DEMOCRITUS UNIVERSITY OF THRACE

DEPARTMENT OF MOLECULAR BIOLOGY & GENETICS

UNDERGRADUATE PROSPECTUS

2020 - 2021

CERTIFIED STUDY PROGRAMME
εθααε
hahe

Alexandroupolis 2020

DEMOCRITUS UNIVERSITY OF THRACE

DEPARTMENT OF MOLECULAR BIOLOGY & GENETICS DUTH

20 years!

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UNDERGRADUATE PROSPECTUS

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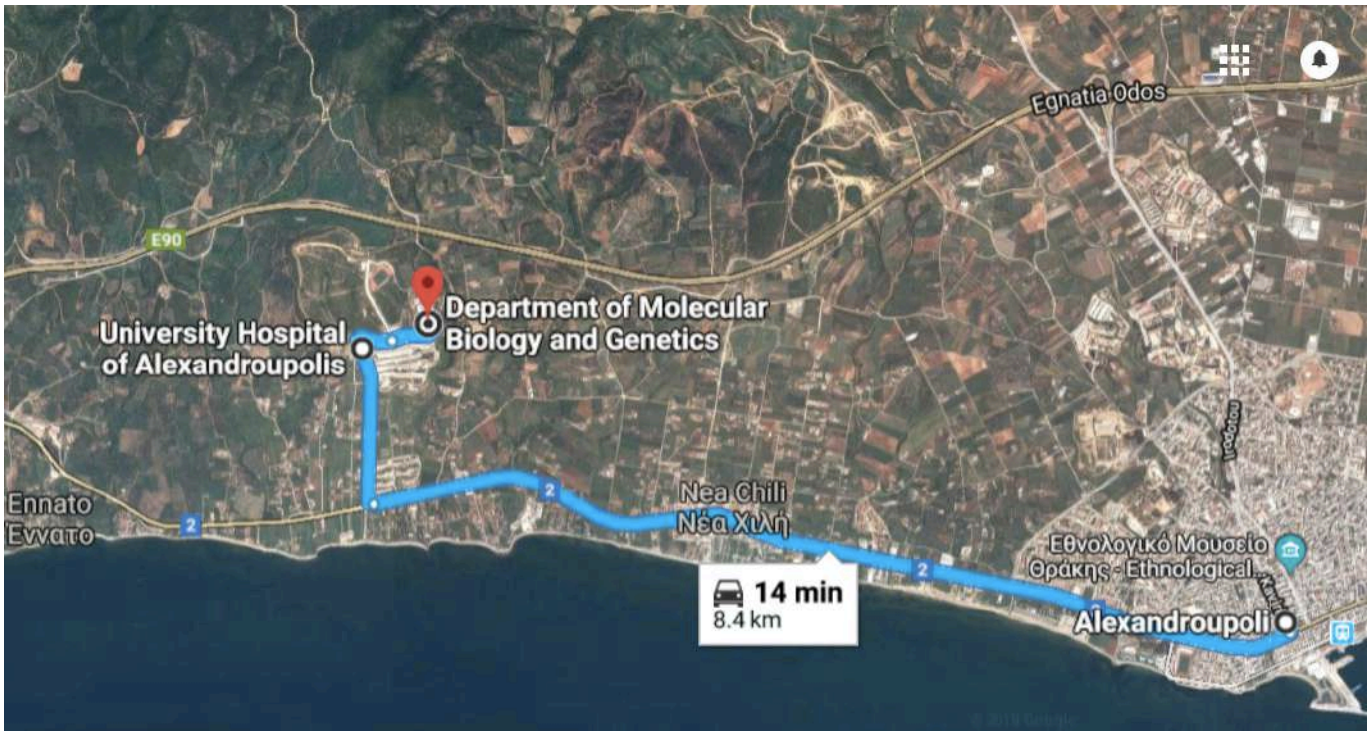
CERTIFIED STUDY PROGRAMME εθααε hahe

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

Photos by A. Roupas, MBG graduate
M. Grigoriou, Professor



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Democritus University of Thrace

Department of Molecular Biology & Genetics,

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University Campus, Dragana,

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INFORMATION

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ACADEMIC DIARY 2020 - 2021

REGISTRATION

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

WINTER SEMESTER

Courses start on	5/10/2020
Courses end on	22/1/2021
Exam period	25/1-12/2 2021

SPRING SEMESTER

Courses start on	15/2/2021
Courses end on	28/5/2021
Exam period	1/6-22/6 2021

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

BANK HOLIDAYS, NATIONAL HOLIDAYS & BREAKS

No lectures, seminars, practicals or exams take place on the following days:

WINTER SEMESTER

October 28th	National Holiday
November 17th	National Holiday
December 23rd-January 6th	Christmas Break
January 30th	Bank Holiday

SPRING SEMESTER

March 15th	Bank Holiday
March 25th	National Holiday
April 26th- May 7th	Easter Break
May 1st	Labour Day
May 14th	Local National Holiday
June 21st	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
Alexandros Polychronidis, Professor, Deparment of Medicine

Deputy Rector of Finance, Planning & Development
Fotios P. Maris, Associate Professor, Department of Civil Engineering

Deputy Rector of Student Welfare and Academic Affairs
Zoe Gavriilidou, Professor, Department of Greek Philology

Deputy Rector of Research, Innovation and Lifelong Learning
Maria Michalopoulou, Professor, Department of Physical Education and Sport Science

Deputy Rector of Administrative Affairs
Raphail Sandaltzopoulos, Professor, Department of Molecular Biology & Genetics

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, Deparment of Medicine

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 :

Katerina Chlichlia

Associate Professor

Tel. 00-30-25510-30630

email: achliclia@mbg.duth.gr

Department Vice Chair :

Ioannis Kourkoutas

Associate Professor

Tel. 00-30-25510-30633

email: ikourkou@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)
Grigoriou Maria	Professor in Molecular & Developmental Biology	30657	mgrigor
Maroulakou Ioanna	Professor in Genetics	30666	imaroula
Mavromara Penelope	Professor of Biochemistry	30618	pmavrom
Sandaltzopoulos Raphael	Professor of Molecular Biology	30622	rmsandal
Tokatlidis Ioannis	Professor in Genetics & Plant Breeding		
Alexiou-Chatzaki Maria	Associate Professor of Biology	30636	mchatzak
Boukouvala Sotiria	Associate Professor of Molecular Genetics	30632	sboukouv
Chlichlia Katerina	Associate Professor of Molecular Immunology	30630	achlicl
Fadouloglou Vassiliki	Associate Professor of Molecular – Structural Biology	30640	fadoulog
Galanis Alexis	Associate Professor of Molecular Biology	30634	agalanis
Glykos Nikolaos	Associate Professor of Computational and Structural Biology	30620	glykos
Kedraka Aikaterini	Associate Professor of Teaching and Job Skills of Bioscientists	30617	kkedraka
Koffa Maria	Associate Professor of Cell Biology	30661	mkoffa
Kolovos Petros	Assistant Professor of Systems Biology		pkolovos
Kourkoutas Ioannis	Associate Professor of Applied Biotechnology	30633	ikourkou
Papageorgiou Aristotelis	Associate Professor of Forest Genetics	30494	apapage
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
Giannakakis Antonios	Assistant Professor of Molecular Biology	30634	antgian
Fakis Giannoulis	Assistant Professor of Human Genetics and Cytogenetics	30628	gfakis
Katsani Aikaterini	Assistant Professor of Protein Chemistry	30635	kkatsani
Paleologou Aikaterini	Assistant Professor	30664	apalaio

3. Teaching Assistants & Technical Staff

Name		**Telephone (00302551)**	**Email** (@mbg.duth.gr)
Malatos Sotirios	PhD Molecular Biology	30384	smalatos
Tsikrikoni Chryssa	PhD Genetics	30621	ctsikrik
Kyriaki Sofia	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 requirements

Students are admitted to the Department of Molecular Biology & Genetics of Democritus University of Thrace via either participation in the Panhellenic Exams for Upper Secondary Schools (Panelladikes Eksetaseis, i.e. the General Admittance Exams in Greece) or, in the case of University Graduates, following Qualifying Exams organized by MBG.

The invitation and enrollment of freshmen take place in September within a deadline set each year by the Ministry of Education, Research and Religious Affairs.

PART II

STUDYING IN MBG

1. Undergraduate Program of Study

The Undergraduate Program of the Department of Molecular Biology & Genetics of Democritus University of Thrace has been designed according to international standards to provide the students with skills, knowledge and abilities required for a successful carreer in Molecular Biosciences and leads to Bachelor Degree ("Ptychion" in Greek) in Molecular Biology and Genetics.

Undergraduate studies last four academic years and are organized in 8 semesters. The curriculum offers a unique combination of breadth and depth of coverage across Molecular Biosciences with an emphasis on experimental training. During the first four semesters students are introduced to the basic concepts and principles of Molecular Biosciences as well as to the methods and techniques, while in the three following semesters students attend a series of advanced theoretical and laboratory courses (compulsory or optional). In final semester of their studies students either attend a set of optional courses or perform a Research Diploma Thesis. The aim of the Research Diploma Thesis 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. Diploma thesis is optional and equals with 30 ECTS units. Diploma thesis is written in Greek but, upon approval by the supervisor and the Faculty, it can be written in English.

Also under the Undergraduate Study Program, MBG students have the opportunity to:

- **Acquire an IT skills certificate.**

Under the curriculum, students acquire an IT skills certificate by successfully attending four courses in the field. Two of these courses are compulsory, while the other two are optional.

- **Perform a Traineeship**

MBG students have the opportunity to work for a two month period (June and July) in an enterprise or an organisation with a view to acquire competences that are required by the labour market and carry out work experience. The Traineeship Program of MBG is currently funded by the Ministry of Education & Religious Affairs.

- **Acquire the Pedagogical & Teaching Adequacy Certificate**

According to the legislation in force (Law 3848/2010, par. 2 art. 2 -ΑΦ Α / 71, as supplemented by Law 4186/2013 and superseded by N.4547 / 2018, A102, 06-2018, article 111, paragraph A), certified pedagogical and didactic competence is a necessary condition for appointment in Public and Private Education. MBG curriculum includes a set of 8 courses (two compulsory and six optional) from the Field of Education Sciences. Studnts that successfully completing these 8 courses are awarded the Certificate of Pedagogy and Tactical Adequacy.

• Participate in the ERASMUS + Program

Erasmus+ enables students to undertake a scholarship and perform part of their studies in a Higher Education Institution in Europe without paying tuition fees or perform an internship as Trainees in an enterprise, or in a training center, a research center or other organization based in Europe, with full academic recognition. Moreover the Department of Molecular Biology & Genetics offers to foreign students positions for Mobility for Studies of for Traineeships.

The Department of Molecular Biology & Genetics in the COVID-19 pandemic

For the coming academic year, the Department of Molecular Biology & Genetics has already made all the preparations necessary for the implementation of the educational process, either in person if allowed by the State, or remotely or with a blended system aiming to provide to the students the best possible quality of education.

Students will be informed through the website of the Department (www.mbg.duth.gr) as soon as there is a relevant decision from the Ministry of Education & Religious Affairs and the Senate og Democritus University of Thrace.

Research in the Department of Molecular Biology & Genetics is carried out under the safety rules of the National Public Health Organization.

Academic Advisor of Studies

The Academic Advisor of Studies is responsible for planning and following the program of study of a small number of students. The Academic Advisor of Studies meets regularly with students to help them improve their performance and to support them in resolving any problems that arise in the course of their studies. The Academic Advisor of Studies has also an advisory role regarding the planning of the student's academic career and, in case of personal problems, advises them to the supportive structures of the University (see also Part III Student Support, Phycosocial support).

