DEMOCRITUS UNIVERSITY OF THRACE

DEPARTMENT OF MOLECULAR BIOLOGY & GENETICS

UNDERGRADUATE PROSPECTUS

Alexandroupolis, 2018

DEMOCRITUS UNIVERSITY OF THRACE

DEPARTMENT OF MOLECULAR BIOLOGY & GENETICS DUTH

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UNDERGRADUATE PROSPECTUS

2018 - 2019

The 2018-2019 undergraduate prospectus was organized by Dr C. Tsikrikoni & Professor M. Grigoriou

Photos by A. Roupas, MBG student

ADDRESS

Fotis Kafatos' Building

Democritus University of Thrace

Department of Molecular Biology & Genetics,

6th km Alexandroupolis-Makris

University Campus, Dragana,

GR. 68100

WEBSITE

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INFORMATION

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secr@mbg.duth.gr

CONTENTS

ACADEMIC DIARY

2018-2019

REGISTRATION

Students are registered within dates assigned by the Ministry of National Education and Religious Affairs.

WINTER SEMESTER

1. Courses start on	1/10/2018
2. Courses end on	18/1/2019
3. Exam period	21/1-8/2/2019

SPRING SEMESTER

1. Courses start on	11/2/2019
2. Courses end on	30/5/2019
3. Exam period	3/6-21/6/2019

(*) the dates for each semester of any academic year are assigned by the Senate and announced in due time by the Departmental Secretariat.

BANK HOLIDAYS

No lectures, seminars, practicals or exams take place

WINTER SEMESTER

October 28th	National Holiday
November 17th	National Holiday
December 23rd-January 6th	Chrismas Holidays
January 30th	Bank Holiday

SPRING SEMESTER

March 11th	Bank Holiday
March 25th	National Holiday
April 19th- May 5th	Easter Holidays
May 1st	Labour Day
May 14th	Local National Holiday
June 16th	Bank Holiday
Student's elections day	

PART I

GENERAL INFORMATION

DEMOCRITUS UNIVERSITY OF THRACE (DUTH)

The University

Democritus University of Thrace (DUTH) was established in July 1973 by Legislative Decree No. 87 of 27 July 1973, and started operating during the academic year 1974-1975. It was named "Democritus" in honor of the ancient Greek philosopher Democritus, who hailed from the town of Abdera in Thrace.
The administration of DUTH is headquartered in Komotini, which is the capital city of the Administrative Region of Eastern Macedonia and Thrace.
The University is currently operating eighteen Departments organised in eight Schools located in four cities of Thrace: seven in Komotini, five in Xanthi, four in Alexandroupolis and two in Orestiada. Overall, more than 15,000 students are studying at DUTH at undergraduate and post-graduate level.
The University plays an important role in strengthening the national and cultural identity of the region of Thrace, and contributes to the high level of education in Greece. Relying on the quality of teaching and research level, DUTH has secured a place among the best Greek Universities.
As a Higher Education Institution, DUTH is a Public Entity with complete autonomy that is supervised and funded by the State through the Ministry of Education, Research and Religious Affairs.
The academic and administrative bodies of the University are the Board of the University, the Rector and the Senate.

Administration

Rector of Democritus University of Thrace
Athanasios I. Karabinis, Professor of the School of Civil Engineering

Acting Rector
Stavros Touloupidis, Professor of Ourology, School of Medicine

Deputy Rector of Research and Innovation
Pantelis N. Botsaris, Professor of Mechanical Design, School of Production & Management Engineering

Deputy Rector of Student and External Affairs

Nikolaos Aggeloussis, Professor of Biomechanics, School of Physical Education and Sport Science

Deputy Rector of Finance

Fotios P. Maris, Associate Professor of Water Management, School of Forestry and Management of the Environment and Natural Resources

The School of Health Sciences

The School of Health Sciences operates in Alexandroupolis, at the University Campus of Dragana and consists of two Departments:

1. The Department of Medicine established in 1985 and
2. The Department of Molecular Biology & Genetics established in 2000.

Dean of School of Health Sciences

Ploumis Passadakis, Professor of Nephrology

The Department of Molecular Biology and Genetics (MBG)

The Department

The Department of Molecular Biology & Genetics (MBG) of Democritus University of Thrace (DUTH) was established in 2000 in Alexandroupolis with a vision to become a Leader Institution in Education and Research. MBG is the only University Department in Greece dedicated to providing a curriculum in Molecular Biology and Genetics, two fast growing scientific disciplines that lie in the heart of Innovation in Health, Food, Environment and Agriculture.

1. Administration

Department Chair :

Professor Maria Grigoriou
Tel. 00-30-25510-30657
email: mgrigor@mbg.duth.gr

Department Vice Chair :

Professor Raphail Sandaltzopoulos
Tel. 00-30-25510-3020
email: rmsandal@mbg.duth.gr

Head of Secretariat

Dimitrios Asimakopoulos
Tel: +30 25510 30610
Fax: +30 25510 30613
email: secr@mbg.duth.gr

2. Academic Faculty Members

Name	Title	Telephone (0030-25510)	Email (@mbg.duth.gr)
Fylaktakidou Konstantina	Professor of Chemistry of Organic Compounds	30663	kfylakta
Grigoriou Maria	Professor of Molecular - Developmental Biology	30657	mgrigor
Maroulakou Ioanna	Professor of Genetics	30666	imaroula
Mavromara Penelope	Professor of Biochemistry	30618	pmavrom
Sandaltzopoulos Raphael	Professor of Molecular Biology	30622	rmsandal
Alexiou-Chatzaki Maria	Associate Professor of Biology	30636	mchatzak
Boukouvala Sotiria	Associate Professor of Molecular Genetics	30632	sboukouv
Chlichlia Aikaterini	Associate Professor of Molecular Immunology	30630	achliclia
Glykos Nikolaos	Associate Professor of Computational and Structural Biology	30620	glykos
Koffa Maria	Associate Professor of Cell Biology	30661	mkoffa
Kourkoutas Ioannis	Associate Professor of Applied Biotechnology	30633	ikourkou
Pappa Aglaia	Associate Professor of Physiology and Molecular Pharmacology .	30625	apappa
Paschou Peristera (on leave)	Associate Professor of Population Genetics	30658	ppaschou
Skavdis Georgios	Associate Professor of Molecular Biology	30626	gskavdis
Agianian Bogos (on leave)	Assistant Professor of Molecular – Structural Biology	30668	magiania
Boulougouris Georgios	Assistant Professor	30637	gbouloug
Galanis Alexis	Assistant Professor of Molecular Biology	30634	agalanis
Fakis Giannoulis	Assistant Professor of Human Genetics and Cytogenetics	30628	gfakis
Katsani Aikaterini	Assistant Professor of Protein Chemistry	30635	kkatsani
Kedraka Aikaterini	Assistant Professor of Teaching and Job Skills of Bioscientists	30617	kkedraka
Paleologou Aikaterini	Assistant Professor	30664	apalaio

3. Teaching Assistants

Name		Telephone (00302551)	Email (@mbg.duth.gr)
Malatos Sotirios	PhD Molecular Biology	30384	smalatos
Staneloudi Chysovalanto	PhD Molecular Biology	30385	cstanelo
Tsikrikoni Chryssa	PhD Genetics	30621	ctsikrik
Kyriaki Σοφια	MSc in Molecular Biology	30642	skyriaki

4. Laboratories

- Laboratory of Gene Expression, Molecular Diagnostics and Modern Therapeutics (established in 2002)
- Laboratory of Population Genetics & Evolution (established in 2002)
- Laboratory of Organic and Biological chemistry and Natural Products (Organic, Biological and Natural Product Chemistry, established in 2003)
- Laboratory of Developmental Biology & Molecular Neurobiology (established in 2006)
- Laboratory of Molecular Cell Biology, Cell cycle & Proteomics (established in 2006)
- Laboratory of Molecular regulation & diagnostic technology (established in 2015)
- Laboratory of Molecular Immunology (established in 2015)
- Laboratory of Applied Microbiology & Biotechnology (established in 2015)
- Laboratory of Computational Physical Chemistry (established in 2015)
- Laboratory of Teaching and Professional Development of Bioscientists (established in 2015)
- Laboratory of genomic variation & genetic epidemiology (established in 2015)
- Laboratory of Human Genetics & Experimental Models (established in 2015)
- Laboratory of Biochemistry & Molecular Virology (established in 2015)
- Laboratory of Biomolecular Structure & Biophysical Analysis (established in 2015)
- Laboratory of Molecular Genetics & Pharmacogenomics-Toxicogenomics (established in 2015)
- Laboratory of Ecology & Biodiversity Conservation (established in 2015)

4. Admission

Students can be admitted to the Department of Molecular Biolofy & Genetics of Democritus University of Thrace via either participation in the Panhellenic Exams (i.e. the General Admittance Exams in Greece), or following a Qualifying Exam (i.e. exams for Higher Level Education or University graduates). The invitation and enrollment of freshmen take place within a deadline set each year by the Ministry of Education, Research and Religious Affairs.

PART II

STUDYING IN MGB

1. Rules and regulations of exams and evaluation

Studies in MBG last four academic years (8 semesters). The academic year starts on September 1st and ends on August 31st of the following year. Each academic year is organized in two semesters, the winter semester and the spring semester. Each semester consists of at least 13 weeks of classes and is followed by two exam periods, each of which lasts three weeks. In semesters 1-3 students attend compulsory modules, that are considered essential for their Degree. In the 4th, the 5th the 6th and 7th semester, students have to choose 8 optional modules.

There are 3 examination periods: Winter, Spring and Fall. In the exam periods of Winter and Spring students are examined in modules taught only in the relevant semesters. In the Fall exam period, students are examined in modules taught in both semesters (Resits). The detailed program of the final exams is drawn up by the administrative secretariat and it is announced in due time.

The marking of student progress is determined on the basis of a 0 to 10 scale. Testing is considered to be successful if students get at least 5/10.

Teaching units (credits) and ECTS units are allocated to all courses. These units reflect the quantity of work each course unit requires in relation to the total quantity of work necessary to complete a full year of academic study at the institution (that is, lectures, practical work, seminars, tutorials, fieldwork, private study- in the library or at home- and examinations or other assessment activities) and equal to 30 ECTS per semester, in total 240 ECTS for diploma.

2. Requirements for graduation

Students become graduates when they have:

a. Successfully attended all compulsory modules

b. Successfully attended 8 optional modules and completed the degree dissertation thesis or Successfully attended 18 optional modules

And thus have accumulated ***240 ECTS credits***

The graduates of the Department are awarded the Degree of Molecular Biology & Genetics.

Upon completion of the studies, the graduates of the Department of Molecular Biology & Geneticswill be able to:

- describe the basic biological concepts and principles.
- demonstrate a thorough and sophisticated knowledge base in molecular biology & genetics and describe in detail the current knowledge in these scientific disciplines.

- have acquired basic knowledge and laboratory skills in the Technology of the Biosciences, as well as advanced knowledge and laboratory skills in the Technology of Molecular Biology & Genetics and will be able to pursue a professional career in Biosciences or enrol in a graduate studies program.
- critically evaluate data, form a hypothesis, and design experiments using the scientific method.
- communicate scientific data and ideas, both orally and in writing.

3. Final semester project (Degree Dissertation)

The aim of the Final semester project is to familiarize students with the techniques frequently used in a Molecular Biology and Genetics lab. Moreover, students acquire essential knowledge on searching related papers in literature and skills on writing up a scientific project/ paper.

- The Final semester project is optional – students that do not choose a Final semester project attend during the 8th semester 10 elective courses.
- The Final semester project equals with 20 teaching units (30 ECTS units)
- Final semester project is written in Greek but, upon approval by the supervisor and the Faculty. It can be written in English.

Advisory Committee for Degree Dissertation

Aglaia Pappa, Associate Professor,
Ioannis Kourkoutas, Associate Professor
Nikolaos Glykos, Associate Professor
Chryssoula Metallinou, Teaching Assistant
Two representatives of the Students' Union

DEPARTMENT OF MOLECULAR BIOLOGY & GENETICS

CURRICULUM

ACADEMIC YEAR 2018-2019

1st Semester	**LECTURES**	**PRACTICALS**	**TEACHING HOURS**	**TEACHING CREDITS**	**ECTS**	**LECTURERS**
Introduction to Biology	3	0	3	3	**5**	Chatzaki
Introduction to Computational Biology	3	1	4	4	**5**	Glykos
General & Inorganic Chemistry	3	0	3	3	**5**	Boulougouris
Organic Chemistry	3	0	3	3	**5**	Fylaktakidou
Physics for Biological Sciences	4	1	5	5	**5**	Kaldoudi
Laboratory course I	0	4	4	2	**5**	Koffa, Boulougouris, Fylaktakidou, Chatzaki
TOTAL				**20**	**30**	
2nd Semester	**LECTURES**	**PRACTICALS**	**TEACHING HOURS**	**TEACHING CREDITS**	**ECTS**	**LECTURERS**
Introduction to Organismal Biology	3	0	3	3	**4**	Chatzaki
Molecular Biology I	4	0	4	4	**6**	Sandaltzopoulos
Genetics I	3	0	3	3	**4**	Maroulakou
Biochemistry I	3	0	3	3	**4**	Katsani - Mavromara
Physical Chemistry and Elements of Biophysics	3	1	4	4	**5**	Boulougouris
English I	2	0	2	2	**2**	Nalbanti
Laboratory course II	**0**	4	4	2	**5**	Maroulakou, Mavromara, Boulougouris,, Fylaktakidou
TOTAL				**21**	**30**	

3rd Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS	LECTURERS
Molecular Biology II	4	0	4	4	**5**	Paleologou
Introduction to Molecular Biology Techniques	3	0	3	3	**4**	Skavdis
Cell Biology	4	0	4	4	**5**	Koffa
Biochemistry II	4	0	4	4	**5**	Mavromara-Katsani
Molecular Microbiology	3	0	3	3	**4**	Kourkoutas-Chlichlia
English II	2	0	2	2	**2**	Nalbanti
Laboratory course III	**0**	4	4	2	**5**	Kourkoutas, Koffa
TOTAL				**22**	**30**	
4th Semester	**LECTURES**	**PRACTICALS**	**TEACHING HOURS**	**TEACHING CREDITS**	**ECTS**	**LECTURERS**
Genetics II	3	1	4	4	**4**	Maroulakou-Fakis
Gene Expression and Cell Signalling	4	0	4	4	**5**	Galanis, Sandaltzopoulos
Physiology	4	0	4	4	**5**	Pappa
Biostatistics	2	1	3	3	**3**	Trypsianis-Boulougouris
Pedagogics	2	0	2	2	**2**	Kedraka
Optional Modules (2X)	4	0	4	4	**6**	
Laboratory course IV	**0**	4	4	2	**5**	Pappa, Chatzaki
TOTAL				**23**	**30**	

5th Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS	LECTURERS
Developmental Biology	3	0	3	3	**4**	Grigoriou-Skavdis
Molecular Immunology	4	0	4	4	**5**	Chlichlia
Population and Evolutionary Genetics	3	1	4	4	**5**	
Bioinformatics	4	1	5	5	**5**	Glykos
Optional Modules (2X)	4	0	4	4	**6**	
Methods in Molecular Biology	**0**	4	4	4	**5**	Galanis, Grigoriou, Paleologou, Sandaltzopoulos, Skavdis
TOTAL				**24**	**30**	
6th Semester	**LECTURES**	**PRACTICALS**	**TEACHING HOURS**	**TEACHING CREDITS**	**ECTS**	**LECTURERS**
Applied Biotechnology	3	0	3	3	**4**	Kourkoutas
Genomics	3	1	4	4	**4**	Maroulakou,Boukouvala
Regulation of Cell function	4	0	4	4	**4**	Galanis, Paleologou
Introduction to Biomolecules Structure	3	0	3	3	**4**	Glykos
Career Development of Bioscientists	2	0	2	2	**3**	Kedraka
Optional Modules (2X)	4	0	4	4	**6**	
Laboratory course VI	**0**	4	4	2	**5**	Malatos, Kourkoutas, Chlichlia
TOTAL				**22**	**30**	

7th Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS	LECTURERS
Human Genetics	4	1	5	5	**5**	Fakis
Application of Molecular Biology in Medical Sciences	3	1	4	4	**5**	Boukouvala
Molecular Neurobiology	3	0	3	3	**4**	Grigoriou- Paleologou
Proteomics	3	1	4	4	**5**	Katsani
Advanced Molecular Biology Techniques	3	0	3	3	**5**	Skavdis-Grigoriou
Optional Modules (2X)	4	0	4	4	**6**	
TOTAL				**23**	**30**	
8th Semester	**LECTURES**	**PRACTICALS**	**TEACHING HOURS**	**TEACHING CREDITS**	**ECTS**	**LECTURERS**
Degree Dissertation Thesis	10	30	40	20	30	
10 Optional Modules	20	0	20	20	30	
TOTAL				**23**	**30**	
CURRICULUM	**150**	**42**	**187**	**180**	**240**	

Optional Modules of Spring Semester

	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS	LECTURERS
Advanced Themes in Bioinformatics	2	0	2	2	3	Glykos
Stem Cell and Regenerative Biology	2	0	2	2	3	Grigoriou
Behavioral Biology	2	0	2	2	3	Skavdis
Advanced Themes of Immunology	2	0	2	2	3	Chlichlia
Forensic Genetics	2	0	2	2	3	Fakis
Introduction to Bioscience Enterprise	2	0	2	2	3	
Practical Training	1	1	2	2	3	Paleologou
Teaching Practicum Course I (Microteaching)	1	1	2	2	6	Kedraka
Teaching Methodology	1	1	2	2	4	Kedraka
Advanced Themes in Computational Biology	2	0	2	2	3	Glykos
Advanced techniques and applications in cell biology	1	1	2	2	3	Koffa
Material Chemistry and Nanotechnology	1	1	2	2	3	Fylaktakidou
Histology	2	0	2	2	3	Lampropoulou
Counselling & Educational Psychology	1	1	2	2	3	Kedraka

The optional modules that are highlighted in orange can be attended at the 6th semester only

Optional Modules of Winter Semester

	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS	LECTURERS
Virology	2	0	2	2	3	Mavromara-Chlichlia
Genetics of Aquired Disease and Translational Medicine	2	0	2	2	3	Maroulakou
Mechanisms of Oncogenesis	2	0	2	2	3	Galanis
Molecular Biotechnology and Nutrition	2	0	2	2	3	Kourkoutas-Galanis
Pharmacology	2	0	2	2	3	Pappa
Teaching Practicum Course II (Teaching in schools)	1	1	2	2	6	Kedraka
Adult Education	1	1	2	2	3	Kedraka
Organizational Psychology	1	1	2	2	3	Kedraka
Molecular Ecology	2	0	2	2	3	Chatzaki
Radiobiology	2	0	2	2	3	Zisimopoulos
Principles of Laboratory Animal Handling	2	0	2	2	3	Ypsilantis
Principles of Pharmaceutical Chemistry and Chemistry of Natural Products	2	0	2	2	3	Fylaktakidou
Bioethics	2	0	2	2	3	
Plant Molecular Biology	2	2	2	2	3	

The optional modules that are highlighted in orange can be attended at the 7th semester only

DESCRIPTION OF COMPULSORY MODULES

LABORATORY COURSE I

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS	Credits
A'	Υ	0	4	2		5

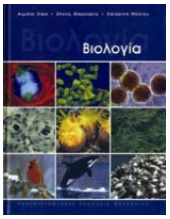
Course objectives

This course is linked to the main courses of General and Inorganic Chemistry and Introduction to Biology and it is an introduction of the first year students to the laboratories of chemistry/biology and the related good practice and safety rules in them. The students are aimed to get familiarized with the basic infrastructure and experimental handlings, in order to be able to perform standard experiments and analyses in cell and molecular biology in the future. The practicals involve the use of the microscope, staining tissues, preparation of solutions via mixing and acid/base titrations, the use of spectrometer etc. The course also aims to introduce the students to plant and animal diversity.

