<td>Lecturer</td>
<td>A. Tsarbopoulos, M. Orkoula</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3 h/w)</td>
</tr>
<tr>
<td>Period</td>
<td>Fall</td>
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<td>ECTS credits</td>
<td>10</td>
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</table>

**Content:**
Separation Techniques: Chromatographic Techniques (Gas-liquid, Liquid-Liquid, HPLC, Supercritical Fluid Chromatography), Electrophoresis, Miscellaneous Separation Processes; Atomic Spectroscopy; Xray Diffraction Analysis; Multistep Analytical Schemes for Complex Samples (Choosing and/or Combining Different Analytical Techniques).

<table>
<thead>
<tr>
<th>ECTS Course Code</th>
<th>PDG-C01</th>
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<tbody>
<tr>
<td>Title</td>
<td>General Principles in Pharmacology</td>
</tr>
<tr>
<td>Lecturer</td>
<td>E. Papadimitriou</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3 h/w)</td>
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<tr>
<td>Period</td>
<td>Fall</td>
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<td>ECTS credits</td>
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</table>

**Content:**
Drugs of the central and autonomic neural systems. Drugs of the cardiovascular system. Anti-inflammatory drugs. Chemotherapeutic drugs. Principles of anti-

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<tr>
<th>ECTS Course Code</th>
<th>PDG-C02</th>
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</thead>
<tbody>
<tr>
<td>Title</td>
<td>Biochemical Basis of Drug Action</td>
</tr>
<tr>
<td>Lecturer</td>
<td>G. Sotiropoulou, E. Papadimitriou.</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3 h/w)</td>
</tr>
<tr>
<td>Period</td>
<td>Fall</td>
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<td>ECTS credits</td>
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</table>

Content:
Antibodies as drugs or drug carriers.

<table>
<thead>
<tr>
<th>ECTS Course Code</th>
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</thead>
<tbody>
<tr>
<td>Title</td>
<td>Advanced Molecular Pharmacology</td>
</tr>
<tr>
<td>Lecturer</td>
<td>A. Papapetropoulos, E. Papadimitriou, S. Topouzis</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3 h/w)</td>
</tr>
<tr>
<td>Period</td>
<td>Fall</td>
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<td>ECTS credits</td>
<td>10</td>
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</tbody>
</table>

Content:
Drugs that act through receptor binding. Molecular structure of drug receptors.
Drugs that affect cell signalling.
Ion channel receptors: Activation and block.
G protein-coupled receptors. Ca^{2+} signals, protein kinase C and diacylglycerol. Cyclic nucleotides.
Tyrosine kinase receptors.
Receptors as pharmaceutical targets.
Transcription factors as drug targets.
ECTS Course Code : PDG-C04
Title : In vivo and in vitro studies on the mechanism of drug action
Lecturer : N. Demopoulos, G. Stefanou, E. Papadimitriou, A. Papapetropoulos and S. Topuzis
Type : Lectures (3 h/w)
Period : Spring
ECTS credits : 10

Content:
*Ex vivo* and *in vivo*: Organ cultures. Studies on animals (mice, rats, rabbits etc). Drug toxicity.
Examples of drug development and studies on their mechanism of action. Clinical problems.

ECTS Course Code : PDG-C05
Title : Pathophysiology and pharmacology of angiogenesis
Lecturer : A. Papapetropoulos, E. Papadimitriou, S. Topouzis
Type : Lectures (3 h/w)
Period : Spring
ECTS credits : 10

Content:
Angiogenesis: Definitions, endothelial cells, basement membrane, growth factors, integrins.
Physiological and pathological angiogenesis. Regulation of angiogenesis.
Involvement of angiogenesis on tumor growth and metastasis. Anti-angiogenic agents in pre- and clinical studies.