Learning outcomes

Upon completion of the studies, the graduates of the Department of Molecular Biology & Genetics will 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.
-

The curriculum of the Department of Molecular Biology & Genetics was certified for the period between 29-05-2020 to 28-05-2024 by the Hellenic Authority for Higher Education

2. Attendance, exams & grading

Studies in MBG last four academic years. 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 an exam period, 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.

Teaching units (credits according to the law in force in Greece) and ECTS units are allocated to all courses. These units reflect the work load of the activities (i.e lectures, practical work, seminars, tutorials, fieldwork, study- in the library or at home) of each course. The workload of each semester equals to 30 ECTS and the total workload of the Undergraduate Program of Studies equals to *240 ECTS*.

MBG follows the national credit system according to the Greek Law for Higher Education, 1466/2007. Grades range from 0 to 10, with 10 being the highest grade awarded to an excellent performance. A course is considered successfully attended, when the student has acquired at least Grade 5. Students that receive grades lower than 5 retain the right to repeat the necessary exams in order to pass the course.

In cases of force majeure, such as the COVID-19 pandemic, on line educational platforms may be used for teaching and learning.

3. Requirements for graduation

Students become graduates and aquire a Degree (Ptychion) in Molecular Biology & Genetics when they have:

a. Successfully attended all compulsory modules

b. Successfully attended 8 optional modules and

c. Successfully completed the degree dissertation (diploma) thesis ***or*** successfully attended during the 8th semester optional modules of the spring semester equivalent to 30 ECTS (in addition to the optional modules needed for b).

and thus have accumulated ***240 ECTS credits***

The graduates of the Department are awarded the Degree (Πτυχίο - Ptychion) in Molecular Biology & Genetics. The calculation of the final grade is based on the teaching units assigned to the courses according to the legislation in force (L.3374/2005).

Local Degree Grade classification

- 8.50 – 10.00 Excellent
- 6.50 – 8.49 Very good
- 5.00 – 6.49 Good

Diploma Supplement

The Diploma Supplement of studies stipulated by Law 3374/2005, is attached to the Degree and provides all information regarding the graduate's academic performance and activities.

You can find the «Rules & Regulations of Studies» at the Website of MBG (only in Greek, as the Program of Studies is in Greek).

DEPARTMENT OF MOLECULAR BIOLOGY & GENETICS

CURRICULUM

ACADEMIC YEAR 2020-2021

1st Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS
Introduction to Biology	3	0	3	3	**5**
Introduction to Computational Biology	3	1	4	4	**6**
General & Inorganic Chemistry	2	0	2	2	**3**
Organic Chemistry	2	0	2	2	**3**
Physics for Biological Sciences	4	1	5	5	**6**
English for Biosciences I	2	0	2	2	**2**
Laboratory course I	1	3	4	2	**5**
TOTAL	**17**	**5**	**22**	**20**	**30**

2nd Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS
Introduction to Organismal Biology	3	0	3	3	**4**
Molecular Biology I	4	0	4	4	**6**
Genetics I	3	0	3	3	**4**
Biochemistry I	3	0	3	3	**4**
Physical Chemistry and Elements of Biophysics	3	1	4	4	**5**
English for Biosciences II	2	0	2	2	**2**
Laboratory course II	1	3	4	2	**5**
TOTAL	**19**	**4**	**23**	**21**	**30**

3rd Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS
Molecular Biology II	4	0	4	4	**5**
Introduction to Molecular Biology Techniques	3	0	3	3	**5**
Cell Biology	4	0	4	4	**5**
Biochemistry II	4	0	4	4	**5**
Molecular Microbiology	3	0	3	3	**5**
Laboratory course III	1	3	4	2	**5**
TOTAL	**19**	**3**	**22**	**20**	**30**

4th Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS
Genetics II	3	1	4	4	**4**
Gene Expression and Cell Signalling	4	0	4	4	**5**
Physiology	4	0	4	4	**5**
Biostatistics	2	1	3	3	**3**
Pedagogics	2	0	2	2	**2**
Laboratory course IV	1	3	4	2	**5**
Optional modules (2X)	4	0	4	4	**6**
TOTAL	**20**	**5**	**25**	**23**	**30**
Optional modules of the 4th semester (or of 8th semester for those not choosing Diploma thesis)					
Advanced Themes in Computational Biology	2	0	2	2	**3**
Advanced techniques and applications in cell biology	1	1	2	2	**3**
Histology	2	0	2	2	**3**
Plant Molecular Biology & genetics	2	0	2	2	**3**
Bioethics	2	0	2	2	**3**
Counselling & Educational Psychology	1	1	2	2	**3**

5th Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS
Developmental Biology	3	0	3	3	**4**
Molecular Immunology	4	0	4	4	**5**
Population and Evolutionary Genetics	3	1	4	4	**5**
Bioinformatics	3	1	4	4	**5**
Methods in Molecular Biology	1	3	4	4	**5**
Optional modules (2X)	4	0	4	4	**6**
TOTAL	**18**	**5**	**23**	**23**	**30**
Optional modules of the 5th semester					
Modeling of Physical-chemical processes in Biology	2	0	2	2	**3**
Plant Molecular Biology	2	0	2	2	**3**
Molecular Ecology	2	0	2	2	**3**
Radiobiology	2	0	2	2	**3**
Principles of Laboratory Animal Handling	2	0	2	2	**3**
Principles of pharmaceutical chemistry and chemistry of natural compounds	2	0	2	2	**3**

6th Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS
Applied Biotechnology	3	0	3	3	**4**
Genomics	3	1	4	4	**4**
Regulation of Cell function	4	0	4	4	**4**
Introduction to Biomolecules Structure	3	0	3	3	**4**
Career Development of Bioscientists	2	0	2	2	**3**
Laboratory Course VI	0	4	4	2	**5**
Optional modules (2X)	4	0	4	4	6
TOTAL	**19**	**5**	**24**	**22**	**30**
Optional modules of the 6th semester (or of 8th semester for those not choosing Diploma thesis)					
Advanced Themes in Bioinformatics	2	0	2	2	**3**
Stem Cell & Regenerative Biology	2	0	2	2	**3**
Behavioral Biology	2	0	2	2	**3**
Advanced Themes of Immunology	2	0	2	2	**3**
Forensic Genetics	2	0	2	2	**3**
Introduction to Bioscience Enterprise	2	0	2	2	**3**
Practical Training	2	0	2	2	**3**
RNA world	2	0	2	2	**3**
Nanotechnology and biomadical applications	2	0	2	2	**3**
Students who follow the Program for obtaining a Certificate of Pedagogical and Didactic competence should also follow:					
Teaching Practicum Course I (Microteaching)	1	1	2	2	**6**
Teaching Methodology	1	1	2	2	**5**

7th Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS
Human Genetics	4	1	5	5	**5**
Application of Molecular Biology in Medical Sciences	3	1	4	4	**5**
Molecular Neurobiology	3	0	3	3	**4**
Proteomics	2	0	2	2	**3**
Advanced Molecular Biology Techniques	3	0	3	3	**4**
Systems Biology	3	0	3	3	**3**
Optional modules (2X)	4	0	4	4	**6**
TOTAL	**22**	**2**	**24**	**24**	**30**
Optional modules of the 7th semester					
Virology	2	0	2	2	**3**
Genetics of Aquired Disease and Translational Medicine	2	0	2	2	**3**
Mechanisms of Oncogenesis	2	0	2	2	**3**
Molecular Biotechnology and Nutrition	2	0	2	2	**3**
Pharmacology	2	0	2	2	**3**
Advanced Themes of Structural Biology	2	0	2	2	**3**
Teaching Practicum Course II (Teaching in schools)	2	0	2	2	**3**
Adult Education	2	0	2	2	**3**
Organizational Psychology	2	0	2	2	**3**

8th Semester	LECTURES	PRACTICALS	TEACHING HOURS	TEACHING CREDITS	ECTS
Degree Dissertation (Diploma) Thesis	10	30	40	20	30
or					
Optional Modules	-	-	-	-	30
TOTAL	**20**	**30**	**40**	**20**	**30**
				TOTAL (Curriculum)	**240**

DESCRIPTION OF COMPULSORY MODULES

Course descriptions by the instructors

COURSE OUTLINE	**Physics in Biological Sciences**

INSTRUCTORS	Eleni Kaldoudi, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 101**	**SEMESTER**	**Winter**
COURSE TITLE	Physics in Biological Sciences		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		5	6
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	Highschool physics, chemistry and mathematics		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01111/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

On successful completion of the course, the student will be able

- to understand the fundamental priniples of modern physics
- to explain the fundamentals of microscopic matter structure (at subatomic, atomic and molecular level)
- to describe the principles of spectroscopy, microscopy, crystallography and imaging and explain how these are applied for the study of biological matter
- to identify biomedical scientific literature and conduct literature queries in popular biomedical literature databases
- to compile scientific knowledge in order to address and present a scientific topic

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information, using the necessary technologies
- Adaptation to new situations
- Autonomous work
- Team work
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

- **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.
- **Physics Concepts 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.
- **Physics Concepts 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. Thermodynamics.
- **Physics Concepts 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. Hydrodynamics.

Tutorials and practicals on scientific knowledge management.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Lectures on the topics listed above. Self-assessment questions. Small project assignment and presentation by the students.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	All course material available on the institutional Learning Management System.
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
to understand the fundamental principles of modern physics	lectures	30
	practice in the classroom	5
	independent study	20
	teamwork	5
	lectures	5

	to explain the fundamentals of microscopic matter structure (at subatomic, atomic and molecular level)	independent study	10
	to describe the principles of spectroscopy, microscopy, crystallography and imaging and explain how these are applied for the study of biological matter	lectures	15
		practice in the classroom	20
		independent study	20
		teamwork	10
	to identify biomedical scientific literature and conduct literature queries in popular biomedical literature databases	lectures	4
		independent practice	10
		teamwork	5
	to compile scientific knowledge in order to address and present a scientific topic	practice in the classroom	4
		teamwork	15
			178
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Public presentation (20%), written exam (80%). Detailed evaluation criteria are published on the course site and explained in the classroom.		