Course contents

1. Good Laboratory safety practice
2. Introduction to optical microscopy
3. Procaryotes: cell staining techniques
4. Eucaryotes: plasmolysis-hemolysis
5. Fungi and Plant physiology: tissues, organs, systems
6. Animal diversity: invertebrates
7. Preparation of solutions
8. Qualitative and Quantitative analysis using UV-Vis Spectroscopy
9. Acid/Base Titrations
10. Aqua solutions, weak electrolytes, pH measurements in Acids bases and salts
11. Buffer solutions

Recommended reading



Title:	ΒΙΟΛΟΓΙΑ
Author:	Α. Ζήση, Ζ. Μαμούρης, Κ. Μούτου
Edition:	Πανεπιστημιακές Εκδόσεις Θεσσαλίας
Τόπος & Χρόνος Έκδοσης:	Λάρισα 2/2011
ISBN:	978-960-8029-66-8
Code ΕΥΔΟΞΟΣ:	68390699

Course notes

1. Laboratory Course I. – Section: «Safety, Theory and Practice of General Chemistry Laboratory Practicals», K. Fylaktakidou (Duth Publishing).
2. Laboratory Course I. – Section: «Introduction to Biology», Alexiou-Chatzaki Maria

Course lecture notes are available at the e-class platform ([https://eclass.duth.gr/courses/ALEX01122/]

Lecturers

G.C. Boulougouris, Assistant Professor of Chemistry-Physical Chemistry

M. Alexiou-Chatzaki, Associate Professor of Biology, Systematics and Ecology of organisms

K. Fylaktakidou, Professor of Organic Chemistry

C. Tsikrikoni, Laboratory Teaching Staff (EDIP)

S. Malatos, Laboratory Teaching Staff (EDIP)

Teaching methods

- Electronic platform (e-class)
- Lab practicals

Assessment methods

Mid-term / final written examination

INTRODUCTION TO BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
A'	C	3	0	3	5

Course objectives

This course aims to introduce the first year student to the principles of biology, the complexity of structure and function of organisms from the unicellular to the multicellular ones, as well as the diversity of animals and plants. The evolution of the earth, the evolution of life in the course of geological time and the natural selection are the main drivers of natural biodiversity and this is the main framework in which the course is being organized. Ultimate goal of the course is the development of critical mind of the student through linking biological knowledge from all levels of organization, molecular, cellular, organismic and ecosystemic.

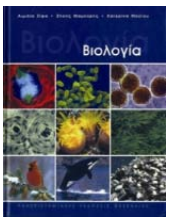
Course contents

- Origin and properties of life
- Biomolecules and their characteristics
- Structure and function of prokaryotic cells
- Structure and function of eukaryotic cells
- Non cellular life structures (viruses-viroids-prions)
- Taxonomy and evolution of organisms
- Protists and Fungi
- Plant diversity
- Structure and function of angiosperms
- Animal diversity I, II, III

Lecturers

M. Alexiou-Chatzaki, Associate Professor of Biology, Systematics and Ecology of organisms

Recommended reading



Title: ΒΙΟΛΟΓΙΑ
Author: Α. Ζήση, Ζ. Μαμούρης, Κ. Μούτου
Edition: Πανεπιστημιακές Εκδόσεις Θεσσαλίας
Locality & Edition year: Λάρισα 2/2011
ISBN: 978-960-8029-66-8
Code ΕΥΔΟΞΟΣ: 68390699

Title:	Ζωολογία
Author:	Miller, S.
Edition:	Broken Hill Publishers Ltd
ISBN:	978-9925-563-37-1
Locality & Edition year:	Κύπρος, 2018

Title:	Βιολογία
Author:	Starr Cecie, Evers Christine, Starr Lisa
Edition:	Utopia
ISBN:	978-618-80647-1-3
Code ΕΥΔΟΞΟΣ:	32998265

Teaching methods

- Oral presentations / lectures
- Documentary projections
- Course lecture notes are available at the e-class platform ([https://eclass.duth.gr/courses/ALEX01122/]

Assessment methods

Final written examination

INTRODUCTION TO COMPUTATIONAL BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
A'	C	3	1	4	5

Course Objectives

Introduction to scientific computing, Unix, C.

Course Contents

Lectures

UNIX: history, characteristics, versions, login-logout, filesystem, directories, users and groups, commands cd, ls, chmod, substitution characters, standard input-output and redirection, find, cat, tail, tee, ln, mv, cp, rm, umask, chown, chgrp, mkdir, rmdir, gzip, gunzip, tar, more, who, finger, date, cal, Networks: architecture, TCP/IP, protocols and examples, ssh, ftp, telnet, talk, unix mail, http, introcuction to html. C: variables and types, for, if-else, while, functions: print() and scanf(), characters, encodings, applications.

Practicals

1st PRACTICAL EXERCISE, 3 hours

- login, logout
- The unix shell
- The filesystem
- cd, pwd, ls, mkdir, rmdir
- Editors: vi, joe, nedit, xedit
- cat, more, cp, mv, rm

2nd PRACTICAL EXERCISE, 3 hours

- cd, pwd, ls, mkdir, rmdir, cp, mv, rm, cat, more
- Special substitution characters: ~, *, ?
- chmod

3rd PRACTICAL EXERCISE, 3 hours

- tar
- grep, find, tail, head, wc
- w, who, finger

4th PRACTICAL EXERCISE, 3 hours

• Unix: the full monty

5th PRACTICAL EXERCISE, 3 hours

• C: introduction24

• The compiler

• printf()

• for

• if and if-else

• Types: int, float

• One-dimensional arrays

6th PRACTICAL EXERCISE, 3 hours

• First application: the least-squares program

7th PRACTICAL EXERCISE, 3 hours

• Characters, strings

• Application: calculation of the molecular weight of a protein from its sequence

• Application: calculation of a hydropathy plot of a protein from its sequence, application to bacteriorhodopsin

8th PRACTICAL EXERCISE, 3 hours

• C, the full monty: program writing exercise

Instructor

Nicholas M. Glykos, Associate Professor (**Structural and Computational Biology**).

Recommended Reading.

Title: Teach Yourself C in 21 Days
Authors: Aitken, Jones
Edition: 2006
ISBN: 978-960-512-491-5
EUDOXUS code: 12373

Title:	Running Linux
Authors:	WELSH, DALHEIMER & KAUFMAN
Edition:	2002
ISBN:	960-209-408-7
EUDOXUS code:	13813

Title:	The UNIX programming environment
Authors:	BRIAN W. KERNIGHAN, ROB PIKE
Edition:	2011
ISBN:	978-960-332-208-5
EUDOXUS code:	12530814

Teaching Methods

Lectures, eight practical exercises.

Assessment Methods

Practical exercises 30%, Exams (multiple choice), 70%

GENERAL & INORGANIC CHEMISTRY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
A'	C	3	0	3	3

Course objectives

The objectives of the course are:

a) Introduction of the basic principles and theories for the structure of atoms, and molecules : the orbitals, the chemical bonds, the periodic table and periodic properties of the elements.

b) Understanding the nature of the forces that act at the molecular and supramolecular level, such as the hydrogen bond forces and Van der Waals.

c) Understanding the stereochemistry leading to the chemistry of complexes, necessary tool for the understanding of biological processes such as enzymatic reactions, etc.

d) Introduction of basic principles in: solutions, chemical equilibrium, chemical kinetics

e) Working knowledge of acids bases, salts and buffer solutions.

Course contents

Lectures

- Structure of atoms
- atomic orbitals
- molecular orbitals
- Hybrid orbitals
- Chemical Bond
- Periodic table
- Hydrogen bond
- Van der Waals forces
- Metal complex
- Solutions
- Chemical Equilibrium
- Chemical Kinetics
- Acids, bases, salts, buffer solutions
- Red-Ox reactions
- Introduction to Electrochemistry

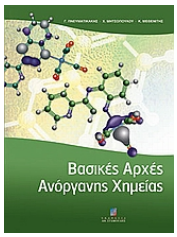
Practicals

Title: "Security, Theory and Practice of General Chemistry Laboratory Exercises"

Author(s): Konstantina Fylaktakidou

Place & Year of Publishing: D.U.TH.

Recommended Reading



Title: Basic principles of Inorganic Chemistry
Author(s): G. Pnevmatikakis
Publishing Company: Stamoulis
Place & Year of Publishing: Athens 2006
ISBN: 9789603516644
EUDOXUS code: 22656

Title: General and Inorganic Chemistry
Author: G. Manousakis
Publishing Company: Kyriakidis monoprosopikh
Year of Publishing: (2015)
ISBN: 978-960-599-009-1
EUDOXUS code: 50663085

Lecturers

G.C. Boulougouris, Assistant Professor of "Chemistry-Physical Chemistry"

Teaching & assessment methods

- Lectures
- Work assignments
- Assessment via written examination

ORGANIC CHEMISTRY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
A	C	3	0	3	5

Course objectives

The objectives of the course are:

a) The knowledge of nomenclature, structure, stereochemistry, electronic phenomena and spectroscopic characteristics of organic compounds, given that almost all biological interesting compounds are categorized as organic compounds.

b) The knowledge of the basic principles of the mechanisms of organic reactions, including the intermediate species like carbanions, carbocations, carbenes and radicals.

c) The knowledge of the structural and electronic characteristics of heterocyclic compounds, amino acids and sugars which consist the main components of biological molecules.

Course contents

Lectures

- Nomenclature
- Isomerism
- Electronic phenomena (inductive and resonance effects)
- Stereochemistry
- Spectroscopy (IR and NMR)
- Mechanisms of organic reactions (nucleophile, electrophile, reactive intermediates, S_{N1}, S_{N2}, E_1, E_2.
- Aromaticity
- Aromatic and heterocyclic compounds
- Carbohydrates

Practicals

The below mentioned practicals are included in the technical course II, please have a look at the corresponding section.

1. Recrystallization (3 hours).
2. Extraction (3 hours).
3. Distillation (3 hours).
4. Chromatography methods (layer, column, and ιon exchange chromatography), (3 hours).
5. Detections of structural features (double bonds, carbonyls, sugars, amino acids), (3 hours).

Lecturers

K. C. Fylaktakidou, Prof. of Chemistry of Organic Compounds,

G. Boulougouris, Lecturer, Chemistry-Physical Chemistry.

Recommended Reading

Title: Οργανική Χημεία Επίτομο
Author(s): Νικολαΐδης Δημήτριος
Publishing Company: Ζήτη Πελαγία &Σια Ο.Ε.
Place & Year of Publishing: 1η έκδοση 1996
ISBN: 978-960-456-291-6
EUDOXUS code: 13004940

Title: Επίτομη Οργανική Χημεία
Author(s): Βάρβογλης Αναστάσιος Γ.
Publishing Company: Ζήτη Πελαγία &Σια Ο.Ε.
Place & Year of Publishing: 1η έκδοση 2005
ISBN: 960-431-948-5
EUDOXUS code: 10998

Title: Οργανική Χημεία για τις Επιστήμες της Ζωής
Author(s): David Klein
Publishing Company: Utopia
Place & Year of Publishing: 2015
ISBN: 978-618-5173-08-
EUDOXUS code:

Practical Notes

Title: Safety, Theory and Practice of Laboratory Techniques
Author(s): K. C. Fylaktakidou
Place & Year of Publishing: Ed. DUTH, 2007

Teaching methods

Electronic presentations of the courses are provided during the lectures, which are accessible to the students via e-class program. Molecular models for the understanding of the 3-dimentional space of the compounds, seminars and practical lab exercises.

Assessment methods

End of term written examinations, Laboratory examination sheets.

Language of instruction

Greek

PHYSICS FOR BIOLOGICAL SCIENCES

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
A'	C	4	1	5	5

Course Objectives

The objectives of the course are:

a) Provide a concise introduction and overview of the principal physical concepts that are necessary for the understanding of phenomena and mechanisms encountered in Chemistry, Biochemistry and Molecular Biology and Genetics.

b) Present the physical foundations of technological tools and techniques commonly used for studying and interacting with biological systems.

c) Outline the basic philosophical concepts that bridge physics with life (thermodynamics of evolution, complex systems, self-organization, etc.)

d) Trigger further discussion, inquiry and study in the area of physics application in molecular biology and genetics.

e) Present the scientific methodology, as well as concepts and best practices of scientific knowledge management.

Course Contents

Lectures

- Introduction: Physics and Molecular Biology and Genetics. Physics in the study of biological systems. Scientific methodology. Experimental procedure, measurement and errors. Scientific knowledge management, scientific literature management, scientific knowledge presentation.

- Evolution of Physics I: Basics of classical mechanics. Principal law of motion. Universal laws of energy, momentum, and angular momentum conservation. Gravity. An example of classical mechanics: hydrodynamics of macromolecules, hydrodynamics as an analytical tool, centrifugation.

- Evolution of Physics II: Theory of electromagnetism. Electric charge, electric force. Moving electric charge, magnetic force. The field concept. Electromagnetic waves and Maxwell theory. Electromagnetic spectrum, interaction of electromagnetic waves with matter and applications in biological sciences.

- Evolution of Physics III: Modern physics. Problems in classical physics (black body radiation, photoelectric effect, atomic absorption spectra, atomic stability). Planck-Einstein energy quantization, Bohr's atomic model. Particle-wave duality of matter and light. Principles of quantum mechanics. Uncertainty principle. Spin and exclusion principle. Quantum theory of matter.
- Light in Modern Physics: Nature and characteristics. Analysis of light spectrum. Light as quantum wave-particle. Production of light. Light as a geometrical ray, geometrical optics, reflection, refraction, physics of vision, microscopy. Light as a wave, polarization, crystallography. Material waves: ultrasound imaging and microscopy.

- Matter in Modern Physics. Atoms and Molecules. Atoms and molecules in modern physics. Atomic and molecular energy levels. Interaction of light and matter. Atomic and molecular spectroscopy. Luminescence and bioluminescence. LASER and applications in biological sciences. X rays and applications in biological sciences (imaging and therapy).

- Matter in Modern Physics. Atomic Nucleus. Nuclear structure. Nuclear forces and energy. Isotope chart, stable and radioactive isotopes. Radioactivity (a, b and γ disintegration). Radiation detection and dosimetry. Biological effects of radiation. Radioctive tracing, imaging and molecular imaging (scintillation, SPECT, PET). Nuclear magnetic spectroscopy, imaging and microscopy.

- Macroscopic Systems. Macroscopic physical variables. Temperature and thermodynamics. Entropy and life. Complex systems. Thermodynamics and self-organization of matter.

Practicals

Practicals involve small group (1-2 persons) assignments on the study and presentation of specific topics in physics as applied to molecular biology and genetics. Each assignment involves search and study of scientific literature, a 20 min presentation and follow-up discussion based on audience questions. Students can choose their assignment out of more than 70 available topics.