ECTS Course Code : PDG-C06
Title : Approaches for the development of new drugs
Lecturer : N. Karamanos, A. Papapetropoulos, S. Nikolaropoulos, G. Pairas, E. Papadimitriou, S. Topouzis
Type : Lectures (3 h/w)
Period : Fall
ECTS credits : 10

Content:
New drug discovery and development: History, principles and definitions, examples. Pharmacogenomics, genetic polymorphisms and response to drugs.
Proteomics and functional glycomics: Studies on protein and proteoglycan structure, interactions and effect on drug development.

ECTS Course Code : PDG-C07
Title : Signal transduction mechanisms in the CNS
Lecturer : G. Kostopoulos, F. Aggelatou, G. Voukelatou, A. Mitsakou, K. Papatheodoropoulos
Type : Lectures (3 h/w)
Period : Spring
ECTS credits : 10

Content:

ECTS Course Code : PDG-C08
Title : Molecular basis of behavior
Lecturer : G. Kostopoulos, F. Aggelatou, G. Voukelatou, A. Mitsakou, K. Papatheodoropoulos
Type : Lectures (3 h/w)
Period : Fall
ECTS credits : 10

Content:

ECTS Course Code : PDG-C09
Title : Clinical Pharmacy I
### Lecturer: E. Giannopoulou, D. Kardamakis, X. Kalofonos, P. Perimenis, K. Markou, D. Alexopoulos, I. Xeiladakis, G. Sivolapenko

**Type**: Lectures (3 h/w)  
**Period**: Fall  
**ECTS credits**: 10

#### Content:

Drugs used for the therapy of:
- Tumors, with or without concomitant radiotherapy.
- Urogenital diseases.
- Endocrinology disorders.
- Heart and blood diseases.

Drug research and development, design and conduct of clinical trials, design of experimental clinical protocols.

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### ECTS Course Code : PDG-C10

**Title**: Clinical Pharmacy II  
**Lecturer**: E. Giannopoulou, A. Psyrogiannis, V. Nikolopoulou, A. Antonopoulos, A. Skoutelis, K. Spyropoulos  
**Type**: Lectures (3 h/w)  
**Period**: Spring  
**ECTS credits**: 10

#### Content:

Drugs used for the therapy of:
- Diabetes.
- Gastrointestinal diseases.
- Reumatology disorders.
- Infectious diseases.
- Pneumology diseases.

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### ECTS Course Code : PDG-C11

**Title**: Introduction to Pathology  
**Lecturer**: X. Gogos  
**Type**: Lectures (3 h/w)  
**Period**: Fall, Spring  
**ECTS credits**: 10

#### Content:

Pathophysiological mechanisms of diseases, symptoms, differential diagnosis and therapy.

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### ECTS Course Code : PDG-D01

**Title**: Pharmaceutical Biotechnology  
**Lecturer**: G. Sotiropoulou
Contents:

Laboratory Course:
1. Manipulating DNA (Video, E. J. Wood)
3. Isolation and analysis of human genomic DNA.
5. Genetic engineering II: isolation, purification and quantitation of plasmid DNA.
6. Polymerase Chain Reaction, PCR: application for site-directed mutagenesis of recombinant proteins.
7. Polymerase Chain Reaction, PCR: application for the detection of polymorphisms in human DNA.


<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Title</td>
<td>: Advanced Biotechnology</td>
</tr>
<tr>
<td>Lecturer</td>
<td>: S, Tzartos, G. Sotiropoulou,</td>
</tr>
<tr>
<td>Type</td>
<td>: Lectures (3h/w)</td>
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<td>Period</td>
<td>: Fall</td>
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<td>ECTS Credits</td>
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Contents :

Biomaterials: Introductory definitions. Biomaterials and receptor (adsorption of proteins on surfaces, interaction of cells with materials, interaction biomaterials and receptor, biocompatibility control, inflammation, toxicity, thrombosis, haemostasia and thrombolysis, pathological calcification). Degradation and corrosion of biomaterials (polymer degradation in controlled release systems of bioactive substances, degradation of metals and ceramics in a biological environment). Design of molecular biosensors.