5. SUGGESTED READING

- Ε. Καλδούδη, Χ. Ελευθεριάδης, "Η Φυσική της Ζωής", Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Αθήνα, 2015. ISBN: 978-960-603-509-8 https://repository.kallipos.gr/handle/11419/6132
- Newman Jay, Φυσική για τις Επιστήμες Ζωής, Δίαυλος ΑΕ, 2013
- Freedman Roger A., Ruskell Todd G., Kesten Philip R., Tauck David L., Βασικές Αρχές Φυσικής στις Επιστήμες Υγείας, Broken Hill Publishers Ltd, Κύπρος, 2019
- D.C. Giancoli, Φυσική Αρχές και Εφαρμογές, Εκδ. Τζιόλα, Θεσσαλονίκη, έκδοση 7, 2018 (επιμέλεια για την ελληνική έκδοση Α. Κεχαγιάς, Κ. Σφέτσος, Γ. Τσιπολίτης)
- Ε. Οικονόμου, "Η Φυσική Σήμερα., Τόμος Ι. Τα Θεμέλια & Τόμος ΙΙ. Οι Δέκα Κλίμακες της Ύλης", Πανεπιστημιακές Εκδόσεις Κρήτης, 1989 (5η εκδ. 2004)
- Α. Αναγνωστόπουλος, Ε. Δόνη, Θ. Καρακώστας, Φ. Κομνηνού, "Κεφάλαια Φυσικής", Εκδόσεις Ζήτη, Θεσσαλονίκη, 1998
  Κωδικός Βιβλίου στον Εύδοξο: 11065
- additional literature for each unit

COURSE OUTLINE	**General and inorganic chemistry**

INSTRUCTORS	Georgios Boulougouris, Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 102**	**SEMESTER**	**A**
COURSE TITLE	General and inorganic chemistry		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	General, Background , Skills Development		
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01217/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course are:

- Introduction of the basic principles and theories for the structure of atoms, the orbitals, the chemical bonds, the electronic effects, the periodic table and periodic properties of the elements.
- Understanding the nature of the forces that act at the molecular and supramolecular level, such as the hydrogen bond and Van der Waals forces.
- Understanding the stereochemistry leading to the chemistry of complexes, necessary tool for the understanding of biological processes such as enzymatic reactions, etc.
- Introduction of basic principles in: solutions, chemical equilibrium, chemical kinetics
- Working knowledge of acids bases and salts chemistry.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

- Structure of atoms
- atomic orbitals
- molecular orbitals
- Hybrid orbitals
- Chemical Bond
- Periodic table

- Hydrogen bond
- Van der Waals forces
- Metal complex
- Solutions
- Chemical Equlibrium
- Chemical Kinetics
- Acids bases and salts
- Red-ox reactions and electrochemistry

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of multimedia
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	**Activity**	**Workload (h)**
Knowledge and understanding of basic principals, skill development in solving quadrative problems.	Lectures	26
Understanding the chemical properties of elements based on the electronic structure. Developing skills for solving interdisciplinary problems	Study	64
Σύνολο		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Written exam, consisting of multiple choice questionnaires combined with short-answer questions short-answer questions open-ended questions numerical problem solving,

5. SUGGESTED 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(s): G. Manousakis
Publishing Company: Kyriakidis
Place & Year of Publishing: Thessaloniki (2015)
ISBN: 978-960-599-009-1
EUDOXUS code: 50663085

COURSE OUTLINE	**Introduction to Biology**

INSTRUCTORS	M. Chatzaki, Associate Professor A. Papageorgiou, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 103**	**SEMESTER**	**A**
COURSE TITLE	Introduction to Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		3	5
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01122/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

A. Learning outcomes:

- Describe the principles of biology
- Understand the complexity of structure and function of organisms from the unicellular to the multicellular ones, as well as the diversity of animals and plants
- Identify the main organismal taxa based on their main characteristics and their phylogenetic placement
- Realize and understand the evolution of life in the course of geological time and the natural selection as the main drivers of natural biodiversity

B. Synthesis, interpretation and analysis:

- Linking biological knowledge from previous levels to university standards
- Compare adaptations and survival mechanisms of plant and animal organisms under similar environmental challenges
- Development of critical thinking of the student via synthetically combining the principles of life and the mechanisms supporting them throughout the organismal diversity

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

1. Searching, data and information analysis and composition with the use of necessary technologies
2. Autonomous work
3. Production of new research ideas
4. Awareness for the natural environment
5. Promoting free, creative and inductive thinking

3. COURSE CONTENT

- 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 of plant tissues and organs
- Photosynthesis, respiration and water balance
- Reproduction and development of seed plants
- Animal diversity I
- Animal diversity II
- Animal diversity III

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Description of principles in biology	Lectures Study	30
Classification of the main organismal taxa based on their main characteristics	Lectures Study	60
Understanding the role of evolution and natural selection in biodiversity processes	Lectures Study Discussions and Interaction in Class	18
Incorporation of previous to current knowledge in biology	Lectures Study Discussions and Interaction in Class	6
Comparison of adaptations of plant and animal organisms under similar environmental challenges	Lectures Study Discussions and Interaction in Class	18

	Development of critical thinking	Lectures Study Discussions and Interaction in Class	18
	Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Assessment methods** Written Examination with Multiple Choice Questions and short answer questions

5. SUGGESTED READING

- Βιολογία. Αιμιλία Ζήφα, Ζήσης Μαμούρης, Κατερίνα Μούτου. Εκδόσεις Παν/μίου Θεσσαλίας. Εκδοση 2/2011 (κωδικός ΕΥΔΟΞΟΥ 68390699)
- Ζωολογία. Miller Stephen Broken Hill Publishers Ltd ISBN: 978-9925-563-37-1 (κωδικός Ευδόξου 77107008, ISBN 9789925563371).
- Βιολογία. Starr Cecie, Evers Christine, Starr Lisa. Μετάφραση- επιμέλεια ελληνικής έκδοσης Μαρία Χατζάκη κ.ά 1η έκδοση στα ελληνικά 2014. Εκδόσεις Utopia 2014 (κωδικός ΕΥΔΟΞΟΥ 32998265 και ο ISBN: 978-618-80647-1-3)

COURSE OUTLINE	**Biostatistics**

INSTRUCTORS	Gregory Tripsianis, Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 104**	**SEMESTER**	**S**
COURSE TITLE	Biostatistics		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		3	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Background Skills Development		
PREREQUISITE COURSES:	NONE		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01213/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The purpose of the course is:
- the introduction to research methods used in the today's biological sciences,
- the presentation of the most important statistical techniques for describing and analyzing research data, and
- students' familiarity with statistical packages.

Upon successful completion of the course the student will be capable:
- to understand the basic principles of planning a research,
- to choose the appropriate type of research to answer a particular clinical question,
- to understand the basic concepts of statistical science,
- to calculate and interpret descriptive measures of data,
- to investigate the linear relationship between variables using correlation techniques,
- to predict the values of a variable using regression analysis,
- to compare two or more percentages or averages (for dependent and independent samples) and justify the results according to the level of significance,
- to understand and interpret correctly the statistical significance of a statistical test,
- to be aware of the conditions required for the application of the statistical methods it chooses to use, to understand the necessity of checking those conditions and be able to choose alternative statistical methods,
- to be aware of the statistical error contained in the conclusions drawn from its statistical analysis,
- to calculate the normal values of a biochemical marker and to evaluate the reliability of laboratory methods, based on sensitivity and specificity,
- to calculate the relative risk that a person exposed to a potential risk factor will develop a disease in relation to a person who is not exposed to that factor,
- to use statistical software to analyze medical data,

- to understand the use of probability and probability density distribution as the basic tools for describing stochastic experiments,
- to understand the concept of conditional probability and its significance in the independence of stochastic events,
- to perform calculations using their Bayes law.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies.
Autonomous work.
Team work.
Production of new research ideas.
Promotion of free, creative and inductive thinking.

3. COURSE CONTENT

1) Research method design. The role of Statistics in scientific research, formulation of research hypothesis, statistical models, basic research methods (experimental, observation, descriptive, analytical, cross-sectional, prospective, retrospective), clinical trials, randomization, determination of research population, random sample.
2) Sampling methods (random, systematic, stratified, cluster, multidimensional), sample size determination, relative risk (RR), odds ratio (OR), confounding factors, statistical error, reliability and repeatability of measurements.
3) Descriptive statistics. Variable, variables types, statistical tables, graphical methods, descriptive statistics of central tendency and variability, coefficient of variability, Gaussian distribution, evaluation of laboratory findings (sensitivity, specificity, positive and negative predictive value), ROC (Receiver Operator Curve) curve.
4) Parameter estimation. Point estimation, confidence interval and standard error in estimation (i) mean, variance and percentage in one population and (ii) difference of means and percentages and ratio of variances in two populations.
5) Statistical tests. Null and alternative hypothesis, Type I and II error, power of a test, statistical significance.
6) Hypotheses testing (i) for the mean, variance and percentage in a population and (ii) for the difference in means and percentages and the ratio of variances in two populations, pair-wise data.
7) Analysis of variance (ANOVA). Analysis of variance for independent samples, analysis of variance table, multiple comparisons.
8) Analysis of qualitative data. χ^2 test, logistic regression analysis, odds ratio (OR).
9) Linear correlation. Pearson's correlation coefficient r, least squares method, prediction, linear regression analysis, coefficient of determination.
10) Non-parametric tests. Advantages and disadvantages of non-parametric tests, Kolmogorov-Smirnov test, Wilcoxon signed rank tests, Mann-Whitney U, Kruskal-Wallis, Spearman's correlation coefficient.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical*	

practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
Lectures		40
Student's study hours		50
Total		**90**

STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation Language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Are evaluation criteria known to the students?

Written final examination, which includes:
- multiple choice questionnaires
- short-answer questions
- problem solving

Written work.

5. SUGGESTED READING

Δ. Τριχόπουλος, Α. Τζώνου, Κ. Κατσουγιάννη, Βιοστατιστική, Εκδόσεις Παρισιάνου Α.Ε., 2002.
M. Pagano, K. Gauvreau (Μετάφραση - Επιμέλεια: Ουρανία Δαφνή), Αρχές Βιοστατιστικής, Εκδόσεις ΕΛΛΗΝ, 2002.
Αρβανιτίδου-Βαγιωνά Μαλαματένια, Χάιδιτς Άννα-Μπεττίνα, Ιατρική στατιστική. Βασικές αρχές. Εκδόσεις University Studio Press Α.Ε., 2013.
Δημόπουλος, Π., Βιομετρία Βιοστατιστική, Εκδόσεις Σταμούλη Α.Ε., 2004.
Σταυρινός, Β., Παναγιωτάκος, Δ., Βιοστατιστική, Εκδόσεις: Gutenberg, 2007.
Bowers, D., Θεμελιώδεις έννοιες στη Βιοστατιστική, Ιατρικές Εκδόσεις Π. Χ. Πασχαλίδης, 2011.
Βασιλόπουλος, Δ., Έξι μαθήματα στατιστικής, Ιατρικές Εκδόσεις Λίτσας, 1998.
Σταυρινός, Β., Στατιστική για τις επιστήμες της υγείας, Εκδόσεις Gutenberg, 1998.
Παπαϊωάννου, Τ., Ιατρική στατιστική και στοιχεία βιομαθηματικών, Εκδόσεις Σταμούλη Α.Ε., 2004.
Cramer Duncan, Howitt Dennis, Στατιστική με το SPSS 13, Εκδόσεις Κλειδάριθμος, 2006.
Χλουβεράκης, Γρ., Εισαγωγή στη στατιστική, Εκδόσεις Ελληνικά Γράμματα, 2002.
Χλουβεράκης, Γρ., Εισαγωγή στη στατιστική. Περιγραφικές μέθοδοι και εφαρμογές. Εκδόσεις Πεδίο, 2012.
Πιερράκου, Χ., Καστανιά, Α., Αποστολάκης, Ι., Στατιστική επεξεργασία δεδομένων στην υγεία, Εκδόσεις Παπαζήσης, 2003.
Λαζαρίδης, Α., Noelle - Λαζαρίδου, Μ., Κουτσογιάννης, Κ., Εφαρμοσμένη στατιστική στις επιστήμες υγείας και πρόνοιας, Εκδόσεις Έλλην, 2003.
Αναστασιάδου, Σ., Στατιστική και μεθοδολογία έρευνας στις κοινωνικές επιστήμες, Εκδόσεις Κριτική, 2012.
Αναγνωστόπουλος, Κ., Παπάνας, Ν., Τρυψιάνης, Γρ., Τέντες, Ι., Κορτσάρης, Α., Εισαγωγή στην κλινική βιοχημεία και στην εργαστηριακή στατιστική, Εκδόσεις Κυριακίδη, 2015.
Sabin Caroline, Petrie Aviva, Ιατρική στατιστική με μια ματιά, Εκδόσεις Παρισιάνου Α.Ε., 2016.
Μπερσίμης, Σ., Σαχλάς, Α., Εφαρμοσμένη στατιστική με έμφαση στις επιστήμες υγείας, Εκδόσεις Τζιόλα, 2016.
Cramer Duncan, Howitt Dennis, Qureshi Faiza, Norris Gareth, Εισαγωγή στη στατιστική με το SPSS για τις κοινωνικές επιστήμες, Εκδόσεις: Κλειδάριθμος, 2017.