Instructor

E. Kaldoudi, Assistant Associate Professor of Physics of Medical Imaging – Telemedicine .

Recommended Reading

Title:	Physics Today
Author(s):	Economou E.N.
Publishing Company:	Cretan University Press
Place & Year of Publishing:	Heraklion 2004
ISBN:	960-7309-08-1
EUDOXUS code:	274

Title:	Physics Chapters
Author(s):	Anagnostopoulos A., Doni E., Karakostas Th., Komninou F.
Publishing Company:	Ziti
Place & Year of Publishing:	Thessaloniki 1998
ISBN:	960-431-249-9
EUDOXUS code:	11065

Course Notes

The following course notes are also available from the course website [in greek]

Title:	Concept Evolution in Physics
Author(s):	E. Kaldoudi
Place & Year of Publishing:	Alexandroupoli 2011
Title:	Principles of Sedimentation & Centrifugation]
Author(s):	E. Kaldoudi
Place & Year of Publishing:	Alexandroupoli 2011
Title:	Physics of Light
Author(s):	E. Kaldoudi
Place & Year of Publishing:	Alexandroupoli 2011
Title:	Radioactivity: Detection, Biological Effects and Imaging
Author(s):	E. Kaldoudi
Place & Year of Publishing:	Alexandroupoli 2011
Title:	Nuclear Magnetic Resonance Spectroscopy & Imaging Author(s): E. Kaldoudi
Place & Year of Publishing:	Alexandroupoli 2011
Title:	X-rays
Author(s):	E. Kaldoudi
Place & Year of Publishing:	Alexandroupoli 2011
Title:	Ultrasound
Author(s):	E. Kaldoudi
Place & Year of Publishing:	Alexandroupoli 2011

Practical Notes

The assignments involve specialized scientific literature proposed for each individual topic, which mainly involves scientific articles.

Teaching Methods

Theatre lectures on the basic theoretical concepts. More special topics are analyzed as students' assignments, presented by students and thoroughly discussed in the classroom. On occasion, invited speakers present specialized topics, while students engage in web based assignments and self-evaluation exercises. The course is fully supported on the web, where discussion forums are also provided.

Language of instruction

Greek. Suggested further reading includes a number of publications in English.

Assessment Methods

Written exams, based on multiple choise questions. Assessment of students' presentations based on well defined criteria.

INTRODUCTION TO ORGANISMAL BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
B'	C	3	0	3	4

Course objectives

This course is divided in two sections, making and introduction to organismal biology (i.e. comparative physiology) and to ecology. In the first section the structure and function of the main model organisms (from unicellular to humans) are presented under the umbrella of phylogeny and natural selection that has tailored their functional relations and their appearances (homologies vs analogies). The main objective for the student is to understand the ways each model organism has developed in order to satisfy its survival needs, in relation to its ancestors and to its environment. In the second section, the principles of ecology are given with an ultimate goal of raising environmental awareness of the students and of understanding the value of preserving biodiversity.

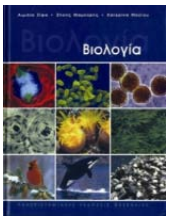
Course contents

- Histology
- Homeostasis – thermoregulation
- Neural system – sensorial organs - senses
- Skin system – Skeletal system – Muscular system
- Circulatory – Respiratory system
- Digestive – Excretory system
- Reproductive system - Development
- Ecosystem ecology – Abiotic factors – Landscape ecology
  Energy flow – Trophic relations – Biogeochemical cycles
- Populations ecology
- Community ecology

Lecturers

M. Alexiou-Chatzaki, Associate Professor of Biology, Systematics and Ecology of organisms

Recommended reading



Title: ΒΙΟΛΟΓΙΑ
Author: Α. Ζήση, Ζ. Μαμούρης, Κ. Μούτου
Edition: Πανεπιστημιακές Εκδόσεις Θεσσαλίας
Locality & Edition year: Λάρισα 2/2011
ISBN: 978-960-8029-66-8
Code ΕΥΔΟΞΟΣ: 68390699

Title: Ζωολογία
Author: Miller, S.
Edition: Broken Hill Publishers Ltd
ISBN: 978-9925-563-37-1
Locality & Edition year: Κύπρος, 2018

Title:	Βιολογία
Author:	Starr Cecie, Evers Christine, Starr Lisa
Edition:	Utopia
ISBN:	978-618-80647-1-3
Code ΕΥΔΟΞΟΣ:	32998265

Teaching methods

- Oral presentations / lectures
- Documentary projections
- Course lecture notes are available at the e-class platform (https://eclass.duth.gr/courses/ALEX01122/

Assessment methods

Final written examination

MOLECULAR BIOLOGY I

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
B’	C	4	0	4	6

GENETICS I

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
B’	C	3	0	3	4

BIOCHEMISTRY I

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
B’	C	3	0	3	4

PHYSICAL CHEMISTRY & ELEMENTARY BIOPHYSICS

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
B'	Y	3	1	4	5

Course objectives

The objectives of the course are:

- **a)** Introduction of mass and energy balance
- **b)** Introduction to the Molecular motion in gases and liquids
- **c)** Understanding of thermodynamic Equilibrium
- **d)** Linking macroscopic properties with molecular forces
- **e)** Understanding the Lows of thermodynamic
- **f)** Introduction to Thermochemistry
- **g)** Introduction of the State functions and exact differentials
- **h)** Work and heat
- **i)** Understanding and measuring Entropy
- **j)** Introduction Phase equilibrium
- **k)** Understanding Irreversibility

Course contents

Lectures

- Introduction to Mathematical techniques
- Mass and energy conservation
- molecular motion of gasses and Liquids
- Equation of states
- Carnot Cycle
- Predicting fluid physical properties using EoS models
- The First Low
- Work and Heat
- The Second Low
- Entropy and irreversibility
- Phase Equilibrium
- Measuring the Enzymatic rate constants
- Aqua's solutions
- Solutions

• Chemical Equilibrium, Chemical Kinetics, and thermodynamics

• Separation techniques

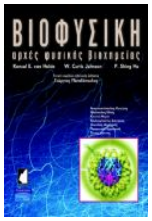
• phase/structure changes of biomolecules

• Elementary molecular simulation computational experiments : from molecules to mols.

Practicals

Title: PHYSICAL CHEMISTRY, ATKINS PETER – DE

Author(s): PAULA JULIO
Publishing Company: PW Atkins
Place & Year of Publishing: Crete University Press
ISBN-13: Crete 2014
EUDOXUS code: 978-960-524-431-6
41954666



Title: "Biophysics"
Author(s): Kensal Van Holde, W. Curtis Johnson, P. Shing Ho
Publishing Company: Vasiliadis
Place & Year of Publishing: Athens (2009)
ISBN: 9789608002555
EUDOXUS code: 7755

Lecturers

G.C. Boulougouris, Assistant Professor of "chemistry-Physical Chemistry"

Teaching & assessment methods

Lectures

Work assignments

Assessment via written examination

ENGLISH I

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
A'	C	2	0	2	3

Objectives

- To familiarize students with scientific vocabulary found in authentic texts relevant to their subject of study and improve their reading skills. This will enable them to cope more efficiently with bibliography and research requirements in their future studies and subsequent career.
- To improve their competence in the written language
- To equip them with the necessary knowledge of grammatical structures and syntactical phenomena which will facilitate a better understanding of language functions
- To encourage critical thinking and discussion of the hot issues in genetics today, thus building students' confidence in speaking.

Course Contents

A wide range of authentic material is used. In the first semester the students are introduced to scientific vocabulary of related fields such as Medicine (Human Anatomy, Common Diseases and Ailments), Anthropology (Theories of Evolution),, Chemistry (Chemical Elements and Compounds) e.t.c.

Instructor

Nalbanti Eleni, Teaching Assistant

Teaching methods:

- Systematic development of the four language skills through realistic challenging tasks which encourage the learner's personal engagement
- clear presentation of the target language through a variety of interesting authentic texts, such as recent articles from scientific journals, accompanied by lexical exercises practising the essential vocabulary thoroughly. The texts are also followed by exercises specifically designed to develop the required techniques through which students acquire the necessary text information quickly and effectively.
- a wide range of speaking activities
- a variety of listening and writing tasks

In all above mentioned areas students work individually, in pairs or groups depending on the type of task. Particular emphasis is given to group work as it gives students ample opportunity to participate in real life communicative activities.

Assessment methods

The course is assessed by an end- of –term written examination.

ENGLISH II

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
B'	C	2	0	2	3

Objectives

- To familiarize students with scientific vocabulary found in authentic texts relevant to their subject of study and improve their reading skills. This will enable them to cope more efficiently with bibliography and research requirements in their future studies and subsequent career.
- To improve their competence in the written language
- To equip them with the necessary knowledge of grammatical structures and syntactical phenomena which will facilitate a better understanding of language functions
- To encourage critical thinking and discussion of the hot issues in genetics today, thus building students' confidence in speaking

Course Contents

A wide range of authentic material is used. In the second semester the reading texts and exercises focus on topics related to Biology (The Cell, The Biological Clock), Molecular Biology and Genetics (Alterations in the Genetic Material, DNA Repair, The Genetic Content of the Human Genome).

Instructor

Nalbanti Eleni, Teaching Assistant

Teaching methods:

- Systematic development of the four language skills through realistic challenging tasks which encourage the learner's personal engagement
- clear presentation of the target language through a variety of interesting authentic texts, such as recent articles from scientific journals, accompanied by lexical exercises practising the essential vocabulary thoroughly. The texts are also followed by exercises specifically designed to develop the required techniques through which students acquire the necessary text information quickly and effectively.
- a wide range of speaking activities
- a variety of listening and writing tasks

In all above mentioned areas students work individually, in pairs or groups depending on the type of task. Particular emphasis is given to group work as it gives students ample opportunity to participate in real life communicative activities.

Assessment methods

The course is assessed by an end- of –term written examination.

INTRODUCTION TO MOLECULAR BIOLOGY TECHNIQUES

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
C'	C	3	0	3	4

Course Objectives

A course of basic molecular biology methods. The concept and aplications of several techniques, is described using a case study approach. Emphasis is given on the applications in Health and Agriculture.

Course contents:

Module I: Enzymes in Molecular Biology.

1. Introduction to Restriction enzymes.
2. Restriction enzymes.
3. DNA polymerases and their use in DNA labeling (nick translation, random priming)
4. RNA polymerases.
5. DNA ligases.
6. Nucleases.
7. DNA kinases and phosphatases and their use in DNA labeling.
8. Recombination enzymes (cre, FLP recombinases).
9. Proteinase K.

Module II: Prokaryotic cloning systems.

1. Elements of E. coli biology.
2. Cloning vectors (plasmid vectors, viral vectors, phagemids, YACs and BACs).

Module III: Purification and analysis of nucleic acids.

1. DNA purification (plasmid, viral, genomic).
2. RNA purification (total RNA / poly A-RNA).
3. DNA and RNA analysis.
4. Electrophoresis of nucleic acids (agarose and polyacrylamide gels).
5. Southern / Northern blotting.
6. RNAse protection, primer extention.

Module IV: PCR.

1. Introduction to PCR.
2. Primer selection.
3. Degenerate primers.
4. Cloning PCR products.
5. Touch-down PCR.
6. Hot start PCR.
7. Nested PCR.
8. Inverse PCR.
9. Reverse Transcription PCR / RT-PCR.
10. Differential Display PCR.

11. SELEX (Systematic Evolution of Ligands by Exponential Enrichment).
12. In vivo footprinting.
13. Analysis of polymorphisms using PCR.
14. Real time PCR.

Module V: Sequencing

1. Maxam – Gilbert method.
2. Sanger method (+ automated PCR sequencing).
3. Pyrosequencing.

Module VI: Libraries

1. Genomic Libraries.
2. cDNA libraries (construction of cDNA libraries, full length cDNA cloning, expression libraries, forced cloning).

Instructor

Georgios Skavdis, Associate Professor of Molecular Biology

Recommended Reading

Tile:	Recombinant DNA
Authors:	Watson D.A. and others (translated to Greek)
Publishing Company:	Academic Publications
Place & Year of Publishing:	1st 2010
ISBN:	978-960-88412-5-3
EUDOXUS code:	2625.

Course Notes

Title:	Introduction to Molecular Biology Techniques
Authors:	Georgios Skavdis
Place & Year of Publishing:	Alexandroupolis, 2015

Language of instruction

Greek

Teaching methods

Lectures, Participatory method of teaching.

Assessment methods

Comprehensive final exam.

LABORATORY COURSE III

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
D	C	0	4	2	5

Course objectives

The 3rd Laboratory Course aims at understanding of the main principles of Cell Biology and Molecular Microbiology, as well as acquiring laboratory experience. For this purpose, 9 laboratory exercises are performed, which include: an introductory laboratory for the familiarization of the students with the laboratory, the use of specific instruments, the preparation of solutions and culture media that will be used during the experiments and the sterilization methods, followed by the laboratory exercises regarding fractionation of eukaryotic cell extracts, protein analysis by SDS-polyacrylamide gel electrophoresis (*SDS-PAGE*) and detection by Coomasie blue staining, observation of mitosis using the microscope, preparation of liquid and solid microbial cultures, the determination of bacterial counts by serial dilutions and isolation of lactic acid bacteria from dairy products, investigation of microbial sensitivity to antimicrobial agents, Gram staining, microscopic observation of prokaryotic and eukaryotic microorganisms and microbial examination of human teeth and mouth.

Course contents

1. Introduction to the laboratory, preparation of solutions.
2. Aseptic methods. Preparation of culture media. Sterilization methods.
3. Pure cultures: Microbial solid and liquid cultures.
4. Quantitative determination of bacteria by serial dilutions. Isolation of lactic acid bacteria from dairy products.
5. Resistance of microbes to antimicrobial agents. Antimicrobial effect of essential oils. Antibiotic susceptibility tests.
6. Gram staining. Use of microscope. Microbial examination of human teeth and mouth.
7. Observing mitosis in onion root tip cells
8. Cell extraction, cell fractionation.
9. Protein analysis by SDS-polyacrylamide gel electrophoresis (*SDS-PAGE*), detection by Coomasie blue staining.

Lecturers

1. M. Koffa, Associate Professor of Cell Biology**.**
2. I. Kourkoutas, Associate Professor of Applied Biotechnology**.**

Recommended Reading

Title: Handbook of Laboratory Microbiology
Author: J.M. MILLER
Publishing Company: Parisianos Scientific Press
Place & Year of Publishing: Athens, 2007
ISBN: 978-960-394-782-0
EUDOXUS code: 12632043

Practical Notes

Title: Laboratory exercises of Molecular Microbiology
Author(s): I. Kourkoutas
Place & Year of Publishing: Department of Molecular Biology & Genetics, Democritus University of Thrace, 2010.

Title: Laboratory Exercises of Cell Biology
Author(s): M. Koffa
Place & Year of Publishing: Department of Molecular Biology & Genetics, Democritus University of Thrace, 2015

Teaching methods

1. eclass
2. Laboratory exercises.
3. Tutorials.

Assessment methods

1. Laboratory assessments.
2. Final written exams.

BIOCHEMISTRY II

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
B’	C	4	0	4	5

CELL BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
B'	C	4	0	4	5

Course objectives

This course will allow students to develop a comprehension of the basic concepts of behavior, physiology and interaction of cells with their environment, at a microscopical and molecular level. Comprehension of the cell structure and function is important for understanding of all biological sciences. Comparison of similarities and differences between cell types is important. Topics covered include single cell organisms and viruses, as well as multi cell systems.

Course contents

- Cell structure and function-Methodology
    - Light and electron Microscopy, Fluorescence Microscopy techniques (including FRAP, FRET, etc)
    - Immunocytochemistry
    - fractionation of cells extracts
    - chromatography
    - gel electrophoresis
    - cell culture
- Procaryotic cell, eukaryotic cell, viruses, intracellular compartments and cell organelles (nucleus, mitochondria, ER, Golgi, chloroplasts, peroxisomes, lysosomes)
- Protein structure and function
- Chromatin organization (briefly), nuclear pores, nuclear lamina
- Cell membrane structure: the lipid bilayer, membrane proteins
- Membrane transport: principles, carrier proteins, ion channels, electrical properties of membranes
- Intracellular compartments and protein sorting: nuclear-cytoplasmic transport, intracellular vesicular traffic
- Cytoskeleton: actin filaments, intermediate filaments, microtubules, molecular motors, cell behavior
- Mechanisms of cell division, cell cycle, senescence and cell death
- Cell communication, cell junction, cell adhesion and the extracellular matrix
- Stem cells and gene therapy, cancer, the lives and deaths of cells in tissues.

Lecturer

M. Koffa, Associate Professor of Cell Biology**.**

Recommended Reading

Title:	The Cell
Authors:	B. Alberts, A. Johnson, J. Lewis, D. Morgan, M. Raff, K. Roberts, P. Walter,j. Wilson, T. Hunt
Publishing Company:	ΙΩΤΟΡΙΑ ΕΚΔΟΣΕΙΣ ΕΠΕ
Place & Year of Publishing:	6th American-1st Greek/2018
ISBN:	978-618-5173-29-6
EUDOXUS code:	68401319

Title:	Βιολογία Κυττάρου
Authors:	ΒΑΣΙΛΗΣ ΜΑΡΜΑΡΑΣ & ΜΑΡΙΑ ΛΑΜΠΡΟΠΟΥΛΟΥ-ΜΑΡΜΑΡΑ
Publishing Company:	Τυπόραμα
Place & Year of Publishing:	2005
ISBN:	
EUDOXUS code:	6

Title:	Βιολογία Κυττάρου
Authors:	Μαργαρίτης Λουκάς Χ.
EUDOXUS code:	25249
Place & Year of Publishing:	4η έκδ./2004
ISBN:	960-372-077-1
Publishing Company:	Κ. & Ν. ΛΙΤΣΑΣ Ο.Ε.

Title:	Ρυθμιστικοί μηχανισμοί κυτταρικής λειτουργίας
EUDOXUS code:	17508
Place & Year of Publishing:	1η έκδ./2006
Authors:	Θωμόπουλος Γεώργιος Ν.
ISBN:	978-960-12-1549-5
Τύπος:	Σύγγραμμα
Publishing Company	University Studio Press A.E.