*Selected topics will be taught by invited experts.*

<table>
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<tr>
<th>ECTS Course code</th>
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<tbody>
<tr>
<td>Title</td>
<td>: Techniques in Molecular Technology and Biotechnology</td>
</tr>
<tr>
<td>Lecturer</td>
<td>: G. Sotiropoulou</td>
</tr>
<tr>
<td>Type</td>
<td>: Lectures (1 h/w) and Laboratory (3 h/w)</td>
</tr>
</tbody>
</table>
Period : Spring
ECTS Credits : 10

Contents :
2. Isolation and quantitation of total cellular RNA. Measurement of gene expression using semi-quantitative RT-PCR.
4. Preparation of an expression construct for the production of a recombinant protein in: a) a bacterial expression system- E. coli (vector PGEX-2T) and b) a eukaryotic expression system-yeast strain Pichia pastoris (vector pPIC9).
5. Protein engineering-application of a PCR-based method for site-directed mutagenesis. Production of a recombinant protein with single amino acid mutations.
6. Analysis of recombinant proteins by SDS-PAGE and densitometry.

ECTS Course code : PDG-D04
Title : Molecular Diagnostics
Lecturer : G. Patrinos
Type : Lectures (3h/w)
Period : Fall
ECTS Credits : 10

Contents :

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Content:

<table>
<thead>
<tr>
<th>ECTS Course code</th>
<th>PDG-D06</th>
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</thead>
<tbody>
<tr>
<td>Title</td>
<td>Molecular Biology of Cancer</td>
</tr>
<tr>
<td>Lecturer</td>
<td>G. Sotiropoulou</td>
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<tr>
<td>Type</td>
<td>Lectures (3h/w)</td>
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<tr>
<td>Period</td>
<td>Spring</td>
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Contents:

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<tbody>
<tr>
<td>Title</td>
<td>Introduction to Biomedical Research</td>
</tr>
<tr>
<td>Lecturer</td>
<td>G. Sotiropoulou, Assoc. Professor (Co-ordinator) and Faculty Members</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3h/w)</td>
</tr>
<tr>
<td>Period</td>
<td>Spring</td>
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<td>ECTS Credits</td>
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</table>

Contents:
critical reading of research and review articles describing current breakthroughs. Topics in various fields will be selected. Students will be encouraged to suggest papers for study. The aims of each study, the methodologies applied, as well as the analysis and interpretation of experimental data will be discussed in depth.

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<tr>
<th>ECTS Course code</th>
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<tbody>
<tr>
<td>Title</td>
<td>Bioinformatics</td>
</tr>
<tr>
<td>Lecturer</td>
<td>G. Sotiropoulou, P. Klepetsanis, G. Pairas, G. Patrinos</td>
</tr>
<tr>
<td>Type</td>
<td>Lectures (3h/w)</td>
</tr>
<tr>
<td>Period</td>
<td>Fall</td>
</tr>
</tbody>
</table>
ECTS Credits : 10

Contents:
Introduction to basic data structures and algorithms. Special topics on computation and complexity theory. Internet technologies. Basic Internet-WWW services. Internet architecture, protocols, WWW servers. Programming languages, Interconnection of WWW servers with databases. Information retrieval, indexing structures and applications.
Introduction to computer-based drug design. Structure-based drug design based on structure-activity relationships of a receptor and a ligand. Modelling three-dimensional biomacromolecules, internal coordinates, computing the optimal conformation and the active sites (binding sites) of a macromolecule. Effective techniques for screening 3D databases to identify small molecule fragments, which can interact with specific sites in a given receptor. De novo design of small ligands. Peptide-protein and protein-protein docking. Algorithms for the prediction of three-dimensional protein structures (PSI, BLAST, hidden Markov models). Grouping of biological data applied to predicting the behavior of biological molecules (biomacromolecules).

*Selected topics will be taught by invited experts*
LIST OF USEFUL ADDRESSES

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