Lectures and lesson notes are provided to students via e-class.

COURSE OUTLINE	**Introduction to Computational Biology**

INSTRUCTORS	Nicholas M. Glykos, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 105**	**SEMESTER**	**Fall, A'**
COURSE TITLE	Introduction to Computational Biology		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	4	5

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field
PREREQUISITE COURSES:	-
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01105/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

- Gain a basic understanding of Computational Biology
- Train on the application of the unix programming environment
- Gain experience from solving simple biological problems through programming a computer using the C language.

After completing the course, the student will be able to

- To use the unix programming environment
- To program a computing machine using the C programming language
- To use unix and C to solve simple biologically relevant problems

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Promotion of free, creative and inductive thinking
- Research, analysis and synthesize of data and information, using the necessary technologies
- Decision making
- Autonomous work
- Production of new research ideas

- Project design and management

3. COURSE CONTENT

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

1st PRACTICAL EXERCISE

- 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

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

3rd PRACTICAL EXERCISE

6. tar
7. grep, find, tail, head, wc
8. w, who, finger

4th PRACTICAL EXERCISE

- Unix: the full monty

5th PRACTICAL EXERCISE

- C: introduction
- The compiler
- printf()
- for
- if and if-else
- Types: int, float
- One-dimensional arrays

6th PRACTICAL EXERCISE

- First application: the least-squares program

7th PRACTICAL EXERCISE

- 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

- C, the full monty: program writing exercise

4. TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>TYPE OF TRAINING
Face-to-face, Distance learning, etc..</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, and in communication with the students</td><td>Active use of ICT in teaching, laboratory education, and in communicating with the students</td></tr>
<tr><td>MODES OF DELIVERY

Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</td><td>
<table>
<tr><th>Learning outcome</th><th>Activity</th><th>Workload (h)</th></tr>
<tr><td>Learn unix</td><td>Lectures, Laboratory practice, homework</td><td>50</td></tr>
<tr><td>Learn programming in C</td><td>Lectures, Laboratory practice, homework</td><td>50</td></tr>
<tr><td>Solve simple biological problems using unix & C</td><td>Lectures, Laboratory practice, homework</td><td>50</td></tr>
<tr><td colspan="2">Total</td><td>150</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation Language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Are evaluation criteria known to the students?</td><td>Language : Greek

Methods of evaluation :
multiple choice questionnaires
short-answer questions
problem solving
written work
The evaluation criteria are known. It is known.</td></tr>
</table>

5. SUGGESTED READING

The unix programming environment, B. Kernighan and R. Pike.

The guide to Linux, M. Welsh, M. K.Dalheimer and Kaufman, L.

Sams Teach Yourself C in 21 Days by Peter Aitken, Bradley L. Jones

COURSE OUTLINE	**English for Biosciences I**

INSTRUCTORS	Eleni Nalbandi, Special Teaching Staff

1.GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**MBG 106**	**SEMESTER**	**A**
COURSE TITLE	ENGLISH FOR BIOSCIENCES I		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	2
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Background		
PREREQUISITE COURSES:	B2 English level		
LANGUAGE OF TEACHING AND EXAMINATIONS:	English		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01253		

2.LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

After successfully completing the course the students will:

-have improved scientific and academic vocabulary
-understand science-related articles
-understand lectures
-contribute effectively in discussions
-have improved his/her academic writing skills such as argumentative essay writing

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Autonomous work
Team work
Promotion of free, creative and inductive thinking
Research, analysis and synthesize of data and information, using the necessary technologies

3.COURSE CONTENT

- Science Basics / Confusing Words in Science
- Compound Words in Biology (Common Prefixes and Suffixes/Determining Meanings Based on Word Parts)

- Plural Formation of Scientific Terms of Greek and Latin Origin
- Inorganic Chemistry for Biologists / Chemical Elements and Compounds / Reading a Chemical Formula
- Introduction to Organic Chemistry and Key Biomolecules
- Enzyme Biochemistry
- From Plant Cell to Plant Development
- Animal Diversity and Development
- Theories of Evolution / Early Humans / Theories on the Origin of Life on Earth
- The Cell / Cell Division
- Types of Tissue – Pathology of Tissue Formation
- Human Anatomy / Major Body Systems
- Basic Hospital Vocabulary
- Viruses

4.TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	e-class
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Understanding science-related texts	study and analysis of bibliography	13
Understanding lectures Contributing effectively in discussions Improving academic writing skills	speaking, listening & writing activities	13
Project		14
Non-directed study		20
Total		60

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other*	A written test at the end of the semester containing: • reading comprehension with short-answer questions • open-ended questions • multiple choice exercises • cloze tests • matching exercises • argumentative essay writing

Are evaluation criteria known to the students?	Evaluation criteria are known to the students

5.SUGGESTED READING

- Katsampoxaki Hodgetts K., Academic English for Biology, DISIGMA PUBLICATIONS, 2018
- Lackie J.M. & Dow J.A.T., Ερμηνευτικό Λεξικό Κυτταρικής & Μοριακής Βιολογίας, Ιατρικές Εκδόσεις Π.Χ. ΠΑΣΧΑΛΙΔΗΣ
- Allan D., Lockyer K., Αγγλική Ορολογία στις Βιοϊατρικές Επιστήμες, BROKEN HILL PUBLISHERS LTD, 2018

COURSE OUTLINE	**Laboratory Course I**

INSTRUCTORS	C. Tsikrikoni, S. Malatos, Laboratory Teaching Staff

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 107**	**SEMESTER**	**A**
COURSE TITLE	Laboratory Course I		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	4	3	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Skills Development		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/HEALTH111/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Via the procedures of teaching (the formulation of questions, the discussion within the lab, the laboratory practice) and home study, the students will accomplish:

At the level of knowledge / understanding:

- To become familiar with the laboratory and the safety principals
- To become familiar with the basic laboratory equipment and the experimental manipulations of a biologist researcher
- To perform experiments and analyses that are related to the common laboratory techniques (e.g. the use of the optical microscope, the tissue stains, the preparation of solutions and their basic measurements, spectrophotometry e.t.c.)

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Searching, data and information analysis and composition with the use of necessary technologies
Autonomous and teamwork
Generation of new research ideas
Awareness for the natural environment
Promoting free, creative and inductive thinking

3. COURSE CONTENT

1.INTRODUCTION TO THE LABORATORY: SAFETY, LABORATORY INSTRUMENTS, USE OF LABORATORY PIPETTE

2.INTRODUCTION TO OPTICAL MICROSCOPY

3.PROKARYOTIC CELLS

4.MICROSCOPY STAINING TECHNIQUES

5.EUKARYOTIC CELLS: PLASMOLYSIS/HEMOLYSIS

6.PLANT TISSUES

7.ANIMAL DIVERSITY

8.PREPARATION OF LABORATORY SOLUTIONS - TITRATIONS

9.SPECTROSCOPY/QUALITATIVE AND QUANTITATIVE ANALYSIS

10.WEAK ELECTROLYTES/HYDROLYSIS/PH MEASUREMENTS - BUFFER SOLUTIONS

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	**Activity**	**Workload (h)**
Introduction to the lab Awareness regarding safety in the lab	Lectures Study Exercises	3
Get familiar with the basic laboratory equipment	Lectures Study Exercises	12
Perform experiments and analyses	Lectures Study Exercises	107
To become familiar with the characteristics of plant and animal organisms	Lectures Study Exercises	28
Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation*	**Assessment language**: Greek **Assessment methods** Written Examination with Multiple Choice Questions and short answer questions

language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Are evaluation criteria known to the students?*	Written Problem Solving

5. SUGGESTED READING

Title: Laboratory Course I – Section: "Security, theory and practice of laboratory exercises in General Cemistry", K. Fylaktakidou

Title: Laboratory Course I – Section: "Introduction to Biology", M. Alexiou Chatzaki

Course Notes
The course notes are available through the e-class platform.

COURSE OUTLINE	**English for Biosciences II**

INSTRUCTORS	Eleni Nalbandi, Special Teaching Staff

1.GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**MBG 111**	**SEMESTER**	**B**
COURSE TITLE	ENGLISH FOR BIOSCIENCES II		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	2	2

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Background
PREREQUISITE COURSES:	English language level B2
LANGUAGE OF TEACHING AND EXAMINATIONS:	English
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01258

2.LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

After successfully completing the course the students will:

-have improved scientific and academic vocabulary
-understand science-related articles
-understand lectures
-contribute effectively in discussions
-have improved his/her academic writing skills such as argumentative essay writing

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Autonomous work
Team work
Promotion of free, creative and inductive thinking
Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Development of social, professional and moral responsibility and gender sensitivity

3.COURSE CONTENT

- Genetics / Principles of Heredity/ Different Types of Inheritance

- An Overview of the Human Genome Project
- Alterations in the Genetic Material / Mutations
- DNA Replication Processes & Steps / Transcription & Translation
- Mechanisms of DNA Repair
- Genome Editing and CRISPR
- Genetic Testing/ Genetic Counseling
- Genes, Environment and Genetic Complexity
- Types of Diseases/ Genetic Diseases
- Proto-oncogenes to Oncogenes to Cancer
- Types of Drugs / The Effects of Drugs / Drug Administration
- Experimental Language in Common Biological Techniques / Laboratory Equipment / About the Naked Mole Rat
- Bioethics/ The Principles of Bioethics/ Major Bioethical Issues

4.TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face,
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	e-class
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Understanding of science-related texts	study and analysis of bibliography	13
Understanding lectures Contributing effectively in discussions Improving academic writing skills	speaking, listening & writing activities	13
Project		14
Non-directed study		20
Total		**60**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	A written test at the end of the semester containing: • reading comprehension with short-answer questions • open-ended questions • multiple choice exercises • cloze tests • matching exercises • argumentative essay writing Evaluation criteria are known to the students

5.SUGGESTED READING

- Katsampoxaki Hodgetts K., Academic English for Biology, DISIGMA PUBLICATIONS, 2018
- Allan D., Lockyer K., Αγγλική Ορολογία στις Βιοϊατρικές Επιστήμες, BROKEN HILL PUBLISHERS LTD, 2018
- Lackie J.M. & Dow J.A.T., Ερμηνευτικό Λεξικό Κυτταρικής & Μοριακής Βιολογίας, Ιατρικές Εκδόσεις Π.Χ. ΠΑΣΧΑΛΙΔΗΣ

COURSE OUTLINE	**Introduction to Organismal Biology**

INSTRUCTORS	M. Chatzaki, Associate Professor

1.GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 112**	**SEMESTER**	**S**
COURSE TITLE	Introduction to Organismal Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	3	4	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01123/		

2.LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

A. Learning outcomes:

- Understand and describe the function of each system in animal physiology throughout main organismal models
- Realize and understand the principles in ecology and relate them with human life and society

B. Synthesis, interpretation and analysis:

- Interprete differences of organisms' functional systems with respect to their phylogenetic relationships and the natural selection
- Develop critical thinking about the connection between ecosystems function and human ecology

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Searching, data and information analysis and composition with the use of necessary technologies
- Autonomous work
- Production of new research ideas
- Awareness for the natural environment
- Promoting free, creative and inductive thinking

3.COURSE CONTENT

1. Histology

2. Homeostasis – thermoregulation
3. Neural system – sensorial organs - senses
4. Skin system – Skeletal system – Muscular system
5. Circulatory system
6. Respiratory system
7. Digestive system
8. Excretory system
9. Reproductive system - Development
10. Ecosystem ecology – Abiotic factors – Landscape ecology
11. Energy flow – Trophic relations – Biogeochemical cycles
12. Populations ecology
13. Community ecology