Course Notes

The power point presentations of the lectures are provided (in a pdf format) at the e-class of the course

Teaching methods

Lecture course: powerpoint presentations as well as videos. These, together with recommended books are up-loaded in the e-class of the course Web sites related to the course, for further study

Assessment methods

Written exam at the end of the semester

MOLECULAR BIOLOGY II

Semester	C/E	Lectures Hours	Practicals	Teaching units	ECTS
C	C	4	0	4	5

Course Objectives

The objectives of the course are:

This core module provides knowledge essential for all Molecular Biology & Genetics students. The molecular mechanisms of living systems are described in detail during lectures.

Course contents

1. Messenger RNA
2. The tRNA
3. The ribosomal RNA
4. Protein synthesis
5. The Genetic code
6. Nuclear transport
7. Protein localization
8. Ubiquitination – protein degradation
9. The replicon
10. DNA replication

Lecturers

A. Galanis, Assistant Professor

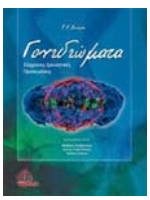
E. Paleologou, Assistant Professor

R. Sandaltzopoulos, Professor

Recommended reading:

Title: Genes VIII (Greek Translation)

Author(s): Lewin
Publishing Company: Akadimaikes Ekdoseis
Place & Year of Publishing: Alexandroupolis 2004
ISBN: 978-960-99895-5-8



Title: Genomes
Author(s): Brown T.A
Publishing Company: Iatrikes Ekdoseis Paschalidis
Place & Year of Publishing: 2010
ISBN: 9603998563

Teaching methods
Lectures, use of e-class, tutorials

Language of instruction
Greek

Assessment methods
End of semester written examination, mid-term written examination

MOLECULAR MICROBIOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
D	C	3	3	4	6

Course objectives

The objectives of the course are:

a) The consolidation of the basic principles of microbiology. Microbiology is the science which studies the microbial world and is considered as one of the major pillars of modern biology.

b) The comprehension of the molecular mechanisms of microbial structure and action, as well as their integration into the environment. In the frame of the course, important applications in medicine, industry, agriculture and biotechnology are also presented. Finally, many astonishing recent findings are discussed, such as the understanding of microbial life on molecular level, the clarification of microbial genetics, the principles of modern virology, etc.

Course contents

Lectures

- Microorganisms and microbiology.
- Survey of microbial life.
- Microbial polymers.
- Cell structure and function: Cell morphology, cell wall of prokaryotes, mechanisms of microbial movement, cell structure, spores.
- Microbial cultures and microbial metabolism.
- Microbial growth.
- Effect of environmental conditions on microbial growth.
- Microbial evolution: The RNA world.
- Microbial systematics.
- New methods of taxonomy.
- The species.
- Principles of microbial taxonomy.
- Taxonomy of bacteria.
- Proteobacteria: *Chromatium*, *Ectothiorhodospira*, *Rhodobacter*, *Rhodospirillum*, *Nitrosomonas* and *Nitrobacter*, *Thiobacillus*, *Ralstonia*, *Methylomonas*, *Methylobacter, Pseudomonas*, Acetic acid bacteria, *Azotobacter, Azomonas,* Enteric bacteria, *Rickettsia*, *Spirillum*, *Bdellovibrio*, *Campylobacter*, *Sphaerotilus*, *Leptothrix*, *Hyphomicrobium*, *Caulobacter*, *Myxococcus*, *Stigmatella*, *Desulfovibrio*, *Desulfobacter*, *Deulfuromonas*.
- Gram (+) bacteria: *Staphylococcus*, Lactic acid bacteria, *Listeria*, *Bacillus*, *Clostridium*.

- *Mycoplasma*, Corynobacteria, Propionic acid bacteria, *Mycobacterium*, *Streptomyces*.
- *Cyanobacteria*, *Chlamydia*, *Verrucomicrobium*, *Bacteroides*, *Flavobacterium*, *Cytophaga*, *Chlorobium*, *Prosthecochloris*, *Chlorochromatium*, *Spirochaeta*, *Deinococcus*, *Chloroflexus*, *Thermomicrobium*, *Thermotoga*, *Thermodesulfobacterium*, *Aquifex*, *Thermocrinus*.
- Taxonomy of Archea: *Halobacterium*, Methane production by methane producing archea: *Methanobacterium*, *Methanocaldococcus*, *Methanosarcina.*
- Taxonomy of eukaryotic microorganisms: Genetics of eukaryotic microorganisms, Protozoa, Mycetes, Algae.
- Control of microbial growth: Antimicrobial agents.
- Microbial pathogenesis-Toxins.
- Biotechnological applications of microorganisms.
- Virology: General principles of viruses, viral structure-virions, quantitative determination of viruses, growth of viruses–attachment and penetration, bacteriophages, animal viruses, retroviruses, viroids and prion proteins.

Recommended reading:

Title: Brock, The Biology of Microorganisms
Author(s): M. T. Madigan, J. M. Martinko, K. S. Bender, D. H. Buckley & D. A. Stahl
Publishing Company: Crete University Press
Place & Year of Publishing: Crete, 2018
ISBN: Not available yet
EUDOXUS code: Not available yet

Title: Microbiology and Microbial Technology
Author(s): G. Aggelis
Publishing Company: Stamoulis Press
Place & Year of Publishing: Athens, 2007
ISBN: 978-960-351-717-7
EUDOXUS code: 22904

Course Notes

Title: Notes of Molecular Microbiology
Author(s): I. Kourkoutas
Place & Year of Publishing: Department of Molecular Biology & Genetics, Democritus University of Thrace, 2010.

Lecturers

1. **I. Kourkoutas**, Associate Professor of Applied Biotechnology.
2. **K. Chlichlia,** Associate Professor of Molecular Immunobiology.

Teaching methods

1. Lectures.
2. E-class.
3. Tutorials.
4. Lectures by invited speakers (invited scientists, invited speakers from the industrial sector, etc).

Assessment methods

1. Mid-term written exams.
2. Final written exams.

LABORATORY COURSE IV

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching credits	ECTS credits
D	Y	0	3	2	5

Course objectives

In this laboratory course, students will get familiarized with the basic principles of cellular physiology and systems anatomy and learn concepts of human homeostatic control through lab practicals and simulation-based learning to get a better understanding of the mechanisms of body function.

Course content

1. Anatomy of Drosophila
2. Muscular system – Motion
3. Circulatory system
4. Digestive system
5. Reproductive system – Birth and Death
6. Neurophysiology of nerve impulses
7. Skeletal muscle physiology
8. Energetics of muscle contraction
9. Blood physiology
10. Cardiac function
11. Renal function
12. Determination of peptic enzymes of mammalian digestive system

Lecturers

Aglaia Pappa, Associate Professor of Molecular Physiology

Maria Alexiou-Chatzaki, Associate Professor of Biology, Systematics and Ecology of organisms

Recommended reading

Title: Introduction of Human Physiology
Author(s): Lauralee Sherwood (Greek translation)
Publishing Company: Academic Publications J. Basdra & Co.
Place & Year of Publishing: Alexandroupolis, 5th edition/2011
ISBN: 978618513027
Eudoxus code: 41959951

Title: Human Physiology: The mechanisms of body function (Greek translation)
Author(s): VanderA., Sherman J., Luciano D.
Publishing Company: Broken Hill Publishers Ltd
Place & Year of Publishing: Athens, 1st Edition/2011
ISBN: 9789604892259
Eudoxus code: 13257031

Title:	Physiology - Laboratory manual
Author(s):	A. Pappa
Publishing Company:	Department of Molecular Biology & Genetics, Democritus University of Thrace
Place & Year of Publishing:	Alexandroupolis, 2016

Course notes

Course lecture notes are available at https://eclass.duth.gr/courses/ALEX01193/

Teaching methods

- Electronic platform (e-class)
- Lab practicals
- Tutorials (laboratory simulations)
- Video projections and critical attendance

Assessment methods

- Lab reports
- Final exams

GENE EXPRESSION AND CELL SIGNALLING

Semester	C/E	Lectures Hours	Practicals	Teaching units	ECTS
D	C	4	0	4	5

Course Objectives

- To understand the fundamental principles of gene expression in eukaryotes and comprehend the multilevel complex regulatory mechanisms.
- To develop a combination of analytical skills and synthesis.
- To realize that the priority is to understand mechanisms and regulatory circuits rather than memorizing details.
- To learn about the basic principles of gene expression regulation of eukaryotic organisms in the context of the dynamic organisation of the structure of the genetic material.

Course contents

1. The structure of genetic material in eukaryotes: The chromosome.
2. The structure and organization of genetic material in nucleosomes.
3. The activation of transcription in eukaryotes.
4. Families and regulation of transcription factors.
5. The regulation of chromatin structure.
6. The molecular base of epigenetic phenomena.
7. The mechanism of RNA splicing.
8. The alternative splicing.

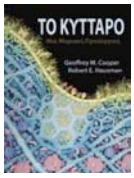
Lecturers

R. Sandaltzopoulos, Professor
A. Galanis, Assistant Professor
E. Paleologou, Assistant Professor

Recommended reading:

Title: Genes VIII (Greek Translation)
Author(s): Lewin
Publishing Company: Akadimaikes Ekdoseis
Place & Year of Publishing: Alexandroupolis 2004
ISBN: 978-960-99895-5-8

Title: : Concepts of Genetics
Author(s): Klug, Cummings,Spencer,Palladino
Publishing Company: Akadimaikes Ekdoseis
Place & Year of Publishing: Alexandroupolis 2015
ISBN: 978-618-5135-03-4



Title: The Cell: A molecular approach

Author(s): Geoffrey M. Cooper & Robert E. Hausman
Publishing Company: Akadimaikes Ekdoseis
Place & Year of Publishing: Alexandroupolis 2011
ISBN: 978-960-99895-8-9

Teaching methods

Lectures, use of e-class, tutorials

Language of instruction

Greek

Assessment methods

End of semester written examination, mid-term written examination

PEDAGOGICS

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS	Credits
D	C	2		1		2

Course objectives

This course attempts an approach of the core terms, conditions and roles linked to Pedagogy.

Course contents

The content of the course is the definition of the field concerning knowledge, basic terminology and concepts involved, research methods of Pedagogy, effective teaching and learning, issues of educational policy, the educational system and its goals, the functions of the school institution, the factors involved in the educational process, the role and the personality of the educator, the institutional framework and interpersonal relationships within the school unit. Students are also expected to acquire basic knowledge and skills of writing a scientific essay, including references, structure, style of writing and its presentation in front of an audience.

Lecturer

Katerina Kedraka, Assistant Professor

Teaching & assessment methods

In the course active learning is used, so students are encouraged to participate during the lessons, through teaching techniques like role playing, working in groups, simulations, discussions etc. Presentations and lectures are used additionally to ensure that all main aspects are discussed.

Assessment is based on written exams at the end of the semester and during examination periods. Since the course is based on active learning, students' participation and interaction, attendance is considered of core importance and for this reason it is included in the final evaluation. Alternatively, essays and research topics could be assigned to students.

Teaching Language

Greek

Recommended Reading

- **Title:** Teaching and Job Planning in BioSciences
- **Authors:** Katerina Kedraka, Christos Gotzaridis
- **Publishing Company:** Academic Publications I. Basdra & Co
- **Year of Publishing:** 2016
- **ISBN**: 9786185135041
- **Type**: Textbook

GENETICS II

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
B’	C	3	0	3	4

PHYSIOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching credits	ECTS credits
D	C	4	0	4	5

Course objectives

The objectives of the course are:

a) To provide a fundamental comprehension of the basic principles of physiology and to recognize that knowledge of cellular and molecular physiology is fundamental to understanding tissue and organ function, as well as integrative systems physiology and disease pathogenesis.

b) To provide an understanding of the basic molecular machinery and signaling cascades responsible for cell communication at the cellular and multi-cellular level.

c) To study and compare differentiated cell types of the body and link them with systemic physiology and specialized function.

d) To understand the basic principles underlining the functions of mammalian cardiovascular, respiratory, renal, digestive and reproductive systems.

e) To comprehend the endocrine regulation of metabolism and development.

Course contents

- Introduction to Physiology - Fundamental principles of Physiology - Movement of molecules through membranes
- Systems of homeostatic control - Feedback systems and local homeostatic responses - Cell communication and mechanisms of regulation of cell function through messenger molecules (receptors -signal cascades)
- Ionic gradients and ion channels -Excitable membranes -Membrane potentials -Creation and transmission of action potentials
- Structure and functional categories of neural cells - Neuroglial cells - Synapses - Neurotransmitters and neuroregulators
- General principles of function of hormonal regulation - Structure, synthesis and transport of hormones - Molecular mechanisms of hormones action -The role of hypothalamus and pituitary on regulatory hormonal systems
- Organization and functions of the nervous system
- General and special senses
- Skeletal muscle cells - Molecular mechanisms of muscle contraction - Energetics of skeletal muscle
- Smooth muscle cells - Molecular mechanisms of muscle contraction - Control of body movement
- Overview of the cardiovascular system – Pressure, volume, flow and resistance, Cardiac muscle and the heart – Stroke volume – Cardiac output

- Circulatory system – Blood flow, blood vessels, blood pressure, distribution of blood to the tissues – Lymphatic system - Control of blood pressure
- Organization of respiratory system – Mechanics of breathing – Gas exchange and transport – Hemoglobin saturation
- Regulation of ventilation
- Overview of kidney function – Filtration – Reabsorption – Secretion – Excretion
- Fluid and electrolyte balance - Regulation of water and ionic homeostasis (Na and K)
- Calcium homeostasis and hormonal regulation
- Function and processes of the digestive system (digestion and absorption) – Regulation of gastrointestinal function
- Homeostatic control of metabolism - Regulation of growth and development
- Reproductive physiology – Sex hormones

Lecturers

A. Pappa, Associate Professor

Recommended reading:

Title: Introduction of Human Physiology
Author(s): Lauralee Sherwood (Greek translation)
Publishing Company: Academic Publications J. Basdra & Co.
Place & Year of Publishing: Alexandroupolis, 5th edition/2011
ISBN: 978618513027
Eudoxus code: 41959951

Title: Human Physiology: The mechanisms of body function

(Greek translation)
Author(s): VanderA., Sherman J., Luciano D.
Publishing Company: Broken Hill Publishers Ltd
Place & Year of Publishing: Athens, 1η έκδ./2011

ISBN: 9789604892259

Course notes

Course lecture notes are available at https://eclass.duth.gr/courses/ALEX01193/

Teaching methods

Lecture course, e-class, laboratory course, mid-term exams for knowledge check.

Language of instruction

Greek

Assessment methods

Students' evaluation is based on their performance on midterm and final exams.

BIOSTATISTICS

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
D'	C	2	1	3	3

Course contents

- Epidemiological Study design – descriptive, analytical and experimental
- Basic experimental designs – clinical trials
- Epidemiological Measures – rate, incidence and prevalence, relative risk, odds ratio
- Reliability and validity of screening and diagnostic tests, ROC analysis
- Sampling – random and non-random sampling methods
- Data summarization – measures of averages and dispersion
- Data Presentation techniques – graphical and tabular
- Normal distribution – properties and applications
- Estimation – standard error, confidence intervals – definition, computation, interpretation and applications
- Basic principles of testing of hypothesis
- Test of significance – t-test, one way anova, repeated measures anova, chi square and non-parametric methods – sample size
- Correlation and regression
- Logistic regression
- Survival analysis
- Software packages – SPSS.

Instructor

G. Trypsianis, Professor

B. Agianian, Assistant Professor

G. Boulougouris, Assistant Professor

Teaching Methods

Lectures, documentaries

Assessment Methods

Written examination at the end of the semester

Language of instruction

Greek

DEVELOPMENTAL BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
E'	C	3	0	3	5

Course Objectives

The primary objective of this course is to introduce the students to modern developmental biology. The course covers general principles of animal development with emphasis on the connection between mechanisms of normal development and disease etiology. Invertebrate and vertebrate model systems are covered, including *C. elegans*, *Drosophila melanogaster*, chick, *Xenopus*, zebrafish, mouse and human. The intimate connection between developmental biology and evolution, is an important theme throughout the course.

Course contents

- Principles of Development.
- Techniques to study animal Development.
- Model organisms.
- Gametogenesis-Fertilization.
- Basic Embryology of *C. elegans*
- Pattern formation I: *C. elegans*.
- Basic Embryology of *D. melanogaster*
- Pattern formation II: *D. melanogaster*
- Basic Embryology of *Xenopus*
- Pattern formation III: *Xenopus*.
- Basic Embryology of chick
- Basic Embryology of mammals
- Pattern formation IV: mouse
- Organogenesis
- The somites and their derivatives.
- Limb development.
- Development of the heart, the kidney and the gonads.

Lecturer (s)

M. Grigoriou, Professor.

G. Skavdis, Associate Professor.

Recommended reading:

Title:	Essential Developmental Biology 3rd ed.
Author:	JMW Slack (translated to Greek)
Publisher	Blackwell Publishing
Place & Year of Publishing:	2014
ISBN:	960-88412-3-2

Additional material

Title: Early development of *D. melanogaster*
Author: G. Skavdis and M. Grigoriou
Place & Year of Publishing: Alexandroupolis

Title: Early development of *C. elegans*
Author: G. Skavdis and M. Grigoriou
Place & Year of Publishing: Alexandroupolis

Course Notes

Title: Developmental Biology Lectures
Author: M. Grigoriou and G. Skavdis
Place & Year of Publishing: Alexandroupolis 2016

Teaching methods

Courses, participatory teaching methods

Language of instruction

Greek study of literature in English

Assessment methods

End of semester written examination

POPULATION & EVOLUTION GENETICS

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
E’	C	3	0	3	5

MOLECULAR IMMUNOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
E'	C	4	0	4	5

Course Objectives

The objectives of the course are:

a) to gain knowledge on the structure and organization of the immune system

b) to understand the basic principles of the immune system's function

c) to study and get insight into the complex mechanisms underlying the immunological responses

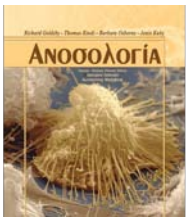
Course Contents

- Overview of the immune system
- Cells and organs of the immune system
- Antigens
- Immunoglobulins: structure and function
- Organization and Expression of immunoglobulin genes
- Antigen-Antibody reactions
- Major Histocompatibility Complex
- Antigen Processing and Presentation
- T Cell Receptor
- T cell development, activation and differentiation
- B cell development, activation and differentiation
- Cytokines
- The complement system
- Cell-mediated effector responses

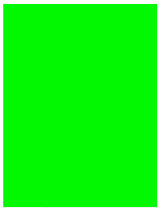
Instructor (s)

Katerina Chlichlia, Associate Professor of Molecular Immunobiology.

Recommended Reading



Title:	IMMUNOLOGY
Authors:	Goldsby R, Kindt T, Osborne B,
company:	Ιατρικές Εκδόσεις Π.Χ. Πασχαλίδη
Place and Year of Publishing:	2007
ISBN:	978-960-399-530-2
EUDOXUS code:	13256416



Title:	Clinical immunobiology: the immune system in health and disease
Authors:	Janeway - Travers
Publishing company:	Ιατρικές Εκδόσεις Π.Χ. Πασχαλίδη
Place and Publishing year:	2002
ISBN:	960-399-101-5
EUDOXUS code:	13256319

Course Notes

Title:	Course notes on Molecular Immunobiology I
Author:	Ass. Prof. Katerina Chlichlia
Place & Year of Publishing:	Alexandroupolis, 2012

Practical Notes

Title:	Molecular Immunobiology – Practical Notes
Author(s):	Ass. Prof. Katerina Chlichlia
Place & Year of Publishing:	Alexandroupolis, 2010

Teaching Methods

Powerpoint presentations, video, participation of students in discussions, presentations on special issues from invited speakers, e-learning platform (e-class), practical training in the laboratory.

Language of instruction

Greek

Assessment Methods

Student's performance is evaluated with tests accompanying.

LABORATORY COURSE V: METHODS IN MOLECULAR BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
E'	C	0	4	2	5

Course Objectives

This course is designed to introduce the students to the process of molecular biology research.
More specifically the objectives of the course are:

- To learn to formulate a hypothesis and design appropriate experiments to test it
- To master fundamental techniques a used in molecular biology studies
- To learn to record and interpret scientific data

Course contents

Students work in groups of 2-3 and participate in a research project in which they use various approaches to study a gene product.

- Transformation of plasmid DNA in *E.coli*.
- Isolation of plasmid DNA - DNA quantitation
- Restriction enzymes/ restriction digests
- DNA electrophoresis
- Expression of recombinant proteins in *E.coli*
- Purification of recombinant proteins from *E. coli*
- Protein quantitation and electrophoresis
- PCR, Real time PCR and primer design
- *In vitro* transcription
- *In situ* hybridization
- Mouse embryo anatomy
- Basic principles of cell culture

Instructors

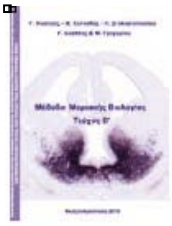
A. Galanis, Assistant Professor
M. Grigoriou, Professor
C. Metallinou, Teaching Assistant
E. Paleologou, Assistant Professor
R. Sandaltzopoulos, Professor
G. Skavdis, Associate Professor
C. Stanelloudi, Teaching Assistant

Recommended reading:

Title:	Basic Laboratory Methods for Biotechnology
Author:	Lisa Seidman (translated to Greek)
Publisher	Academic Publications
Place & Year of Publishing:	2009
ISBN:	978-960-88412-9-1

Additional material

Title:	Methods in Molecular Biology-A Laboratory manual (A)
Author:	Galanis A., Paleologou K & R. Sandaltzopoulos
Place & Year of Publishing:	Alexandroupolis 2015



Title:	Methods in Molecular Biology-A Laboratory manual (B)
Author:	Fysekis I., Chytoudis C., Stylianopoulou E, G. Skavdis and M. Grigoriou
Place & Year of Publishing:	Alexandroupolis 2015

Teaching methods

Practicals, small group work, guided

Language of instruction

Greek

Assessment methods

End of semester written examination, Assessement of the laboratory notebook.

BIOINFORMATICS

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
E'	C	4	1	5	5

Course Objectives

Bioinformatics: data bases, algorithms and and tools.

Course Contents

Lectures

Applications of computing machines to biology, definitions - Bioinformatics as a tool and as a research field - Algorithms, programs, the importance of the network (the client-server computing model) - Data bases: structure and function, some very well known data bases - Pairwise sequence alignment, rigorous methods: Needleman & Wunsch, Smith & Waterman – Substitution matrices (PAM, BLOSUM) - Hereustic algorithms: BLAST, FASTA - Multiple sequence alignment: problems, algorithms, applications, the program CLUSTAL - Phylogenetic trees: definitions, problems, algorithms, programs, the UPGMA and Neighbor
Joining algorithms Protein motifs, fingerprints, profiles, their data bases, and their tools - Expressed Sequence Tags: data bases, methods, problems, applications - Functional genomics: microarrays (twochannel), data reduction and analysis - Applications to structural biology: secondary structure prediction, prediction of transmembrane regions, homology modeling, threading, abinitio structure prediction (empirical force fields, molecular dynamics simulations).

Practicals

1st ASSIGNMENT, 5 hours
"Data bases: identification and characterisation of a protein based on incomplete data"

2nd ASSIGNMENT, 5 hours
"Using sequence alignments, motifs and phylogenetic reletionships to identify conserved regions and amino acids in a protein sequence"

3rd ASSIGNMENT, 5 hours
"Applications to structural biology: sequence-structure-function relationships"

Instructor

Nicholas M. Glykos, Associate Professor (**Structural and Computational Biology**).

Recommended Reading.

Title:	Bioinformatics
Authors:	BAXEVANIS & OVELLETTE
Edition:	2004
ISBN:	978-960-394-222-1
EUDOXUS code:	41233

Title:	An introduction to Bioinformatics Algorithms
Authors:	NEIL C. JONES, PAVEL A. PEVZNER
Edition:	2010
ISBN:	978-960-461-388-5
EUDOXUS code:	21522

Title:	Bioinformatics
Authors:	KOSSIDA, S.
Edition:	2009
ISBN:	978-960-9309-60-8
EUDOXUS code:	5110

Teaching Methods

Lectures, three assignments.

Assessment Methods

Assignments 30%, Exams (multiple choice), 70%

REGULATION OF CELL FUNCTION

Semester	C/E	Lectures Hours	Practicals	Teaching units	ECTS
F	C	4	0	4	4

Course Objectives

- To enhance knowledge and understanding of the molecular mechanisms of signal transduction.
- To enhance knowledge and understanding of the regulation of cell cycle and the basic aspects of carcinogenesis.
- DNA damage and repair mechanisms

Course contents

1. G-proteins and protein kinases in signal transduction
2. MAP kinase signaling pathways
3. Specificity of MAP kinase signaling pathways
4. cAMP, JAK-STAT, SMAD signalling pathways
5. Cell cycle regulation
6. Apoptotic pathways
7. The Biology of Cancer - Introduction
8. Cellular Oncogenes and Tumor Suppressor Genes
9. Types of DNA damage
10. DNA repair
11. Repair of double strand breaks
12. Homologous recombination
13. RNA interference

Lecturers

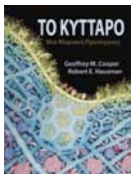
A. Galanis, Assistant Professor

R. Sandaltzopoulos, Professor

Recommended reading:

Title: Genes VIII (Greek Translation)
Author(s): Lewin
Publishing Company: Akadimaikes Ekdoseis
Place & Year of Publishing: Alexandroupolis 2004
ISBN: 978-960-99895-5-8

Title: : Concepts of Genetics
Author(s): Klug, Cummings,Spencer,Palladino
Publishing Company: Akadimaikes Ekdoseis
Place & Year of Publishing: Alexandroupolis 2015
ISBN: 978-618-5135-03-4



Title: The Cell: A molecular approach
Author(s): Geoffrey M. Cooper & Robert E. Hausman
Publishing Company: Akadimaikes Ekdoseis
Place & Year of Publishing: Alexandroupolis 2011
ISBN: 978-960-99895-8-9

Teaching methods

Lectures, use of e-class, tutorials

Language of instruction

Greek

Assessment methods

End of semester written examination, mid-term written examination

INTRODUCTION TO BIOMOLECULAR STRUCTURE

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
F	C	3	0	3	4

APPLIED BIOTECHNOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
F	C	3	2	4	4

Course objectives

The aim of the course is the consolidation of the basic principles of biotechnology. Nowadays, biotechnology is considered as cutting-edge technology and is involved in almost all processes aiming at improvement of human life, such as improvement of food products, production of novel medicines, protection of environment, improvement of agriculture, etc. In an effort to cover the students' needs for up-to-date education, the course is designed to combine traditional and modern knowledge on enzyme and microbial technology, offering a wide range of information.

Course contents

Lectures

- Introduction to enzyme and microbial biotechnology.
- Enzyme purification: Down Stream Processing, Chromatography (Gel filtration chromatography, Ion-exchange chromatography, Affinity chromatography), Scale-up, Product standardization.
- Enzyme kinetics: Enzyme kinetics, Inhibition kinetics, Effect of temperature and pH on the enzymatic reactions.
- Immobilized biocatalysts: Enzyme and cell immobilization techniques, Advantages of immobilization, Prerequisites of immobilization supports, Effect of immobilization on molecular and kinetic characteristics, Effect of immobilization on cell viability and metabolic activity.
- Bioreactors: Types of Bioreactors (Stirred tank bioreactor, Contiunous stirred tank bioreactor, Tower bioreaactor, Fluidized bed bioreactor), Bioreactors kinetics, Aerobic fermentation systems, The problem of foaming, Sterilization methods.
- Biotechnological applications in food industry: In Wine-making, brewing, baking, cheese-making, edible oils, production of fruit products.
- Bioremediation of agro-industrial wastes for production of added value: Production of potable alcohol using agro-industrial wastes as raw material, Biotechnological applications in starch hydrolysis, Biotechnological applications in hydrolysis of cellulosic materials, Exploitation of cheese whey, Production of animal feed.
- Applications of biotechnology in the production of protein enriched products: Single cell protein production, Production of aminoacids.

- Biological treatment: Aerobic and anaerobic treatment. Biotechnological applications in papermill, and tannage.
- Production of sugars and sugar polymers.
- Analytical applications: Biosensors, Homogenic and heterogenic ELISA.
- Cure treatments: Genetic abnormalities, Cancer therapy, Heart-related problems.
- Pharmaceutical applications: Production of antibiotics, Production of insulin.
- Introduction to application of HAACP in the industrial sector.

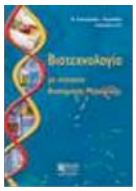
Lecturers

I. Kourkoutas, Associate Proffessor of Applied Biotechnology.

Recommended reading:

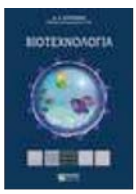
Title: Biotechnology of enzymes
Author(s): I. Klonis
Publishing Company: Crete University Press
Place & Year of Publishing: Crete, 2010
ISBN: 978-960-524-304-3
EUDOXUS code: 356

Title: Food Biotechnology
Author(s): T. Roukas
Publishing Company: S. Giachoudis & SIA O.E.
Place & Year of Publishing: Thessoliniki, 2009
ISBN: 978-960-6700-30-9
EUDOXUS code: 8921



Title: Biotechnology with biochemical engineering elements
Author(s): M. Liakopoulou-Kyriakidou
Publishing Company: Ziti Pelagia &SIA O.E.
Place & Year of Publishing: Thessaloniki, 2004
ISBN: 960-431-900-0
EUDOXUS code: 11134

Title: Microbiology and Microbial Technology
Author(s): G. Aggelis
Publishing Company: Stamoulis Press
Place & Year of Publishing: Athens, 2007
ISBN: 978-960-351-717-7
EUDOXUS code: 22904



Title: Biotechnology
Author(s): D.A. Kyriakidis
Publishing Company: Ziti Pelagia &SIA O.E.
Place & Year of Publishing: Thessaloniki, 2000
ISBN: 960-431-595-1
EUDOXUS code: 11133

Course Notes

Title: Notes of Applied Biotechnology
Author(s): I. Kourkoutas
Place & Year of Publishing: Department of Molecular Biology & Genetics, Democritus University of Thrace, 2010.

Teaching methods

1. Lectures.
2. E-class.
3. Tutorials.
4. Lectures by invited speakers (invited scientists, invited scientists by the industrial sector, etc).

Assessment methods

1. Mid-term written exams.
2. Final written exams.

GENOMICS

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
6	C	3	1	4	4

Course objectives

The course introduces students to a cutting-edge discipline with major impact on human health, biotechnology, ecology and environmental management, evolutionary biology, etc. Students learn how to access and use genomic databases, and discuss the ethical, legal and social implications of genomics.

Course contents

Lectures

1) The history of genomics - Major advancements and applications
   (S. Boukouvala, 3 hours)
2) Genetic and physical mapping of genomes
   (S. Boukouvala, 3 hours)
3) Genomic data mining from electronic databases
   (S. Boukouvala, 3 hours)
4) Genome sequencing technologies
   (S. Boukouvala, 3 hours)
5) Genotyping technologies for genome-wide analysis
   (S. Boukouvala, 3 hours)
6) Transcriptomics and other "omics" (proteomics, metabolomics etc.)
   (S. Boukouvala, 3 hours)
7) The Human Genome Project and subsequent advancements in human genomics (dbSNP, dbVar, dbGaP, HapMap, 1000 Genome project, ENCODE etc.)
   (S. Boukouvala, 3 hours)
8) Oncogenomics and the Cancer Genome Project
   (I. Maroulakou, 3 hours)
9) Functional genomics and epigenomics
   (I. Maroulakou, 3 hours)
10) Pharmacogenomics, Toxicogenomics and Nutrigenomics
    (S. Boukouvala, 3 hours)
11) Microbial genomics - Pathogenomics and Ecogenomics
    (S. Boukouvala, 3 hours)
12) Comparative genomics
    (S. Boukouvala, 3 hours)

13) Ethical, legal and social implications of genomics
(I. Maroulakou, 3 hours)

Practicals

1. ***The history of genomics***: Seminar class, 3 hours, in groups of 24 students (S. Boukouvala)
2. ***Pharmacogenomics*****:** Laboratory class, 3 hours, in groups of 24 students (S. Boukouvala)
3. ***Comparative genomics*****:** Computer class, 3 hours, in groups of 24 students (S. Boukouvala)

Lecturers

Sotiria Boukouvala, Associate Professor in Molecular Genetics

Ioanna Maroulakou, Professor in Genetics

Teaching & assessment methods

Lectures and exercises; Study of Nobel laureate biographies, articles and databases; Preparation of oral presentations, reports and essays.

End of semester written examination contributes 85% of the final grade. Essays, laboratory reports and presentations contribute 15% of the final grade.

CAREER DEVELOPMENT OF BIOSCIENTISTS

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
G	C	2		1	2

Course objectives

During the course subjects as the career development and the job profile of the Bioscientists in modern working environments are discussed, and in order to facilitate their job entry, students are taught how to make plans for their future studies and/or career, including acquiring skills on CV writing or interviews.

Course contents

A. Issues of career development and management in the current working environment

B. Personal career planning – Personality traits (Personal Characteristics) – Decision making skills – Setting an Action plan for managing career development on a realistic basis

C. Practical skills for job searching (Conducting a CV /Getting prepared for a Job Interview)

Lecturer

Katerina Kedraka, Assistant Professor

Teaching & assessment methods

In the course active learning is used, so students are encouraged to participate during the lessons, through teaching techniques like role playing, working in groups, simulations, discussions etc. Presentations and lectures are used additionally to ensure that all main aspects are discussed.

Assessment is based on written exams at the end of the semester and during examination periods. Since the course is based on active learning, students' participation and interaction, attendance is considered of core importance and for this reason it is included in the final evaluation. Alternatively, essays and research topics could be assigned to students.

Teaching Language

Greek

Recommended Reading

- **Title:** Teaching and Job Planning in BioSciences
- **Authors:** Katerina Kedraka, Christos Gotzaridis
- **Publishing Company:** Academic Publications I. Basdra & Co
- **Year of Publishing:** 2016
- **ISBN**: 9786185135041
- **EUDOXUS code**: 59396334
- **Type**: Textbook

LABORATORY COURSE VI: IMMUNOBIOLOGY, PROTEIN STRUCTURE & APPLIED BIOTECHNOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
F	C	0	4	2	5

Course objectives

The 6th Laboratory practical course aims at understanding of the main principles of Molecular Immunobiology, the Structure of Biomolecules and Biotechnology. For this purpose 5 laboratory exercises (L) will be performed, which include: morphological examination of blood leukocytes and isolation of mononuclear cells, ELISA immunoassay and immunofluorescence, single cell protein production by aerobic fermentation, yeast cell immobilization on natural supports, fermentation technology with immobilized cells. The lab includes in addition 5 computational exercises (C) on protein structure and function as well as in flow cytometry. In addition, visits to industrial units are carried out.