4.TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Understanding the function of various physiological systems in model organisms	Lectures Study	56
Understanding the principles in ecology in relation to human life and society	Lectures Study	28
Comparison of organisms' functional systems with respect to their phylogenetic relationships	Lectures Study Discussions and Interaction in Class	24
Development of critical thinking about the connection between ecosystems function and human ecology	Lectures Study Discussions and Interaction in Class	12
Total		**120**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Assessment methods** Written Examination with Multiple Choice Questions and short answer questions

5.SUGGESTED READING

1. Η Πανίδα της Ελλάδας-Βιολογία και Διαχείριση της Άγριας Πανίδας κ.ά 1η έκδοση 2020. Εκδόσεις Broken Hill Publishers Ltd Κύπρος, 2020 (κωδικός ΕΥΔΟΞΟΥ 86055696 και ο ISBN:

9789925575053)

2. Ζωική Ποικιλότητα: Βασικές αρχές Ζωολογίας με Εργαστηριακό Οδηγό. Hickman C.P., Kats L., Keen SL., Roberts, L.S., Larson, A., Eisenhour D.J. Επιμέλεια ελληνικής έκδοσης: Broken Hill Publishers Ltd, Κύπρος, 2020. (κωδικός ΕΥΔΟΞΟΥ 86055626, ISBN: 9789925575275)
3. Βιολογία. Αιμιλία Ζήφα, Ζήσης Μαμούρης, Κατερίνα Μούτου. Εκδόσεις Παν/μίου Θεσσαλίας. Εκδοση 2/2011 (κωδικός ΕΥΔΟΞΟΥ 68390699)

COURSE OUTLINE	**Organic Chemistry**

INSTRUCTORS	G. Boulougouris, Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 113**	**SEMESTER**	**1**
COURSE TITLE	Organic Chemistry		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	2	3	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Background		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01153/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course are:

- The knowledge of the structure, the stereochemistry and the electronic phenomena of organic compounds, as well as of the principles of their nomenclature, isomerism and spectroscopy
- The knowledge in molecular level of the structural and electronic differences of the organic functional groups, heterocylic aromatic compounds, aminoacids and carbohydrates which consist the main components of biological structures

Skills and competencies that students will acquire after successfully completing the course are:

• to recognise the different classes of Organic compounds, to name them, to compare their properties and solve issues in isomerism and nomenclature
• to distinguish electronic areas as rich or poor of electrons, to recognise the way the charge is moving and distributed throughout bonds and use this knowledge in mechanistic problems in biochemistry and molecular biology and genetics
• to distinguish the different kinds of stereochemistry and compare them using this knowledge at molecular level and three dimensional space
• to distinguish the different kinds of spectroscopy and their applications, mainly for IR and NMR spectroscopy
• to distinguish the different types of mechanisms of action of Organic Reactions and use this knowledge in issues in biochemistry and molecular biology and genetics
• to realize and analyse aromaticity
• to realize the basic chemistry and the characteristics of carbohydrates
• to estimate, analyse, evaluate and use the above knowledge in combination and at multiple levels

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies *Adaptation to new situations* *Decision making* *Autonomous work* *Team work* *Work in an international environment*	*Work in an interdisciplinary environment* *Production of new research ideas* *Project design and management* *Respect for diversity and multiculturalism* *Respect for the natural environment* *Development of social, professional and moral responsibility and gender sensitivity* *Promotion of free, creative and inductive thinking*

Research, analysis and synthesize of data and information, using the necessary technologies
Autonomous work
Team work
Production of new research ideas
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Introduction in Organic Chemistry, Relationships with other sciences and Biology
2. Isomerism
3. Nomenclature
4. Electronic Phenomena - Inductive Effect
5. Electronic Phenomena - Conjugation Effect
6. Stereochemistry
7. Introduction in Spectroscopy
8. IR Spectroscopy
9. NMR Spectroscopy
10. Mechanisms of Organic Reactions
11. Aromaticity, aromatic and heteroaromatic compounds
12. Introduction in basic characteristics and chemistry of carbohydrates
13. Overview of Organic Chemistry: Problems combining the obtained knowledge in all aspects of Organic Chemistry and analysis of the behavior of the molecules

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	**Activity**	**Workload (h)**
Contact and analysis of the knowledge	lectures	78
Analysis of the courses based on projects	practicum	20
Understanding and analysis of the courses	interactive teaching	19
Learning	Study at home	33
Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-*	Language of exams: Greek Type of exams: problem solving, short answer questions Evaluation criteria are known to the students

answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Are evaluation criteria known to the students?*	

5. SUGGESTED READING

1. Title: Οργανική Χημεία για τις Επιστήμες της Ζωής, Author: David Klein, Publisher: Οίκος: Utopia, 2015, ISBN: 978-618-5173-08-1, Evdoxos Code: 50657707
2. Title: Οργανική Χημεία, Επίτομο: Μέρος Πρώτο και Δεύτερο, Author: Νικολαΐδης Δημήτριος, Publisher: Ζήτη Πελαγία & Σια Ο.Ε., 1st publication 1996, ISBN: 978-960-456-291-6, Evdoxos Code: 13004940
3. Title: Επίτομη Οργανική Χημεία, Author: Βάρβογλης Αναστάσιος, Publisher: Ζήτη Πελαγία & Σια Ο.Ε., 1st publication 2005, ISBN: 960-431-948-5, Evdoxos Code: 10998
4. All lectures and proposed problems to solve are provided at the site of the coursewebsite

COURSE OUTLINE	**Physical chemistry & elementary biophysics**

INSTRUCTORS	Georgios Boulougouris, Assistant Professor

- **GENERAL**

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 114**	**SEMESTER**	**S**
COURSE TITLE			

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	4	5

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	General, Background , Skills Development
PREREQUISITE COURSES:	
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01228/

- **LEARNING OUTCOMES**

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course are:

- Introduction of mass and energy balance
- Introduction to the Molecular motion in gases and liquids
- Understanding of thermodynamic Equilibrium
- Linking macroscopic properties with molecular forces
- Understanding the thermodynamic Lows
- Introduction to Thermochemistry
- Introduction of the State functions and exact differentials
- Work and heat
- Understanding and measuring Entropy
- Understanding Phase equilibrium
- Irreversibility

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- **COURSE CONTENT**

• Introductory Mathematical backgroud
• Mass and energy conservation

- molecular motion of gasses and Liquids
- Equation of states
- The First Low
- Work and Heat
- The Second Low
- Entropy and irreversibility
- Phase Equilibrium
- Solutions
- open systems ,Gibbs free energy
- Chemical Equlibrium, Chemical Kinetics, and thermodynamics
- Separation techniques, and Structure of biomolecules

- **TEACHING and LEARNING METHODS - EVALUATION**

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of multimedia , interactive computational experiments
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Knowledge and understanding of basic principals, skill development in solving quadrative problems.	Lectures	39
skill development using interactive computational experiments	interactive computational experiments	13
Understanding the chemical properties of elements based on the electronic structure. Developing skills for solving interdisciplinary problems	Study	98
Sum		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation Language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Written exam, consisting of multiple choice questionnaires combined with short-answer questions short-answer questions open-ended questions numerical problem solving,

- **SUGGESTED READING**

1. Title : "ΦΥΣΙΚΟΧΗΜΕΙΑ ATKINS", ATKINS PETER - DE PAULA JULIO, ISBN: 978-960-524-431-6
2)Title : "Φυσικοχημεία Βιολογικών Συστημάτων" (Εύδοξος: 77119529), ISBN: 978-960-563-192-5
3)Title: "Physical Chemistry for the Biological Sciences , Hammes, ISBN 978-960-99858-3-3 (Both in English (ISBN: 9781118859148) and in greek)
4.) Title : "Επίτομη φυσικοχημεία" (Εύδοξος: 10999) , ISBN: 960-431-245-6
5.) Title : "ΒΙΟΦΥΣΙΚΗ" (Εύδοξος: 7755) ISBN: 978-960-8002-55-5

COURSE OUTLINE	**Biochemistry I**

INSTRUCTORS	Katsani A, Assistant Professor Mavromara P., Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 115**	**SEMESTER**	**S**
COURSE TITLE	Biochemistry I		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK** 3	**ECTS CREDITS** 4	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01119/		

2. LEARNING OUTCOMES

Learning outcomes

The learning outcomes of the course are the knowledge of the basic biochemical concepts, the introduction to the structure-function and chemical properties of biomolecules (protein, sugars, lipids, nucleic acids) with emphasis on proteins and amino acids finally the Introduction to enzymes and enzyme kinetics.

After the successful completion of the course the student will be able to:

- To know the Chemistry Concepts explaining the Properties of Biological Molecules
- To classify and name the biomolecules
- To comprehend the structure and function relationship.
- To comprehend the basics of the enzyme kinetic experiments.
- To use the acquired knowledge in a combinatorial way in order to interpret biological phenomena.

General Competencies

- Research, analysis and synthesize of data and information, using the necessary technologies
- Autonomous work
- Teamwork
- Promoting of free, creative and inductive thinking

3. COURSE CONTENT

1. INTRODUCTION TO BIOCHEMISTRY: Biochemistry: An Evolving Science.
2. THE WATER MOLECULE and the properties of its solutions
3. AMINO ACIDS : Structure and properties
4. PROTEINS I: Structure and properties
5. PROTEINS II: Protein groups-structure and function relationship
6. PROTEINS III: Protein denaturation and protein folding.
7. ENZYMES I: Basic Concepts
8. ENZYMES II: Enzyme Kinetics-1
9. ENZYMES III: Enzyme Kinetics-2
10. LIPID and MEMBRANES : Membrane Channels and Pumps

11. CARBOHYDRATES: Stereoisomers –Monosaccharides, Polysaccharides)- Glycoproteins
12. NUCLEIC ACIDS: structures and properties
13. Biochemistry Review – Specialized topics

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, laboratory education, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	<table><tr><th>Activity</th><th>Workload (h)</th></tr><tr><td>Lectures</td><td>39</td></tr><tr><td>student's study hours</td><td>81</td></tr><tr><td>Total</td><td>120</td></tr></table>
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	• Evaluation in Greek • multiple choice questionnaires • short-answer questions • problem solving YES

5. SUGGESTED READING

Eudoxus 77113116, BIOCHEMISTRY. 6TH American Edition – 1st Greek edition, 2019. Reginald H. Garrett, Charles M. GrishamISBN: 978-618-5173-40-1T. UTOPIA EDITIONS.
Eudoxus : 77107032. Biochemistry Basic Principles. 1st Greek edition, 2018. Tymoczko John, Berg Jeremy, Stryer Lubert. ISBN: 9789925563333. BROKEN HILL PUBLISHERS LTD

Eudoxus 77107011. Lehninger's Principles of Biochemsitry, 2nd edition, 2018. Nelson David L., Cox Michael M. ISBN: 9789925563203. BROKEN HILL PUBLISHERS LTD

Eudoxus 68370528. BIOCHEMISTRY. 1st ed. , 2017. Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto Jr., Lubert Stryer. ISBN: 978-960-524-495-8. Crete University Press.