Course contents

1. Morphological examination of blood leukocytes. Isolation of mononuclear cells from peripheral blood (L)
2. Immunoassay ELISA και Immunofluorescence (double practical course) (L)
3. Introduction into flow cytometry – Analysis of results with computational software (C)
4. Molecular graphics (C)
5. Introduction to protein chemistry and structure (C)
6. Secondary structure of proteins (C)
7. Super-secondary structure of proteins (C)
8. Single cell protein production: Aerobic fermentation of molasses (L)
9. Yeast immobilization on natural supports (L)
10. Fermentation technology with immobilized yeast (L)
11. Visits to industrial units

Recommended Reading

Title: Microbiology and Microbial Technolog
Author(s): G. Aggelis
Publishing Company: Stamoulis Press
Place & Year of Publishing: Athens, 2007
ISBN: 978-960-351-717-7
EUDOXUS code: 22904

Course Notes

Title: Applied Biotechnology, Practical course Handbook

Author(s): I. Kourkoutas

Place & Year of Publishing: Department of Molecular Biology & Genetics, Democritus University of Thrace, 2010.

Title: Immunobiology Practical course Handbook

Author(s): Katerina Chlichlia

Place & Year of Publishing: Department of Molecular Biology & Genetics, Democritus University of Thrace, 2016.

Lecturers

1. K. Chlichlia, Associate Professor of Molecular Immunobiology

2. M. Agianian, Assistant Professor of Molecular Biology and Macromolecular Structure (on leave)

3. Y. Kourkoutas, Associate Professor of Applied Biotechnology

Teaching methods

1. E-class.
2. Laboratory exercises.
3. Tutorials and computer exercises.
4. Visits to industrial units.
5.

Assessment methods

1.Laboratory assessments and questioners/tests.

2. Final written exams.

ADVANCED MOLECULAR BIOLOGY TECHNIQUES

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
H'	C	3	0	3	5

Course Objectives

An advanced course of molecular biology methods. The concept and aplications of several techniques is described using a case study approach. Emphasis is given on the applications in Health and Agriculture.

Course contents

Module I: Library screening.

1. Screening of libraries with DNA/ RNA probes.
2. Screening of libraries using PCR.
3. Expression screening.

Module II: In vitro mutagenesis.

1. Site specific mutagenesis.
2. *Random in vitro* mutagenesis.

Module III: Expression of proteins in E. coli.

1. pBAD.
2. pET.
3. pLEX.
4. Purification of proteins expressed in *E. coli*.

Module IV: Cell lines: culture, transfection and protein expression in eukaryotic cells.

1. Cell lines.
2. Transfection of animal cells.
3. Infection of eukaryotic cells using retroviral vectors.
4. Selection markers.

Module V: Genetically modified animals.

1. Transgenic animals
2. Gene targeting.

Module VI: Genetically modified plants

1. Generation of genetically modified plants using Ti.
2. Generation of genetically modified plants using viruses.
3. Generation of genetically modified plants by physical methods.
4. Control of gene expression in plants.
5. Marketing genetically modified plants.

Module VII Microarrays και RNAi.

1. Microarrays
2. RNA interference (RNAi).

Module VIII: Biomedical Applications of Molecular Biology Methods.

1. Nucleic Acid sequences as diagnostic tools.

2. Recombinat proteins as drugs.
3. Animal models of disease.
4. Gene Therapy.
5. Therapeutical cloning.
6. Vaccines.
7. Forensics.

Instructors

Georgios Skavdis, Associate Professor of Molecular Biology.
Maria Grigoriou, Professor of Molecular – Developmental Biology

Recommended Reading

Tile:	Recombinant DNA
Authors:	Watson D.A. (translated to Greek)
Publishing Company:	Academic Publications
Place & Year of Publishing:	1st 2010
ISBN:	978-960-88412-5-3
EUDOXUS code:	2625.

Course Notes

Title:	Introduction to Molecular Biology Techniques
Authors:	Georgios Skavdis
Place & Year of Publishing:	Alexandroupolis, 2016

Language of instruction

Greek

Teaching methods

Lectures, Participatory method of teaching.

Assessment methods

Comprehensive final exam.

APPLICATIONS OF MOLECULAR BIOLOGY IN MEDICAL SCIENCES

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
7	C	3	1	4	5

Course objectives

a) To introduce students to the principles and methodologies of applied research in biotechnological fields associated with human health.

b) To describe the link between basic research, industrial R&D and clinical application.

c) To introduce concepts like innovation, protection of intellectual property, resource management and quality management in applied research.

d) To present the current regulatory framework encompassing the development of drugs and IVD devices.

e) To describe major technological breakthroughs and current career prospects in the field.

Course contents

Lectures

Part I: *From basic to applied research*

- The history and progress of applied biomedical research (3 hours).
- Innovation and intellectual property (3 hours).
- Funding and managing of start-up businesses in biotechnology (3 hours).

Part II: *Applications of modern biosciences in molecular diagnostics*

- The regulatory framework for *in vitro* diagnostic devices in the EU and the USA (3 hours).
- Quality management in the industrial setting – Laboratory safety principles (3 hours).
- Modern technologies for nucleic acid detection and their diagnostic applications in clinical microbiology, preventive and predictive population genetic screening, preimplantation and prenatal genetic diagnosis, etc. (9 hours).

Part III: *Applications of modern biosciences in therapeutics*

- The regulatory framework for drug development in the USA and the EU (3 hours).
- From drug discovery to drug development – Clinical trials (3 hours).
- The contribution of modern biosciences to the development and clinical evaluation of new therapies: Target identification and validation, lead discovery and optimization, pre-clinical and clinical development; pharmacogenetics and pharmacogenomics; targeted cancer therapies; recombinant proteins and monoclonal antibodies as therapeutic agents; therapeutic applications of

antisense nucleic acids, ribozymes and RNA interference; recombinant vaccines and DNA vaccines; gene therapy; targeted drug delivery (9-12 hours).

Practicals

1. ***Patents*** (3 hours, in groups of 24 students): The students read, present and discuss patents describing important biomedical innovations.
2. ***Organizations involved in applied biomedical research*** (3 hours, in groups of 24 students): The students search the internet for information regarding biotechnology and pharmaceutical companies, science parks, biotechnology research institutes, regulatory organizations, patent offices, etc. They present and discuss their results in the class.
3. ***Quality management systems*** (3 hours, in groups of 24 students): The students assume that they are members of an industrial R&D project team, undertaking the development of an innovative technology for *in vitro* genetic diagnosis. The instructor guides them through the steps leading from user need evaluation and design input, to new product verification and validation, in compliance with standard quality management system requirements. The students then write an essay, describing their hypothetical work and results.
4. ***Targeted therapies*** (selected academic years): The students assume that they are members of an industrial R&D project team undertaking the validation of novel therapeutic targets with the purpose of developing novel anti-cancer therapies. They access electronic databases to retrieve essential information concerning the disease and the pharmaceutical target of interest, but also to assess IP issues and current competition in the field. They present their results and conclusions in a written report.
5. ***Molecular diagnostics*** (selected academic years): The students assume that they work in a clinical laboratory performing routine genetic diagnosis. They familiarize with an innovative technology and learn about the principles and ethics of modern diagnostics. They subsequently describe their methodology, results and conclusions in a written report.

Lecturer

Sotiria Boukouvala, Associate Professor in Molecular Genetics

Teaching & assessment methods

Lectures and exercises; Study of patents, articles and databases; Preparation of oral presentations, reports and essays.

End of semester written examination contributes 85% of the final grade. Essays, laboratory reports and presentations contribute 15% of the final grade.

MOLECULAR NEUROBIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
G'	C	3	0	3	4

Course Oblectives

The primary objective of this course is to provide a basic but thorough understanding of modern Neurobiology. The course covers experimental work on a wide range of invertebrate and vertebrate model systems. More specifically the goals of the course are:

1) to impart fundamental knowledge of contemporary Molecular Neurobiology

2) to convey an understanding of the molecular basis of various diseases of the Nervous System.

Course contents:

- The Molecular and Cellular Biology of the Neuron.
- Molecular and cellular mechanisms regulating synaptic transmission.
- Induction of the nervous system.
- Birth and survival of neuronal cells.
- Axon formation and guidance.
- Synapse formation - Network formation.
- The molecular Biology of olfaction (Mammals/*Drosophila*).
- Genes and behavior.
- Language and the aphasias.
- Molecular mechanisms of learning and memory
- Schizophrenia
- Ageing of the nervous system –Alzheimer's disease.

Instructors

Maria Grigoriou, Professor

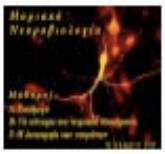
Ekaterini Paleologou, Assistant Professor

Recommended reading

Title: *Principles of Neural Science*
Authors: Kandel, Schwartz and Jessell (translated to Greek)
Publishing Company: Paschalidis Ed
Place & Year of Publishing: 1st ed./200 4
ISBN: 9603992135

Title:	*Essentials of Neural Science and Behavior*
Author(s):	Kandel, Schwartz and Jessell (translated to Greek)
Publishing Company:	Crete University Press
Place & Year of Publishing:	1st ed./2009
ISBN:	978-960-524-075-2
EUDOXUS code:	467

Course Notes



Title:	Molecular Neurobiology Course Notes
Authors:	Maria Grigoriou – A. Paleologou
Place & Year of Publishing:	Alexandroupolis, 2016

Teaching methods

Courses / Group discussions, Participatory methods

Assessment methods

Comprehensive final exam, reports, and oral presentations.

Language of instruction

Greek.

PROTEOMICS

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
7	C	3	1	4	5

DESCRIPTION OF OPTIONAL MODULES

PLANT MOLECULAR BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
G'	E	2	0	2	3

Course Oblectives

The objective of this course is to provide a basic understanding of modern molecular plant biology.

Course Contents

- Plant Model Organisms (*Zea mays* & *Arabidopsis thaliana*)
- *Agrobacterium tumefaciens* (plant- *Agrobacterium* interactions, *vir* genes, reference genes)
- The plant genome
- Plant cell cycle
- Plant transposable elements
- Gene regulation in the plants
- Signaling pathways in the plants
- Plant hormones and defense
- Plant development
- Generation of genetically modified plants

Recommended reading

Title:	Αναπτυξιακή Μοριακή Βιολογία Φυτών (Plant Developmental Biology)
Author(s):	P. Charalampidis (Editor)
Publishing Company:	EMBRYO Ed
Place & Year of Publishing:	2009
ISBN:	978-960-8002-46-3
EUDOXUS code:	7783

Teaching methods

Lectures, seminars, e-class

Assessment methods

Written examination

Language of instruction:

Greek

PRINCIPLES OF LABORATORY ANIMAL MANAGEMENT

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
G'	E	2	0	2	3

Course Objectives

The objectives of the course are:

a) To introduce the student to the basic principles of Laboratory Animal Science

b) To provide the student with general information on laboratory animal management

c) To provide the student with species-specific information regarding the biology, husbandry, anesthesia, euthanasia and non-surgical experimental procedures of the most commonly used laboratory animal species.

Course Contents

Section 1

1. The use of animals in biomedical research
2. Ethics in the use of animals for research purposes
3. Alternative to the use of animals
4. Legislation
5. Basic principles of laboratory animal husbandry
6. Administration of drugs and other substances
7. Collection of body fluids
8. Anesthesia
9. Recognition of pain – analgesia
10. Euthanasia
11. Health monitoring and control
12. Methodology of examination
13. Zoonoses

Section 2

1. Rodents
   a. Mouse
   b. Rat
   c. Gerbil
   d. Hamster
   e. Guinea pig
2. Lagomorphs
   a. Rabbit
3. Carnivores
   a. Dog
   b. Cat
4. Ungulates
   a. Pig – minpig

Instructor

Petros Ypsilantis, Associate Professor of Experimental Surgery, School of Medicine, Democritus University of Thrace.

Recommended Reading

Title:	Αρχες διαχείρισης ζώων εργαστηρίου
Principles of Laboratory Animal Management	
Author(s):	P. Ypsilantis
Publishing Company:	Rotonda
Place & Year of Publishing:	Thessaloniki, 2011
ISBN:	978-960-6894-20-6

Teaching Methods

Lectures, Power Point presentations, videos, demonstration of techniques on live animals with the students' participation

Language of instruction

Greek

Assessment Methods

Written examinations.

HISTOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
D'	E	2	0	2	3

Course Objectives

The objectives of the course are:

The aim of Histology has to do with the biological material's study and the various ways that the distinct elements of which are structurally and functionally jointed. In the course introduction, is made mention of the cell's structure and function as well as in the cell division. Afterwards, the basic tissue types (connective tissue, epithelial tissue, muscular tissue and neural tissue) are analyzed. In the last part, the course focused in the following systems: circulatory, immune, respiratory, central neural system, male and female reproductive system, skin, gastrointestinal, liver, pancreas and endocrine glands.

Course Contents

- Gross anatomy and special techniques in Histology (Histochemistry, Cytochemistry, Immunohistochemistry and others Molecular techniques).
- Cell.
- Epithelial tissue.
- Connective tissue.
- Neural tissue.
- Muscular tissue.
- Cardiovascular system.
- Gastrointestinal tract.
- Respiratory System.
- Skin
- Female and Male Reproductive system.
- Placenta.
- Congenital diseases.

Instructor

Maria Lambropoulou, Associate Professor of Histology-Embryology

Recommended Reading

Title:	HISTOLOGY
Author(s):	TALLITSCH R. & GUASTAFERI R. (Greek Edition)
Publishing Company:	"ROTONTA"
Place & Year of Publishing:	THESSALONIKI 2011
ISBN:	978-960-6894-28-2
EUDOXUS code:	7950625

Course Notes

Title: HISTOLOGY NOTES
Author: Lambropoulou Maria
Place & Year of Publishing: DUTH

Teaching Methods

Lectures and group discussions.

Language of instruction

Greek

Assessment Methods

Final written exams.

STEM CELL AND REGENERATIVE BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
F'	E	2	0	2	3

Course Objectives

This advanced theoretical course is open to students interested in the area of stem cell biology and regenerative biology. The main objective of this course is to introduce the students to the basics of regenerative Biology, stem cell biology and the medical applications of cell therapy. Students are also introduced to key technologies utilized in stem cell research. The course also covers key concepts in translational research from the laboratory to the clinic.

Course contents

- Regenerative Biology.
- Introduction to Stem cell Biology.
- The Molecular basis of pluripotency.
- Stem cell niche.
- Isolation, culture and differentiation of embryonic stem cells and iPS cells.
- Adult stem cells.
- Stem Cell-Based Tissue Regeneration.
- Cancer Stem cells
- Stem cells and therapeutics.
- Gene therapy and stem cells.
- Ethical/legal issues associated with stem cell biology and regenerative medicine.

Instructor

Maria Grigoriou, Professor of Molecular Biology-Developmental Biology

Recommended reading:

Title: ΒΙΟΛΟΓΙΑ ΒΛΑΣΤΟΚΥΤΤΑΡΩΝ
(Stem cell Biology)
Authors: Georgatos, Kouklis, Lazarides and Melidoni
Edition: 1st 2008
ISBN: 978-960-89692-5-4
EUDOXUS code: 2519

Research papers.

Course Notes

Title: Stem cell and Regenerative Biology"
Authors: Maria Grigoriou
Edition: Alexandroupolis, 2016

Language of instruction

Greek

Teaching methods

Active learning method. Students work in small groups engaged in hands-on classroom activities. In every lesson an introduction of the basic concepts by the instructor is followed by the analysis of primary literature focusing on papers published by one group with significant contribution in the field. Students work in the class in small groups that analyse the experiments, explain the results, formulate hypotheses and propose further experiments.

Assessment methods

Comprehensive final exam and/or oral or written assessemnts in class.

BEHAVIORAL BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
F'	E	2	0	2	3

Course Objectives

An introductory course to Behavioral Biology. Emphasis is given on the design of experimental approaches.

Course contents:

I. Introduction to Behavioral Biology.
II. Altrouistic behavior.
III. Ethology – Nature / Nurture Controversy.
IV. Game Theory.
V. Sexual behavior of *Drosophila melanogaster*.
VI: Aggresive behavior

Instructor

George Skavdis, Associate Professor of Molecular Biology

Recommended reading

Title: Behavioral Biology- Course Notes
Author: George Skavdis
Edition: Alexandroupolis, 2015

Review papers and book chapters.

Teaching methods

Courses/Group discussions.

Assessment methods

Comprehensive final exam.

Language of instruction

Greek.

ADVANCED THEMES OF COMPUTATIONAL BIOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
F'	E	2	0	2	3

Course objectives

Computational Structural Biology : from crystallography and Fourier transforms, to energy minimization and molecular dynamics simulations.

Course contents

A non-mathematical introduction to crystallography : waves, crystals, scattering, diffraction, the phase problem, the crystallographic experiment, production of X-rays, interaction between matter and X-rays, X-ray detectors, phase determination: an example, electron density maps, resolution.

Introduction to computational crystallography: scattering of electromagnetic radiation from an arbitrary (non-periodic) objects, introduction to Fourier transformations, scattering of electromagnetic radiation from periodic objects: the structure factor, the convolution theorem and applications, the Patterson function, methods for solving the phase problem (MIR, MAD, molecular replacement, direct methods), optimization. The problem of protein folding.

Lecturers

Nicholas M. Glykos, Associate Professor (Structural and Computational Biology)

Teaching & assessment methods

Lectures, one practical exercise.

Written exam (multiple choice).

PHARMACOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching credits	ECTS credits
F	E	2	0	2	3

Course objectives

The objectives of the course are:

a) To describe and define the basic concepts in Pharmacology.

b) To provide a fundamental understanding of the molecular mechanisms and the principles of drug action.

d) To describe the molecular mechanisms of drugs acting on the autonomous nervous system, central nervous system, and cardiovascular system.

e) To outline the basic principles of chemotherapy.

f) To identify novel molecular targets for drug development.