COURSE OUTLINE	Genetics I

INSTRUCTORS	Maroulakou I., Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 116**	**SEMESTER**	
COURSE TITLE	Genetics I		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*			
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice,*	

fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	**Learning outcome** / **Activity** / **Workload (h)** (empty) / (empty) / (empty) (empty) / (empty) / (empty) **Total** / (empty)
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	

5. SUGGESTED READING

COURSE OUTLINE	Laboratory Course II

INSTRUCTORS	Katsani A., Assistant Professor Maroulakou I., Professor Dr Anestopoulos I. Malatos S., Tsikrikoni C., Laboratory Teaching Staff

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 117**	**SEMESTER**	**S**
COURSE TITLE	Laboratory Course II		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		4	5
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Skills Development		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/HEALTH113/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Upon successful completion of the course students will be able to:

- become familiar with the use of basic laboratory equipment
- perform experiments that are related to Organic Chemistry, Biochemistry and Genetics interpret and analyzes them
- critically evaluate how to select the appropriate methods for resolving a scientific question

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Searching, data and information analysis and composition with the use of necessary technologies
Autonomous and teamwork
Generation of new research ideas
Awareness for the natural environment
Promoting free, creative and inductive thinking

3. COURSE CONTENT

1. Seminar: Introduction to safety rules. Laboratory Solution Preparation
2. Purification - Recrystallization of Benzoic Acid

3. Extraction: Separation of an Acidic and Neutral Compound. Distillation: Demonstration by the teacher
4. Seminar: Physico-Chemical Techniques for Separation of Organic-Biological Molecules. Applications to Proteins
5. Isolation of Milk Proteins. Isoelectric Precipitation - Salting out
6. Chromatography Methods: Thin Layer & Gel Filtration Chromatography
7. Protein Determination by the Bradford Method
8. Determination of Phosphatase Enzyme Activity
9. Spectrophotometric Determination of Sugars
10. Detections of structural features: double bonds, carbonyls, sugars, amino acids
11. Blood Groups: ABO & Rhesus (D) typing
12. Dosage Compensation: Observing Barr Bodies
13. Genetic Exercise Training

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the E CTS*	

Learning outcome	**Activity**	**Workload (h)**
Become familiar with the use of basic laboratory equipment	Lectures Study Exercises	30
Perform experiments that are related to Organic Chemistry, Biochemistry and Genetics	Lectures Study Exercises	40
Interpretation and analysis of the experimental data	Exercises Laboratory tests Laboratory reports	40
Critically evaluate how to select the appropriate methods for resolving a scientific question	Lectures Study Exercises	40
Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation Language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other*	**Assessment language**: Greek **Assessment methods:** -Tests, Laboratory Reports - Final written examination

Are evaluation criteria known to the students?	

5. SUGGESTED READING

Title: “Security, theory and practice of laboratory exercises in General Chemistry”, K. Fylaktakidou

Course Notes: The course notes are available through the e-class platform.

COURSE OUTLINE	Biochemistry II

INSTRUCTORS	Katsani A, Assistant Professor, Mavromara P., Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 201**	**SEMESTER**	**A**
COURSE TITLE	BIOCHEMISTRY II		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK** 3	**ECTS CREDITS** 4	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01121/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The course aims to introduce the students to the basic metabolic pathways, to the coupled enzyme-catalyzed reactions of the human organism that lead to the necessary for its survival production of energy, reducing potential and biosynthetic molecules. In addition, the course focuses on the main metabolic pathway's regulation, the differentiating metabolic profile of key tissues, and the association of key metabolic processes with the required energy balance and human health status.

After the successful completion of the course the student will be able to:

1. To understand basic consepts such as anabolic and catabolic processes.
2. To comprehend basic concepts such as oxidation-reduction, thermodynamic reaction, energy load and their connection to biology.
3. To have the basic knowledge of the main metabolic pathways (see course contents) with their main metabolites and key enzymes
4. To comprehend the interdependence of metabolic pathways and to give examples of metabolic regulation and control.

General Competencies

- Research, analysis and synthesize of data and information, using the necessary technologies
- Autonomous work
- Teamwork
- Promoting of free, creative and inductive thinking

3. COURSE CONTENT

1. Metabolism-Basic concepts

2. Carbohydrate metabolism part I: glycolysis, glyconeogenesis
3. Carbohydrate metabolism part II: the glycogen metabolism (synthesis and degradation)
4. Carbohydrate metabolism part III: the phosphate pentose pathway and Calvin Cycle
5. Krebs Cycle-part I
6. Krebs Cycle-part II
7. Oxidative phosphorylation
8. The Light Reactions of Photosynthesis
9. Lipid metabolism I: β-oxidation
10. Lipid metabolism II: biosynthesis of fatty acids, triacyloglycerols, and cholesterol.
11. Amino acid catabolism (the urea cycle)
12. Nucleotide Biosynthesis
13. The Integration of Metabolism

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, laboratory education, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	<table><tr><th>Activity</th><th>Workload (h)</th></tr><tr><td>Lectures</td><td>52</td></tr><tr><td>student's study hours</td><td>98</td></tr><tr><td>Total</td><td>150</td></tr></table>
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation* *language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	• Evaluation in Greek • multiple choice questionnaires • short-answer questions • public presentation YES

5. SUGGESTED READING

Eudoxus 77113116, BIOCHEMISTRY. 6TH American Edition – 1st Greek edition, 2019. Reginald H. Garrett, Charles M. GrishamISBN: 978-618-5173-40-1T. UTOPIA EDITIONS.
Eudoxus : 77107032. Biochemistry Basic Principles. 1st Greek edition, 2018. Tymoczko John, Berg Jeremy, Stryer Lubert. ISBN: 9789925563333. BROKEN HILL PUBLISHERS LTD
Eudoxus 77107011. Lehninger's Principles of Biochemsitry, 2nd edition, 2018. Nelson David L., Cox Michael M. ISBN: 9789925563203. BROKEN HILL PUBLISHERS LTD
Eudoxus 68370528. BIOCHEMISTRY. 1st ed. , 2017. Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto Jr., Lubert Stryer. ISBN: 978-960-524-495-8. Crete University Press.

COURSE OUTLINE	Introduction to Molecular Biology Techniques

INSTRUCTORS	G. Skavdis, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 204**	**SEMESTER**	**A**
COURSE TITLE	Introduction to Molecular Biology Techniques		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		3	4
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific Field		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/modules/auth/opencourses.php?fc=42		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The main objectives of the course are:
a) to learn the principles underlying the basic techniques of Molecular Biology
b) to understand the applications of the basic techniques of Molecular Biology in Basic and Applied Research
c) to understand the practical applications of the basic techniques of Molecular Biology in various fields such as Health, Agriculture, enviornment etc.

Learning outcomes
Upon successful completion of the course the student is able:
• demonstrate an understanding of the principles underlying the basic molecular biology techniques and methodologies
• demonstrate an understanding of the applications of the main molecular biology techniques and methodologies and explain their impact
• to analyze, evaluate and interpret experimental data of the basic techniques and methodologies of molecular biology
• to design and propose experimental methodology to answer a simple question of molecular biology

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Application of knowledge to solve practical problems

- Development of research skills
- Autonomous work
- Production of new research ideas
- Development of critical thinking
- Promotion of free, creative and inductive reasoning
- Development of asssessment skills for a high quality experimental work
- Exposure to the workplace environment of the Molecular Biologist-Geneticist

3. COURSE CONTENT

1. A brief review of Molecular Biology history
2. Enzymes and their Use in Molecular Biology [Part A]
3. Enzymes and their Use in Molecular Biology [Part B]
4. Protein & Nucleic Acid Sequencing Methods [Part A]
5. Protein & Nucleic Acid Sequencing Methods [Part B]
6. Bacteria, phages and cloning vectors [Part A]
7. Bacteria, phages and cloning vectors [Part B]
8. Genomic & cDNA libraries
9. The PCR method
10. Methods of *in vitro* study of Nucleic Acid Study and Protein [Part A]
11. Methods of *in vitro* study of Nucleic Acids and Proteins [Part B]
12. Methods of *in vitro* study of Nucleic acids and Proteins [Part C]
13. Methods of *in vivo* study of gene function in the mouse

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	In order to support and develop the student's scientific thinking, participatory teaching methods are used. Therefore, the student not only acquires knowledge, but also develops experimental design and interpretation skills, while at the same time he cooperates with both his colleagues and the instructor.

Learning outcome	**Activity**	**Workload (h)**
demonstrate an understanding of the principles underlying the basic molecular biology techniques and methodologies	Lectures, work in the classroom, private study	40
demonstrate an understanding of the applications of the main molecular biology techniques and methodologies and explain their impact	Lectures, work in the classroom, private study	40

	to analyze, evaluate and interpret experimental data of the basic techniques and methodologies of molecular biology	Lectures, work in the classroom, private study	20
	to design and propose experimental methodology to answer a simple question of molecular biology	Lectures, work in the classroom, private study	20
	Total		**120**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Assessment methods:** Written Examination with Multiple Choice Questions (Formative, Concluding) The evaluation criteria are presented in the course guide available on the course's website.

5. SUGGESTED READING

1. Recombinant DNA, Watson D.A. (Greek translation) ISBN: 978-960-88412-5-3 Eudoxus Code: 2625.

2. Powerpoint presentations and handouts of the course (G. Skavdis, Alexandroupolis 2018)

COURSE OUTLINE	Molecular Biology I

INSTRUCTORS	Dr. R. Sandaltzopoulos, Professor Dr. G.P. Voulgaridou

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 205**	**SEMESTER**	**S (2nd)**
COURSE TITLE	Molecular Biology I		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	4	6

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course
PREREQUISITE COURSES:	No
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01211/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Learning goals and objectives:

a) Understanding basic concepts of Molecular Biology related to the flow of the genetic information and the nature of the genetic material.

b) Understanding the principles of transcription and the mechanisms of gene expression regulation in prokaryotic cells and phages.

Learning outcomes:

By the end of this course, students should:

- Understand the flow of genetic information
- Know the basic concepts on the nature of the genetic material
- Be familiar with the basic principles of transcription
- Know the mechanisms of gene expression regulation in prokaryotic cells and phages
- Apply critical thinking towards biological research
- Understand the importance of gene regulation

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesis of data and information, using relevant technologies
- Autonomous work

- Production of new research ideas
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Introduction: the flow of genetic information, the gene, the structure of the genetic material
2. Genetic code, effects of mutations
3. *cis*-regulatory elements, *trans*-acting factors
4. Basic principles of transcription
5. Exons and introns
6. Transcription in prokaryotic cells
7. The Sigma factors
8. Termination of transcription
9. The Operon
10. Regulatory circuits – An introduction
11. Regulatory circuits in prokaryotic cells
12. Phage strategies
13. Regulation of the lytic cycle and lysogeny

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Understand basic concepts of Molecular Biology (flow of the genetic information, nature of the gene, structure of the genetic material)	Lectures. Study and analysis of bibliography	15
Understand the genetic code, the effect of mutations, the differences between *cis*-regulatory elements and *trans*-acting factors	Lectures. Study and analysis of bibliography	25
Know and understand the principles of transcription and the role(s) of sigma factor in prokaryotic cells	Lectures. Study and analysis of bibliography	40
Know and understand operon structure, function and regulation	Lectures. Study and analysis of bibliography	20

	Know and understand regulatory circuits in prokaryotic cells	Lectures. Study and analysis of bibliography	40
	Know and understand phage strategies	Lectures. Study and analysis of bibliography	40
	Total		**180**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, , problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of evaluation**: Greek **Methods of evaluation**: multiple choice questionnaires, short answer questions, open-ended questions The evaluation criteria are known to the students

5. SUGGESTED READING

- Genes VIII. Lewin
- The Cell: A molecular approach. Geoffrey M. Cooper & Robert E.

COURSE OUTLINE	Cell Biology

INSTRUCTORS	Koffa Maria, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 206**	**SEMESTER**	**A**
COURSE TITLE	Cell Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	4	5	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific Field Course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01173/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course are:

- understanding the mechanisms that govern cell functions
- understanding the basic principles of the behavior, physiology and interaction of cells with their environment, at the microscopic and molecular level
- assessing the similarities and differences between different cell types

Learning outcomes:
Upon successful completion of the course the student acquires skills and knowledge to demonstrate:

- understanding of the basic principles of Cell Biology
- understanding of the basic organs of a eukaryotic cell, and the way they function
- understanding of the basic experimental approaches and new technologies emerging in Cell Biology
- understanding of the basic questions in the field of Cell Biology, and propose experimental designs for approaching such questions

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesis of data and information, using the necessary technologies
- Team work

- Production of new research ideas
- Promotion of free, creative and inductive thinking
- Exercising criticism and self-criticism

3. COURSE CONTENT

1. Cell Structure and Function Analysis - Methodology
   - Photonic Microscopy, Microscopic Fluorescence Techniques
   - Electron Microscopy
   - Immuno-cytochemistry
   - Cell fractionation, Chromatography
   - Electrophoresis
   - Cell cultures
2. Prokaryotes, eukaryotic cells, viruses, cellular organelles - structure and function (nucleus, mitochondria, ER, Golgi, chloroplasts, peroxisomes, lysosomes)
3. Nuclear cytoskeleton, nuclear pores
4. Protein synthesis and processing, protein function
5. Intracellular Compartments and transport: Nuclear-Cytoplasmic Transport
6. Intracellular compartments and transport: sorting, transport and secretion of proteins, endocytosis, exocytosis
7. Cell Membranes: Composition and Structure of Biomembranes – Permeability of membranes - Protein transporters - Ion channels
8. Cytoskeleton: intermediate filaments, microtubules,
9. Cytoskeleton: actin filaments, muscle contraction
10. Cell division, meiosis, cell cycle, cell cycle regulation
11. Cellular aging and cell death
12. Cellular communication and cell junctions
13. Stem cells, cancer cells, cell life and death in tissues

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
understanding of the basic principles of Cell Biology	Lectures, seminars, work in the classroom, student's study	40
understanding of the basic organs of a eukaryotic cell, and the way they function	Lectures, seminars, work in the classroom, student's study	40
understanding of the basic experimental approaches and new technologies emerging in Cell Biology	Lectures, seminars, work in the classroom, student's study	40

	understanding of the basic questions in the field of Cell Biology, and propose experimental designs for approaching such questions	Lectures, seminars, work in the classroom, student's study	30
	Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Evaluation methods**: Written final exams using multiple choice questionnaires, short-answer questions, open-ended questions, problem solving questions and written work Evaluation criteria are known to the students at the beginning of the semester

5. SUGGESTED READING

1. Molecular Biology of the Cell Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter, 2008
ISBN: 978-618-5173-29-6, Evdoxos code: 68401319

2. Molecular Cell Biology, Harvey Lodish, Arnold Berk, Chris Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelica Amon, Kelsey Martin
ISBN: 978-618-5173-39-5, Evdoxos code: 77113296

COURSE OUTLINE	Laboratory Course III

INSTRUCTORS	Koffa Maria, Associate Professor Kourkoutas Ioannis, Associate Professor Malatos Sotirios, Laboratory Teaching Staff

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 207**	**SEMESTER**	**A**
COURSE TITLE	Laboratory Course III		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	4	5	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course, Skills development		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01218/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course:

- understand the basic principles of Cell Biology and Molecular Microbiology as well as gaining practical experience in basic laboratory methods.
- familiarize the students with the laboratory space, the use of specific instruments, the preparation of solutions and buffers to be used during the experimental process, followed by the laboratory exercises.

Learning outcomes:

Upon successful completion of the course the student acquires the following skills and knowledge to:

- Understand the basic principles in the field of Cell Biology, and Molecular Microbiology
- Prepare solutions, buffers and media commonly used for the laboratory exercises
- Understand the experimental approaches of basic Cell Biology techniques
- Prepare microbial cultures and determine the number of live cells in biological samples
- Determine the susceptibility of microbes to antimicrobial agents (antibiograms)
- Understand the experimental approaches in Microbiology and related basic and emerging technologies
- Analyze and interpret experimental results in Cell Biology and Microbiology
- Suggest solutions to problems / questions in Cell Biology and Microbiology, formulate hypothesis and design appropriate methodological approaches
- Improve critical thinking, problem-solving abilities and communication

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using *Work in an interdisciplinary environment*

the necessary technologies *Adaptation to new situations* *Decision making* *Autonomous work* *Team work* *Work in an international environment*	*Production of new research ideas* *Project design and management* *Respect for diversity and multiculturalism* *Respect for the natural environment* *Development of social, professional and moral responsibility and gender sensitivity* *Promotion of free, creative and inductive thinking*

- Research, analysis and synthesis of data and information, using the necessary technologies
- Team work
- Autonomous work
- Exercising criticism and self-criticism
- Production of new research ideas
- Promotion of critical, problem-solving thinking
- Adaptation to new situations
- Production of new research ideas

3. COURSE CONTENT

• Introduction to the laboratory, preparation of solutions
• Aseptic methods in microbiology, medium preparation, sterilization
• Sterile culture preparation: Preparation of liquid and solid microbial cultures.
• Determination of bacterial number by serial dilutions. Isolation of lactic acid bacteria from dairy products.
• Microbial susceptibility to antimicrobial agents. Antimicrobial activity of essential oils. Antibiograms.
• Fixation and Gram staining. Microscopy observation. Observation of mouth microbial flora.
• Fixation of specimens for observation of mitosis under a microscope.
• Cell culture of attached and cells in suspension. Cell count.
• Tissue homogenization. Proteins extraction from tissue. Cell fractionation.
• Preparation of SDS polyacrylamide gel. Protein electrophoresis.
• Transfer of proteins to a nitrocellulose membrane. Non-specific blocking.
• Western blotting: Incubation with primary and secondary antibody. Visualization using the Chemidoc system. Analysis of the results with the corresponding software (Image Lab).

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	The interactive teaching method is used to assist the development of the student's scientific thinking in the class. This way, the student not only acquires knowledge, but also develops the skills of experimental design and results interpretation, while at the same time learns to work together with both his colleagues and the lecturer.

Activity	Workload (h)
Interactive teaching	10
Laboratory practise/work	40
Student's study	50
Project writing	50
Total	**150**

STUDENT PERFORMANCE EVALUATION	**Assessment language**: Greek **Evaluation methods**:

Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Are evaluation criteria known to the students?*	• Written assignments / lab reports • Writting of a scientific assay Evaluation criteria are known to the students at the beginning of the semester

5. SUGGESTED READING

2. Title: Microbiology Laboratory Handbook
Authors: J.M. Miller.
Publisher: Parisianou Publications S.A.
Publication year: 2011.
ISBN: 978-960-394-782-0.
Eudoxos code: 12632043.

Course Notes:
Scientific articles and reviews, related websites, articles and videos are posted on the course's e-class website:
1. Title: Notes on Molecular Microbiology Laboratory Exercises.
Author: I. Kourkoutas.
Date & Place of Publication: Department of Molecular Biology & Genetics-DUTH, Alexandroupolis, 2010.
2. Title: Cell Biology Laboratory Exercise Notes.
Author: M. Koffa.
Date & Place of Publication: Department of Molecular Biology & Genetics-DUTH, Alexandroupolis, 2015.

COURSE OUTLINE	Genetics II

INSTRUCTORS	Fakis G., Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ**	**SEMESTER**	
COURSE TITLE	Genetics II		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*			
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice,*	

fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	**Learning outcome** / **Activity** / **Workload (h)** (empty) / (empty) / (empty) (empty) / (empty) / (empty) **Total** / (empty)
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	

5. SUGGESTED READING

COURSE OUTLINE	Introduction to biomolecules structure

INSTRUCTORS	Vasiliki Fadouloglou, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 213**	**SEMESTER**	**F**
COURSE TITLE	Introduction to biomolecules structure		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	3	4

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course
PREREQUISITE COURSES:	no
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	no
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01254/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Course objectives

- Basic knowledge of Structural Biology
- Basic knowledge of the architecture of macromolecular structure
- Skills on molecular graphics programs

Learning outcomes

After the successful completion of the course the student can

- Understand the basic principles of Structural Biology
- Understand the basic elements of protein structure architecture
- Use molecular graphics programs to study the protein structure

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Analysis and synthesis of data and information
Production of new research ideas
Promotion of free, creative and inductive thinking
Decision making
Adaptation to new situations
Project design and management

3. COURSE CONTENT

Introduction-Summary, basic principles of Structural Biology. Chemistry of biomolecules, chemistry of water, molecular interactions, amino acids.

Methodologies of Structural Biology- X-ray scattering and diffraction. Crystals and X-ray Crystallography. Principles of Microscopy. Principles of cryo electron microscopy and 3D particle reconstitution. Principles of electron crystallography. Principles of NMR (nuclear magnetic resonance) and neutron diffraction. Protein Data Bank (PDB). Molecular graphics.

Protein structure I- Peptide chain, peptide bond, amino acid residues, dihedral angle, ϕ, ψ,ω dihedral angles, stereochemistry of amino acid side chains, Ramachandran plots.

Protein structure II- Secondary structure elements and motifs. Helices, β-strands, turns and loops.
Protein structure III- Structural motifs and their spatial organization. Structural domains. Protein structure classification (the databases SCOP and CATH), protein structure comparison (DALI and FSSP).
All alpha domains- globin fold, coiled coil, 4-alpha-helical bundles. Geometry of interactions between α-helices.

Alpha/beta domains- α/β TIM barrel folding, Rossmann fold, horseshoe fold. Geometry and topology of α/β-barrels. Structures of enzymes.

Beta domains- topologies of β-motifs (β-meander motif, greek key, jelly roll). Topology diagrams, β-barrel topology, β-sandwiches. Structures of γ-crystalin, concavalin, lipocalin. Structures of β-propeller and β-helix.

Nucleic acids structure- Structure of DNA (B, A, Z), structural basis of DNA recognition by proteins, DNA structure plasticity. Structure of RNA.

Nucleoprotein complexes I- Structure of prokaryotic transcription factors, HLH and HTH motifs, structures of DNA complexes with lamda, lac, Cro, 434 and 434Cro repressors, trp and CAP protein.
Nucleoprotein complexes II- Structure of eukaryotic transcription factors, homodomains, POU, zinc fingers, leucine zippers, b/HLH, b/HLH/z and β-motifs of DNA binding.

Structural basis of signalling- structure, function and regulation of G-proteins, structure and regulation of Ras protein, GTPases, tyrosine kinases etc.

Structural basis of enzymatic catalysis- Introduction to catalytic mechanisms. Structure-function of serine proteases, EcoRI, tyrosil-tRNA synthase, lysozyme. Structure-function of antibodies.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	Students are encouraged to actively participate in the delivery process through an interactive teaching procedure. Thus, students acquire in depth knowledge of the field and develop the skills of experimental design and interpretation of the results. Moreover, students learn how to collaborate with their colleagues and teacher.

	<table><tr><th>Learning outcome</th><th>Activity</th><th>Workload (h)</th></tr><tr><td>To understand the basic principles of Structural Biology</td><td>Lectures, non-directed study, laboratory practice</td><td>40</td></tr><tr><td>To understand the basic elements of protein architecture</td><td>Lectures, non-directed study, laboratory practice</td><td>40</td></tr><tr><td>To study the protein structure using molecular graphics programs</td><td>Lectures, non-directed study, laboratory</td><td>40</td></tr><tr><td colspan="2">Total</td><td>120</td></tr></table>
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Evaluation language: greek Methods of evaluation: written examination by multiple choice questions written examination by short-answer questions written examination by problem solving written examination by open-ended questions

5. SUGGESTED READING

Introduction to Protein Structure, Carl Branden & John Tooze
A no mathematic introduction to protein crystallography, Nicholas Glykos

COURSE OUTLINE	Molecular Biology II

INSTRUCTORS	Katerina Paleologou, Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**MBG214**	**SEMESTER**	**A**
COURSE TITLE	Molecular Biology II		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		4	5
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01232/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The learning aim of the course is the acquisition of in depth knowledge on:

a) the structure and function of the various ribonucleic acids (RNA) with emphasis on the RNAs involved in translation (*i.e.* mRNA, tRNA, rRNA).

b) the molecular events taking place during the prokaryotic and eukaryotic translation.

c) the various mechanisms of protein sub-cellular translocation in eukaryotes and prokaryotes.

d) the molecular events taking place during the eukaryotic and prokaryotic replication.