Course contents

- Introduction to Pharmacology -Principles of Pharmacology
- Pharmacokinetics (Administration, absorption, metabolism and excretion of drugs)
- Pharmacodynamics (Mechanisms of drug action, drug receptor interactions)
- Pharmacogenetics - Pharmacogenomics
- Autonomic and Neuromuscular Pharmacology
- Drugs that act on the Central Nervous System
- Cardiovascular Pharmacology
- Principals of Chemotherapy
- Microbial Chemotherapy
- Cancer Chemotherapy
- Drug Development: Preclinical research and clinical trials

Lecturers

A. Pappa, Associate Professor

Recommended reading:

Title: Pharmacology (Greek translation)
Author(s): K. Whalen, R. A. Harvey
Publishing Company: Parisianos A.E.
Place & Year of Publishing: Athens, 6th edition/2015
ISBN: 9789605830854

Title:	Pharmacology (Greek translation)
Author(s):	Rang H.P., Dale M.M., Ritter J.M., Moore P.K
Publishing Company:	Parisianos A.E.
Place & Year of Publishing:	Athens, 5th edition/2007
ISBN:	978-960-394-429-4

Course notes

Course lecture notes are available at https://eclass.duth.gr/eclass/courses/ALEX01132/

Teaching methods

Lecture course, e-class, guided literature research assignments

Language of instruction

Greek

Assessment methods

Students' evaluation is based on their performance on written and oral assignments and final exams.

MECHANISMS OF ONCOGENESIS

Semester	C/E	Lectures Hours	Practicals	Teaching units	ECTS
G	E	2	0	2	3

Course Objectives

The objectives of the course are: To enhance knowledge and understanding of the molecular mechanisms of cancer initiation and progression and to present current strategies in cancer therapy.

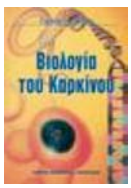
Course contents

1. Introduction – Cancer Epidemiology
2. Cellular Oncogenes and Tumor Suppressor Genes
3. Cell Cycle deregulation and Cancer
4. Hypoxia – Angiogenesis
5. Metastasis
6. Oxidative stress and Cancer
7. Rational Treatment of Cancer
8. Molecular Diagnosis
9. Gene microarrays and Cancer
10. Molecular Treatment

Lecturers

A. Galanis, Assistant Professor

Recommended reading



Title: Cancer Biology
Author(s): Kitraki, Trougkos
Publishing Company: Pasxalidis
Place & Year of Publishing: Athina 2006
ISBN: 9789603994046

Title: Recombinant DNA
Author(s): J.D. Watson
Publishing Company: Akadimaikes Ekdosis
Place & Year of Publishing: Alexandroupolis 2006
ISBN: 9789608841253

Teaching methods

Lectures, use of e-class, tutorials

Language of instruction

Greek

Assessment methods

End of semester written examination

ADULT EDUCATION

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS	Credits
G	E	1	1	2		2

Course objectives

The objective of this course is to introduce students to the issues concerning the field of Adult Education, its main theories, practices and tendencies, within the spectrum of planning, implementing and evaluating a seminar/ educational program addressed to adults.

Course Contents

The course includes: the definition of the field of Adult Education and a brief report of its history in Greece - educational institutions, introduction to the basic concepts, principles and methods of Adult Education with special focus on the Transformative Learning Theory, on the Open and Distance learning, on the use of techniques encouraging the energetic participation of the students, as well as, of assessment methods. In the course a whole thematic unit is dedicated to "the Adults' Educator as a Researcher", referring to the basic principles of the qualitative research approach.

Lecturer

Katerina Kedraka, Assistant Professor

Recommended Reading

1st Title: Adult Educators in Greece. Their professional development

Author: Katerina Kedraka

Publishing Company: Kyrakidis Publ.

Place & Year of Publishing: Thessaloniki, 2017

ISBN: 978-960-599-198-2

EUDOXUS code: 68407476

2nd Title: PLANNING EDUCATIONAL PROGRAMS. Practical Guide for Beginners Adult Trainers

Author: Katerina Kedraka & Niki Phillips

Publishing Company: Kyrakidis Publ.

Place & Year of Publishing: Thessaloniki, 2017

ISBN: 978-960-599-199-9

EUDOXUS code: 68407482

Teaching methods

In the course active learning is used, so students are encouraged to participate during the lessons, through teaching techniques like role playing, working in groups, simulations, discussions etc. Presentations and lectures are used additionally to ensure that all main aspects are discussed. The methodology used will enable students to carry out, as individuals or in small groups, small-size research projects involving the techniques of interview or/and observation and to present their research outcomes during a plenary session in class.

Teaching Language

Greek

Assessment methods

Assessment is based on the presentation of essays and research topics assigned to students. Since the course is based on active learning, students' participation and interaction, attendance is considered of core importance and for this reason it is taken into consideration for the final evaluation. Alternatively, written exams at the end of the semester and during examination periods could take place.

INTRODUCTION TO BIOSCIENCE ENTERPRISE

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
6	E	2	0	2	3

Course objectives

a) To introduce final-year students to entrepreneurial ventures involving bioscientists (e.g. in the biotechnology and pharmaceutical industries, healthcare service providers, etc.) and to inspire them to pursue a career in those sectors.

b) To describe the complex regulatory framework encompassing entrepreneurial activities in biosciences and present common routes for the development of technology and innovation in biotechnology.

c) To enable students to attend lectures by experienced professionals from the biotechnology and pharmaceutical industries, encouraging networking with potential future employers.

d) To connect students with the job market, through case studies and visits to biotechnology or pharmaceutical companies.

Course contents

Lecture topics (26 hours):

- Introduction to the course content and aims
- Career options for bioscientists beyond the academia
- Introduction to Bio-entrepreneurship – The Business Plan
- Innovation and patenting
- The regulatory framework for drugs and other medicinal products
- Research and Development in the biotechnology industry
- Pharmaceuticals (regulatory framework, clinical trials, pharmacovigilance, pharmaco-economics, quality assurance, other medical affairs, etc.)
- Medical devices (regulatory framework, quality assurance, etc.)
- Corporate management
- Production management and quality control
- Scientific marketing and customer support

Teaching & assessment methods

Lectures, internet searches, case studies, visits to companies.

Attendance of lectures (up to 50% of final grade), written examination (up to 50% of final grade).

BIOETHICS

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS	Credits
F	E	1	1	1		2

Course objectives

The course aims to develop critical reflection as well as scientific perception on issues related to the ethical aspects and the role of bioscientists and researchers in the modern scientific environment. Complex scientific and social problems that derive from the development of biotechnology and the applications of Molecular Biology and Genetics in the rapidly grown field of biosciences are analyzed in the frame of a responsible and ethical approach.

Course contents

A. Basic ethical concepts and issues of scientific development and management of ethical dilemmas in the modern scientific environment.

B. The current bioethical Greek and international legal framework.

C. Critical analysis and reflection related to the ethical dimensions of the role of the modern bioscientist.

More specifically, the following chapters are assessed:

Chapter 1: Introduction to Bioethics

Basic ethical principles

Issues of scientific development and management of ethical dilemmas in the modern scientific environment

Chapter 2: The legal framework

The legal framework in Greece – directives & legislation

The legal framework in Europe - directives & legislation

Bioethics and International forums

Chapter 3: The role of modern bioscientist

Ethics in biosciences

Ethical responsibilities of bioscientists

Chapter 4: Modern ethical issues in molecular biosciences (Indicatively)

Animal rights – Animals & Experimental procedures

Reproductive Biology – Assisted reproduction - Designer babies

Stem cells, Cell therapies & Cloning

DNA banks

Cord blood banks

Genetic modification and agriculture

Human genome and associated challenges

Warrior genes

Lecturers

Recommended Reading

- **Title:** BIOETHICAL ISSUES
- **Author(s):** Stavroula Tsinorema & Kitsios Louis (editors)
- **Publishing Company:** Crete University Press
- **Year of Publishing:** 2013
- **ISBN**: 978-960-524-383-8
- **EUDOXUS code**: 22705708

Teaching methods

The teaching approach is based on active learning and especially in the principles of Transformative Learning. Debates are used as the main teaching technique: the students are separated in small groups and they support oppositional scientific dilemmas derived by the application of biosciences. The "opposite" groups support their aspects and all participants discuss the issues through contradictory vies and assess the group that convinced the audience based on the presentation and the scientific documentation. The subjects together with the relevant bibliographic references are provided by the Lectures. Lectures are also applied to complement the necessary knowledge, focusing on the approach of the main ideas, as well as the Greek and international legal framework on bioethics.

Teaching Language

Greek

Assessment methods

Attendance is obligatory. Assessment is based on the evaluation of the participation of the students on the concerns and the discussion during the review of the scientific dilemmas, but mainly on their performance in the debates. Alternatively, written examinations are conducted.

COUNSELING & EDUCATIONAL PSYCHOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS	Credits
F	E	1	1	2		2

Course objectives

This course focuses on the basic theories of learning and the emotional aspects involved in the process of learning (individual differences, the self-concept, self-esteem, self-efficacy etc), that influence the classroom climate. Special reference is being made to the educator's role in early detection and intervention within the context and limits addressed by his/her role.

Course contents

Of specific interest are the most common emotional and behavioral difficulties that the educator faces in classroom settings, such as aggressive behavior, Attention Deficit and Hyperactivity Disorder (A.D.H.D.), shyness and social phobia, learning difficulties, anxiety, pervasive developmental disorders etc.

As far as the educator is concerned, the course will examine the intrapersonal variables such as personality traits, values, beliefs, occupational stress (burnout), professional self-identity and self-esteem.

Students will be presented with indicative methods, strategies and techniques of coping with the aforementioned behavioral and emotional difficulties, as well as with counseling and school-family cooperation skills.

Lecturer

Katerina Kedraka, Assistant Professor

Teaching & assessment methods

In the course active learning is used, so students are encouraged to participate during the lessons, through teaching techniques like role playing, working in groups, simulations, discussions etc. Presentations and lectures are used additionally to ensure that all main aspects are discussed.

Assessment is based on essays and research topics assigned to students. Since the course is based on active learning, students' participation and interaction, attendance is considered of core importance and for this reason it is included in the final evaluation. Alternatively, written exams at the end of the semester and during examination periods could take place.

Teaching Language

Greek

Recommended Reading

- **Title:** Educational Psychology
- **Authors:** Ef. Dimitropoulos & Ou. Kalouri-Antonopoulou
- **Publishing Company:** ION-ELLIN
- **Year of Publishing:** Athens, 2010
- **ISBN**: 978-960-286-998-7
- **EUDOXUS code**: 71957

ORGANIZATIONAL PSYCHOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS	Credits
G	E	1	1	2		2

Course objectives

The objective of this course is to familiarize students with the structures and functions of work organizations and environments.

Course contents

Issues that are discussed -in the context of the modern working environment- are staff selection and management, motivation and work values, job satisfaction, leadership models, professional development, mobility, relationships and communication in the workplace etc.

Lecturer

Katerina Kedraka, Assistant Professor

Teaching & assessment methods

In the course active learning is used, so students are encouraged to participate during the lessons, through teaching techniques like role playing, working in groups, simulations, discussions etc. Presentations and lectures are used additionally to ensure that all main issues are discussed.

Assessment is based on the presentation of essays and research topics assigned to students. Since the course is based on active learning, students' participation and interaction, attendance is considered of core importance and for this reason it is included in the final evaluation. Alternatively, written exams at the end of the semester and during examination periods could take place.

Teaching Language

Greek

Recommended Reading

- **Title:** Organizational Psychology and Behavior
- **Authors:** Maria Vakola & Ioannis Nikolaou
- **Publishing Company:** Rosili
- **Year of Publishing:** Athens, 2012
- **ISBN**: 978-960-89407-4-1
- **EUDOXUS code**: 12257495

TEACHING METHODOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS	Credits
F	E	1	1	2		3

Course objectives

This course aims at familiarizing students with the basic concepts and the structural elements of teaching, following the current theoretical trends.

Course contents

Issues of instruction/lesson planning, methods and techniques of teaching, the curriculum and the school textbooks, and ways of organizing the learning process, managing the teaching time and implementing alternative forms of educational assessment are presented. Special reference is made to the project method and the cooperative learning in classroom settings.

Lecturer

Katerina Kedraka, Assistant Professor

Teaching & assessment methods

In the course active learning is used, so students are encouraged to participate during the lessons, through teaching techniques like role playing, working in groups, simulations, discussions etc. Presentations and lectures are used additionally to ensure that all main aspects are discussed. During the course educators-biologists appointed in state schools are invited to share their personal experience with the students.

Assessment is based on written exams at the end of the semester and during examination periods. Since the course is based on active learning, students' participation and interaction, attendance is considered of core importance and for this reason it is included in the final evaluation. Alternatively, essays and research topics could be assigned to students.

Teaching Language

Greek

Recommended Reading

- **Title:** Teaching and Job Planning in BioSciences
- **Author(s):** Katerina Kedraka, Christos Gotzaridis
- **Publishing Company:** Academic Publications I. Basdra & Co
- **Year of Publishing:** 2016
- **ISBN**: 9786185135041
- **Type**: Textbook

TEACHING PRACTICUM COURSE II

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
G	E	1	1	2	2

Course objectives

The Teaching Practicum Course II is carried out in collaboration with state school units of the region of Thrace or other educational settings, so that students could be familiarized with the preparation and planning of actual teaching, as well as to avoid common teaching mistakes.

Course Contents

Students are informed about lesson planning, as well as about practical matters that an educator must take under consideration when preparing and planning an instructional procedure concerning the course Biology in the Secondary Educational System. As the next step, they will have to apply their knowledge and teaching skills in real terms, by undertaking the actual teaching of a biological course in an educational/ school setting. The Teaching Practicum Program II is carried out under supervision.

Lecturer

Katerina Kedraka, Assistant Professor

Teaching methods

In the course Practicum is used, so students, in order to acquire teaching skills and attitudes, are asked first to observe courses of biology in schools and then to undertake the actual teaching in school units.

Teaching Language

Greek

Assessment methods

Assessment of each student concerning his teaching performance is based on a 30% of the total grade given by his Mentor, a 10% based on the evaluation of the pupils and a 60% of the Professor's evaluation.

TEACHING PRACTICUM COURSE I

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS	Credits
G	E	1	1	2		2

Course objectives

The objective of Teaching Practicum Course I is the training of students, via microteaching, in acquiring teaching skills in order to be able to apply them in their instruction.

Course contents

Students are informed about the basic elements of microteaching and its contribution in the education and training of educators. Individual practical exercise of microteaching implementation follows, including preparation, realization, observation, discussion and assessment of the microteaching.

Lecturer

Katerina Kedraka, Assistant Professor

Teaching methods

In the course students, in order to acquire teaching skills and attitudes, are asked to simulate the actual teaching of small learning units, through microlessons, which may be recorded and in that case, videos are sent to students for their self-evaluation.

Teaching Language

Greek

Assessment methods

Students must attend all courses. Assessment is based on the presentation and the teaching material of their microteaching.

MATERIAL CHEMISTRY AND NANOTECHNOLOGY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
A	E	2	0	3	3

Course objectives

The objectives of the course are:

a) To familiarize students with chemical compounds used in everyday life, with emphasis to their interrelationship with biological organisms

b) To familiarize students with chemical compounds found in new materials, mainly nano-materials which are used nowadays in everyday life and in biomedical applications

c) To be able to understand, study, analyze and submit a written assignment using the scientific nomenclature, give an oral presentation on the specific topic, and answer the questions of the audience. Attendance of the student's lectures is obligatory for all participants.

Course contents

Lectures

- Chemistry of new materials, Introduction
- Nanotechnology, Introduction, Methodology in Synthesis, Properties
- Nanotechnology and Applications in Medicine and Pharmacy
- Nanotechnology and Applications in Microbiology
- Nanotechnology and Applications in Food Chemistry
- Nanotechnology and Applications in Cosmetics
- Nanotechnology and Applications in Building Materials, Colors etc
- Nanotechnology and Applications in Environmental Issues
- Nanotechnology, Toxicity in Humans and Environment

Lecturers

K. C. Fylaktakidou, Prof. of Chemistry of Organic Compounds,

Recommended Reading

Title: Φαρμακευτική Νανοτεχνολογία
Author(s): Δεμέτζος Κωνσταντίνος
Publishing Company:Παρισιάνου Α. Ε.
Place & Year of Publishing:23/5/2014
ISBN: 978-960-394-988-6
EUDOXUS code:41959388

Title: Χημεία και Καθημερινή Ζωή
Author(s): Βάρβογλης Αναστάσιος
Publishing Company: Αλ. Μαμάλης &Σια
Place & Year of Publishing: 1η Έκδοση 2006
ISBN: 960-7778-91-X
EUDOXUS code:15999

Title: Τα ετεροκυκλικά στη ζωή και την κοινωνία
Author(s): Pozharskii Alexander F.
Publishing Company: Εκδοτικός Οίκος Α. Τζιόλα &Υιοί Α.Ε.
Place & Year of Publishing: 1η Έκδοση 2004
ISBN: 960-418-038-X
EUDOXUS code:18548935

Teaching methods

Lectures, seminars, use of new technologies in education, videos, meetings, discussions on review papers, etc.

Assessment methods

Assignment and oral presentation and/or end of term written examinations.

Language of instruction

Greek and English

ASPECTS OF MEDICINAL AND NATURAL PRODUCT CHEMISTRY

Semester	C/E	Lectures (Hours/week)	Practicals (Hours/week)	Teaching Credits	ECTS Credits
E	E	2	0	3	3

Course objectives

40% of drugs which are used today are produced or originated from natural products. In some therapeutic fields, like cancer or bacterial infections the percentages of the contribution of natural products is more than 75%. Natural products are secondary metabolites, which have important, nevertheless not vital to the producing organism. They represent a very useful tool for biological chemistry and molecular biology for the discovery of biological pathways and target proteins of various diseases.

The objectives of the course are:

a) The knowledge of the main categories of secondary metabolites-natural products (alkaloids, terpenoids, flavonoids, lipids, macrolides, carbohydrates etc

b) The knowledge of their biosynthetic pathways

c) The knowledge of their biological activities and their structure-activity relationship

d) The understanding, study, analysis, writing and presentation of a scientific subject of the student's choice and interest. Attendance of the student's presentation is obligatory to all students.

Course contents

Lectures

- Natural Product Chemistry and History, Introduction
- Medicinal Chemistry, Introduction
- Classes of Natural Products, methods of biosynthesis
- Phenylpropanoids, flavonoids- biosynthesis and biological activities
- Terpenoids and steroids-biosynthesis and biological activities
- Alkaloids- biosynthesis and biological activities
- Peptides, proteins and other amino acid derivatives- biosynthesis and biological activities
- Carbohydrates, lipids- biosynthesis and biological activities
- Natural Products with anticancer activity, structure-activity relationships
- Natural Products with antimicrobial activity, structure-activity relationships

Lecturers

K. C. Fylaktakidou, Prof. of Chemistry of Organic Compounds,

Recommended Reading

Title: Φαρμακευτικά Προϊόντα Φυσικής Προέλευσης
Author(s): Samuelsson Gunnar
Publishing Company: Πανεπιστημιακές Εκδόσεις Κρήτης
Place & Year of Publishing: 1η έκδοση 2004
ISBN: 978-960-524-015-8
EUDOXUS code: 469

Teaching methods

Lectures, seminars, use of new technologies in education, videos, meetings, discussions on review papers, etc.

Assessment methods

Assignment and oral presentation and/or end of term written examinations.

Language of instruction

Greek and English

MECHANISMS OF ONCOGENESIS

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
G'	E	2	0	2	3

Course Objectives

The objectives of the course are: To enhance knowledge and understanding of the molecular mechanisms of cancer initiation and progression and to present current strategies in cancer therapy.

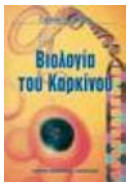
Course Contents

1. Introduction – Cancer Epidemiology
2. Cellular Oncogenes
3. Tumor Suppressor Genes – p53 and apoptosis
4. Cell Cycle deregulation and Cancer
5. Hypoxia – Angiogenesis
6. Metastasis
7. Rational Treatment of Cancer
8. Gene microarrays and Cancer
9. Molecular Diagnosis
10. Molecular Treatment

Name of Lecturer

Dr. Alex Galanis, Assistant Professor of Molecular Biology

Recommended Reading



Title:	Biologia tou Karkinou
Author(s):	Kitraki, Trougkos Pasxalidis
Publishing Company:	
Place & Year of Publishing:	Athina 2006
ISBN:	9789603994046
EUDOXUS code:	13256404

Title:	Recombinant DNA
Author(s):	J.D. Watson
Publishing Company:	Akadimaikes Ekdosis
Place & Year of Publishing:	Alexandroupolis 2006
ISBN:	9789608841253
EUDOXUS code:	2625

Teaching Methods

Lectures, use of e-class

Language of instruction

Greek

Assessment Methods

End of term written examination

MOLECULAR BIOTECHNOLOGY AND NUTRITION

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
	E	2	0	2	3

Course Objectives

The main objective of the course is to introduce the students to the basic principles of Molecular Biotechnology and Nutrition. Biotechnology is currently involved in all key processes of food production involving the improvement of quality and safety, development of novel products, as well as improving consumer's health. Combining principles of Molecular Biology and Biotechnology, Nutrition, Microbiology and Chemistry and paying attention to the prospects and applications of molecular techniques, enzymes and microorganisms, the course was designed to meet the needs of students for a wider range of knowledge.

Course Contents

1. Introduction
2. Molecular techniques in Food Biotechnology – TTGE, DDGE, Multiplex PCR, Real-Time PCR.
3. Genetic modification of plants and microorganisms – Genetically modified foods – Bioethical issues.
4. Functional Foods: Probiotics, Prebiotics, Symbiotics.
5. Nutraceuticals – Edible Vaccines.
6. Molecular techniques for the detection of food forgery.
7. The red wine, resveratrol, and the French paradox.
8. Biotechnology products of high nutritional value.
9. Plant extracts with antioxidant – anti-cancer activity.
10. Molecular interactions and sensory quality.

Instructors

Alex Galanis, Assistant Professor of Molecular Biology

Ioannis Kourkoutas, Associate Professor of Applied Biotechnology

Recommended Reading

Title:	Nutrition and Food Chemistry
Author(s):	K. Galanopoulou, G. Zametakis, M. Mauri-Babagianni,A. Siafa
Publishing Company:	Stamoulis Press
Place & Year of Publishing:	Athens 2007
ISBN:	9789603516941
EUDOXUS code:	22696

Title:	Biotechnology
Author(s):	Kyriakidis
Publishing Company:	Ziti
Place & Year of Publishing:	2000
ISBN:	9604315951
EUDOXUS code:	11133

Teaching Methods

Lectures, e-class

Language of instruction

Greek

Assessment Methods

Final written exams

Oral presentations

Written courseworks

PHARMACOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
F'	E	2	0	2	3

Course Objectives

The objectives of the course are:

a) To describe and define the basic concepts in Pharmacology.

b) To provide a fundamental understanding of the molecular mechanisms and the principles of drug action.

d) To describe the molecular mechanisms of drugs acting on the autonomous nervous system, central nervous system, and cardiovascular system.

e) To outline the basic principles of chemotherapy.

f) To identify novel molecular targets for drug development.

Course Contents

- Introduction to Pharmacology - Principles of Pharmacology
- Pharmacokinetics (Administration, absorption, metabolism and excretion of drugs)
- Pharmacodynamics (Mechanisms of drug action, drug receptor interactions)
- Pharmacogenetics - Pharmacogenomics
- Autonomic and Neuromuscular Pharmacology
- Drugs that act on the Central Nervous System
- Cardiovascular Pharmacology
- Principals of Chemotherapy
- Microbial Chemotherapy
- Cancer Chemotherapy
- Drug Development: Preclinical research and clinical trials
-

Instructor

A. Pappa, Associate Professor of Molecular Physiology

Recommended Reading

Title:	Pharmacology
Author(s):	Harvey R.A., Champe P.C.
Publishing Company:	Parisianos A.E.
Place & Year of Publishing:	Athens, 3rd edition/2007
ISBN:	978-960-394-502-4
EUDOXUS code:	41693

Title:	Pharmacology
Author(s):	Rang H.P., Dale M.M., Ritter J.M., Moore P.K.
Publishing Company:	Parisianos A.E.
Place & Year of Publishing:	Athens, 5th edition/2007
ISBN:	978-960-394-429-4
EUDOXUS code:	41692

Course Notes

Course lecture notes are available at https://eclass.duth.gr/eclass/courses/ALEX01132/

Teaching Methods

Lecture course, e-class, guided literature research assignments

Language of instruction

Greek

Assessment Methods

Students' evaluation is based on their performance on written and oral assignments (30%) and final exams (70%).

RADIOBIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
	E	2	0	2	3

FORENSIC GENETICS

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
	E	2	0	2	3

ADVANCED TECHNIQUES AND APPLICATIONS IN CELL BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
F	E	1	1	2	3

Course Objectives

The aim of this advanced course is a deeper understanding of the recent techniques and applications used in Molecular Cell Biology and especially in Microscopy, as well as to discuss and present the newest literature on the above topics. The approach is problem – based learning. The goal is to stimulate self-directed learning and develop flexible knowledge on the advanced microscopic techniques, as well as effective collaboration and intrinsic motivation

Course Contents

The course occurs in small groups, and each group (6-7 people) is organized around a certain challenge/question/problem, which is chosen on the first lesson. Each topic is extracted from the recent literature and involves Advanced Microscopic Techniques and their applications in Cell Biology and forms the basis for organized focus and stimulus for learning. The questions are discussed weekly, and deepen student's learning by centering on significant issues, questions and/or problems.Development: Preclinical research and clinical trials

Lecturer

M. Koffa, Associate Professor of Cell Biology

Course notes

Scientific articles, web sites and videos related to the project of each group are up-loaded on the e-class of the course

Teaching methods

Problem-based learning creates opportunities for groups of students to investigate meaningful questions that require them to gather information and think critically.

Language of instruction

Greek. Study of original scientific literature (in English) will be required for the review and presentation of the advanced topics of the molecular cell biology field.

Assessment Methods

The final mark is based on the overall participation of each student in the weekly meetings, as well as based on the public presentation of the topic each group has chosen.

ADVANCED TECHNIQUES AND APPLICATIONS IN CELL BIOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
	E	2	0	2	3

VIROLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
	E	2	0	2	3

GENETICS OF AQUIRED DISEASE AND TRANSLATIONAL MEDICINE

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
	E	2	0	2	3

MOLECULAR ECOLOGY

Semester	C/E	Lectures	Practicals	Teaching units	ECTS
	E	2	0	2	3

Course objectives

Initially this course sets the principles of ecology, biogeography and evolution and gives a way to understand the relation between them. Its main objective is to present the basics of molecular ecology as a new approach to solve ecological and evolutionary problems, with the use of molecular markers, population genetics and other molecular biology and biotechnology techniques. In the framework of this course it is aimed to give the young student of molecular biology and genetics new perspectives in the possible research lines he/she may attain in the future.

Course contents

- Principles of ecology in relation to other biological fields
- Evolutionary theory – Genetic variation schools – Adaptation – Speciation
- Ecological definition of evolution. Molecular ecology
- Molecular markers in ecology
- Molecular systematics and phylogenetics
- Population genetics
- Phylogeography
- Molecular evolution and adaptation
- The molecular basis of behavior
- Conservation genetics
- Special topics

Lecturers

M. Alexiou-Chatzaki, Associate Professor of Biology, Systematics and Ecology of organisms

Teaching methods

- Lectures
- Oral presentations by visiting scientists
- Course lecture notes are available at the e-class platform (https://eclass.duth.gr/courses/ALEX01124/)

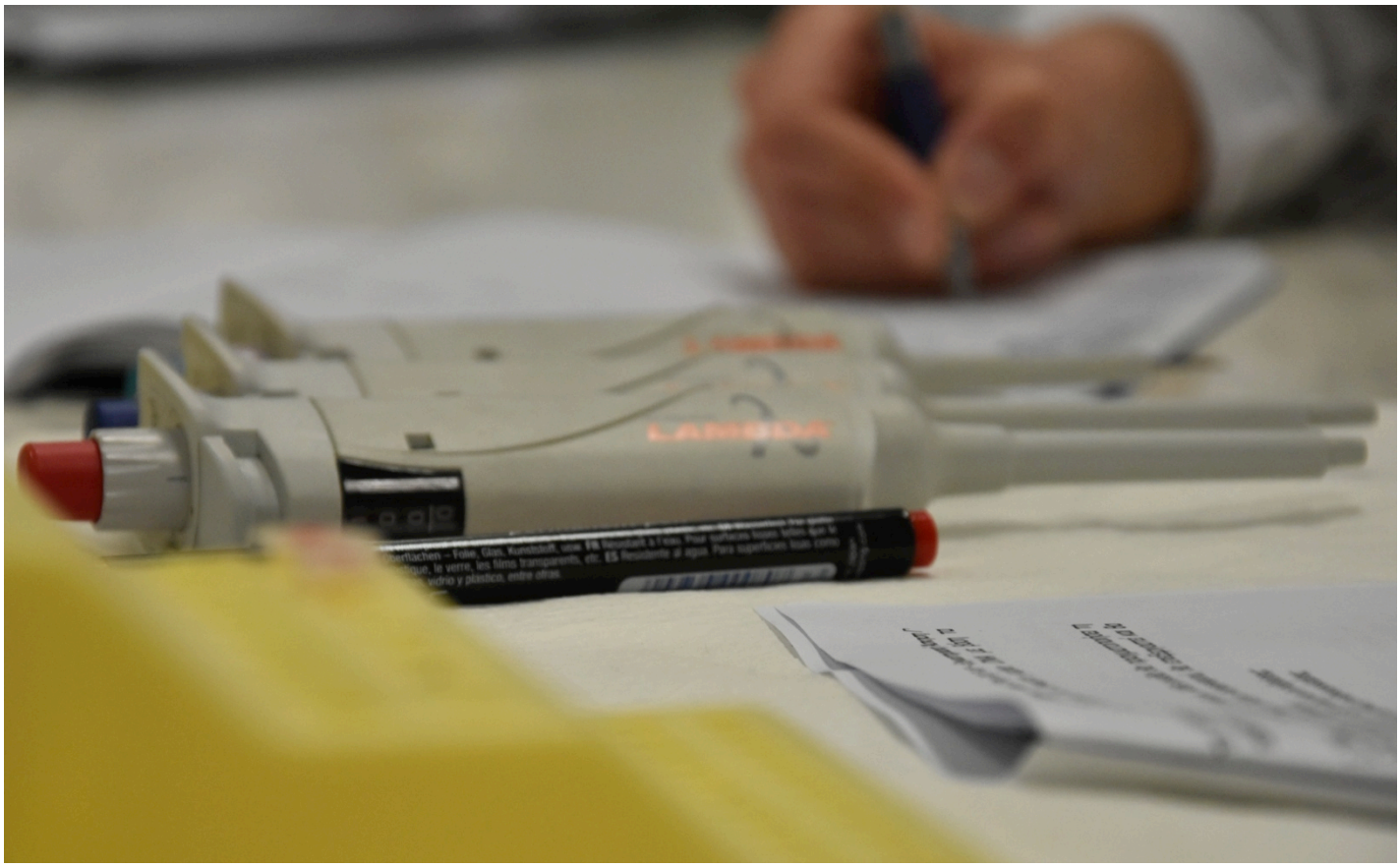
Recommended reading

- **An Introduction to Molecular Ecology**. Travor J.C. Beebee & Graham Rowe. *Oxford University Press, 2004*
- **Molecular Markers, Natural History, and Evolution**. John C. Avise, *2nd edition, Sinauer Associates, 2004*
- **Advances in Molecular Ecology**. Gary R. Carvalho, *IOS Press, 1998*

(not available in Ευδοξο)

Assessment methods

Oral presentations and peer to peer seminars by the students and/or final written examination



PART III

STUDENT SUPPORT

STUDENT SUPPORT

1. Teaching Books/ E-teaching

Students are entitled to free textbooks. The University enables e-teaching through e-Class: http://eclass.duth.gr/eclass

2. Student Restaurant

Students with low income are entitled to free meals at the student restaurant, which is located at the Department of Primary Level Education (for further information please contact the Secretariat of the Department).

3. Accommodation, Travelling and Medical Care

Students with low income are entitled, subject to the fulfillment of certain conditions stipulated by the law, to free accommodation. In addition, undergraduate students are provided with card passes for ticket discounts when travelling with public transport. Finally, the University offers medical care to students who have no other form of insurance (for further information please contact the Secretariat of the Department).

4. Student Grants-Scholarships

Student grands are available to students who are not entitled to free accommodation in order to cover their living expenses. Moreover, all students are eligible for scholarships, which are granted by the Greek State Scholarship Foundation. Grants and Scholarships are provided to students on the basis of their academic performance (for further information please contact the Secretariat of the Department).

5. Library

The library is located at the University campus and its resources meet the needs of all users-members of both the Department of Molecular Biology and Genetics and the Department of Medicine. It comprises a building of about 1400m^2 in area , with 18,000 books and 230 journals. The building has reading rooms where students can use the resources within the library. Moreover, there are computer Workstations for students to search for on line journals.

The library is open from Monday till Friday (7:00pm-7:00am)

Librarian : Theodoros Kyrkoudis

For further information please contact:

Tel - Fax: (+30 25510-30902)

Website: www.lib.duth.gr

E-mail: Medical@lib.duth.gr

6. Careers Office

The Liaison/Career Office of Democritus University of Thrace was founded in 1997, to serve as an information centre for students and graduates of DUTH, aspiring to become a link between the University and the labour market.

7. Erasmus

Erasmus is a European Commission exchange program that enables students in 31 countries to study for part of their degree in another country (for further information visit the website of the European Commission- http://europa.eu.int/comm/education/socrates.html)

The city of Alexandroupolis

Alexandroupolis is a coastal city with a population of about 48.000 (as estimated in 2001). It is the capital of the Prefecture of Evros. With bus, train and air services to Athens and Thessaloniki (as well as to other Greek cities) and a sea connection with the island of Samothrace, it is one of the best centers from which one can explore Thrace. In Samothrace one can visit the Sanctuary of the Great Gods and the traditional village of Chora.

At a short distance from the city one can find important archaeological sites which date from the Classical, Hellenistic, Roman and Byzantine era.

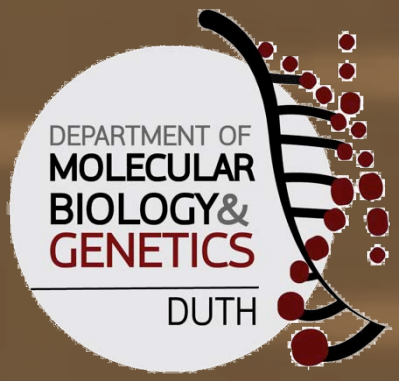
Within its geographical district there is the Delta of Evros, one of the most important wildlife parks not only in Greece but in Europe too, and the wildlife park in the forest of Dadia.

In Alexandroupolis there are four departments of the Democritus University of Thrace: the School of Medicine, the School of Molecular Biology and Genetics, the School of Primary Education, the School of Sciences of Education for Pre-School Ages.

The University Campus is located at Dragana about 6 km away from the city.

Useful Phone Numbers (+0030 25510)

Airport Democritus	45198
Central Bus Station	26479
Port	26468
Hospital	25772
Central Train Station	26398
Taxi	27700, 27200, 27770
Tourist Police	37411



Alexandroupolis 2018