Upon successful completion of the course, the students should know and understand:

The structure, the life cycle and the sub-cellular localization of prokaryotic and eukaryotic mRNA

The maturation process and the structure of tRNA and its role in translation

The structure of prokaryotic and eukaryotic ribosomes and their role in translation

The molecular events taking place during the various stages of prokaryotic and eukaryotic translation and the various factors involved in these stages

The structure, function and proofreading mechanisms of aminoacyl-tRNA synthetases

The characteristic features of the genetic code, the deviations from the standard genetic code and the various recoding phenomena

The co-translational and post-translational protein targeting in prokaryotes and eukaryotes

The structure and function of the major families of molecular chaperones

The major structural features and functions of the ubiquitin-proteasome proteolytic pathway

The structure, function and proofreading mechanisms of DNA-polymerases

The molecular events taking place during prokaryotic and eukaryotic DNA replication and the various factors involved in these processes

The various mechanisms of DNA replication including the mechanism of replication of mitochondrial DNA

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information	*Work in an interdisciplinary environment*
Adaptation to new situations	*Production of new research ideas*
Decision making	*Project design and management*
Autonomous work	*Respect for diversity and multiculturalism*
Team work	*Respect for the natural environment*
Work in an international environment	*Development of social, professional and moral responsibility and gender sensitivity*
	Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies, autonomous work, production of new research ideas, exercise judgment and self-judgment, promotion of free, creative and inductive thinking.

3. COURSE CONTENT

1. The messenger RNA (mRNA)
2. The transfer RNA (tRNA)
3. The aminoacyl-tRNA synthetases and the aminoacylation of tRNA
4. The ribosomal RNA (rRNA) and ribososmes
5. Translation in prokaryotes and eukaryotes: initiation
6. Translation in prokaryotes and eukaryotes: elongation
7. Translation in prokaryotes and eukaryotes: termination
8. Genetic code: characteristic features, deviations, recoding
9. Major systems of molecular chaperones: structure and function
   The ubiquitination-proteasome pathway
10. Protein sorting in eukaryotes: co-translational and post-translational targeting
11. Protein sorting in prokaryotes: co-translational and post-translational targeting
12. DNA polymerases: structure, function, proofreading
13. DNA replication in prokaryotes and eukaryotes

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
To know and understand the structure, the life cycle and the sub-cellular localization of prokaryotic and eukaryotic mRNA	Lectures, interactive teaching, study at home	20
To know and understand the maturation process and the structure of tRNA and its role in translation	Lectures, interactive teaching, study at home	10
To know and understand the structure of prokaryotic and eukaryotic ribosomes and their role in translation	Lectures, interactive teaching, study at home	10

	To know and understand the molecular events taking place during the various stages of prokaryotic and eukaryotic translation and the various factors involved in these stages	Lectures, interactive teaching, study at home	35
	To know and understand the structure, function and proofreading mechanisms of aminoacyl-tRNA synthetases	Lectures, interactive teaching, study at home	5
	To know and understand the characteristic features of the genetic code, the deviations from the standard genetic code and the various recoding phenomena	Lectures, interactive teaching, study at home	10
	To know and understand the co-translational and post-translational protein targeting in prokaryotes and eukaryotes	Lectures, interactive teaching, study at home	10
	To know and understand the structure and function of the major families of molecular chaperones	Lectures, interactive teaching, study at home	6
	To know and understand the major structural features and functions of the ubiquitin-proteasome proteolytic pathway	Lectures, interactive teaching, study at home	4
	To know and understand the structure, function and proofreading mechanisms of DNA-polymerases	Lectures, interactive teaching, study at home	20
	To know and understand the molecular events taking place during prokaryotic and eukaryotic DNA replication and the various factors	Lectures, interactive teaching, study at home	10
	To know and understand the various mechanisms of DNA replication including the mechanism of replication of mitochondrial DNA	Lectures, interactive teaching, study at home	10
	Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-*	**Language of evaluation:** Greek • Written mid-term exams containing multiple choice questions • Written mid-term exams containing “right or wrong” questions • Written mid-term exams containing short-answer questions

answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Are evaluation criteria known to the students?*	• Written mid-term exams containing open-ended questions • Written final exams containing multiple choice questions • Written final exams containing "right or wrong" questions • Written final exams containing short-answer questions • Written final exams containing open-ended questions *The evaluation criteria are presented by the instructor on the first lecture and can be also found on the course website.*

5. SUGGESTED READING

5. Genes VIII, B. Lewin, Academic Publications J. Basdra & Co., Alexandroupolis, 2004, ISBN: 978-960-99895-9-6, Evdoxos code: 33133226
6. Basic Principles of Molecular Biology, B.E. Tropp, Academic Publications J. Basdra & Co., Alexandroupolis, 2014, ISBN: 978-618-5135-01-0, Evdoxos code: 41959952
7. Powerpoint presentations on eclass updated on an annual basis.

COURSE OUTLINE	Molecular Microbiology

INSTRUCTORS	Ioannis Kourkoutas, Associate Professor Katerina Chlichlia, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 215**	**SEMESTER**	**C**
COURSE TITLE	Molecular Microbiology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK** 3	**ECTS CREDITS** 4	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01117/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The course objectives of the course are:

a) Understanding of the basic principles governing the science of microbiology.
b) Understanding the molecular mechanisms that govern the structure, function and integration of microorganisms into their environment.
c) Understanding microbial life at the molecular level and clarifying the complete genetic "recipe" of microorganisms (genomic analysis).
d) Understanding the fundamental social and economic applications in medicine, industry, agriculture and biotechnology.

Learning results:

Upon successful completion of the course the student will:
• Know the basic principles of microbiology.
• Understand microbial life at the molecular level.
• Know and understand the basic molecular mechanisms that govern the structure, function and integration of microorganisms into their environment.
• Understand the evolutionary microbial associations.
• Understand the potential of micro-organisms in biotechnological applications.
• Understand the integral role of microorganisms in human biology.
• Know and understand the emerging technologies in Microbiology.
• Suggest solutions to microbiology problems / questions, formulating hypotheses and designing appropriate methodological approaches.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Analysis and synthesis of data and information.
- Creation of new research ideas.
- Promote free, creative and inductive thinking.
- Decision making.

3. COURSE CONTENT

1. **Microorganisms and Microbiology.** Overview of microbial life, Microbial macromolecules.
2. **Cell Structure and Function:** Cell morphology, Prokaryotic cell wall, Microbial movement, Surface structures and prokaryotic inclusions, Endospores.
3. **Nutrition, Laboratory Cultivation and Metabolism of Microorganisms.**
4. **Microbial Growth:** Cell Growth, Environmental Impacts on Microbial Growth.
5. **Microbial Evolution**: Primitive Life: The World of RNA, Endosymbiosis, Biological Classification Systems, New Classification Methods, Evolutionary History Timers, The Species Concept.
6. **Classification of Bacteria-Part I:** Proteobacteria: Nitrifying bacteria, Sulphur-oxidizing and Iron-oxidizing bacteria, Hydrogen-oxidizing bacteria, Methanotrophic and Methyltrophic bacteria, *Pseudomonas*, Acetic acid bacteria, Non-symbiotic aerobic nitrogen-binding bacteria, Enterobacteria, Ricketssia, Filamentous bacteria, Myxobacteria, Sulfate and Sulfur-reducing Proteobacteria. Gram (+) bacteria: *Staphylococcus*, Lactic acid bacteria.
7. **Classification of Bacteria-Part II:** *Listeria*, *Bacillus*, *Clostridium*, *Mycoplasma*, Corynebacteria, Propionic acid bacteria, Mycobacteria, *Streptomyces*. Cyanobacteria, *Chlamydia*, Verrucomicrobia, Flavobacteria, *Cytophaga*, Green sulfur bacteria, Spirochetes, Deinococci, Green non-sulfur bacteria, Hyperthermophiles with early phylogenetic branches.
8. **Classification of Archaea:** Crenarchaeota, Euryarchaeota, Evolution and life at high temperatures.
9. **Classification of Eukaryotic Microorganisms:** Overview of eukaryotic genetics, Protozoa, Fungi, Algae.
10. **Virology:** General properties of viruses, virus quantification, viral proliferation, bacteriophages, animal viruses, retro-viruses, viruses and prion proteins.
11. **Control of Microbial Growth-Antimicrobial Factors:** Determination of antimicrobial activity, Antiseptics, disinfectants, and sterilizers, Synthetic antimicrobial drugs (growth factor analogs, quinolones), Natural antimicrobial drugs-Antibiotics (antibiotics affecting protein synthesis, antibiotics affecting transcription, β-Lactam antibiotics, Prokaryotic antibiotics, Antifungal drugs, New antibiotics), Antiviral drugs, Antimicrobial resistance, Research on new antimicrobial drugs.
12. **Pathogenesis of Microorganisms-Microbial Toxins:** Pathogenicity and Infection, Adhesion, Invasion, Infection and infectious factors, Toxins, Host factors in infection and disease.
13. **Biotechnological Microbial Applications:** Bacteria applications, Yeast applications, Antibiotic production, Enzymes production.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.*	Interactive teaching methods are used to assist the development of the student's scientific thinking. In this way, the student not only acquires new information and knowledge, but also develops the skills of experimental design and interpretation of results, while working with both his colleagues and the teacher at the same time.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
Know the basic principles of microbiology	Lectures, study at home	15
Understanding microbial life at the molecular level	Lectures, class work, study at home	15
Know and understand the basic molecular mechanisms governing the structure, function and integration of microorganisms into their environment	Lectures, class work, study at home	15
Know and understand the microbial evolutionary associations	Lectures, study at home	15
Know and understand the potential of micro-organisms in biotechnological applications	Lectures, class work, study at home	15
Understand the role of microorganisms in human biology	Lectures, class work, study at home	15
Know and understand the emerging technologies in microbiology	Lectures, class work, study at home	15
Suggest solutions to microbiology problems / questions, formulating hypotheses and designing appropriate methodological approaches	Lectures, class work, study at home	15
Total		**120**

STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation language, methods of evaluation, types of exams, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Are evaluation criteria known to the students?

Language of evaluation: Greek

Methods of evaluation
Written exams (multiple choice)
Written exams (short answer questions)
Written exams (extended answer questions)
Written exams (problem solving questions)

The evaluation criteria are known to the students through the *e-class* platform.

5. SUGGESTED READING

8. Title: Brock Biology of Microorganisms.
Authors: M. T. Madigan, J.M. Martinko, K. S. Bender, D. H. Buckley & D. A. Stahl.
Publisher: Foundation for Research and Technology-Crete University Press.
Publication year: 2018.
ISBN: 978-960-524-523-8.
Eudoxus code: 77106995.

2. Title: Microbiology and Microbial Technology.
Authors: G. Aggelis.
Publisher: Stamoulis Publications S.A.
Publication year: 2007.
ISBN: 978-960-351-717-7.
Eudoxus code: 22904.

Course Notes
Course notes are available through the *e-class* platform.
1. Title: Molecular Microbiology Notes.
Authors: I. Kourkoutas.
Publication date & place: Department of Molecular Biology & Genetics-DUTH, Alexandroupolis, 2010.

COURSE OUTLINE	Physiology

INSTRUCTORS	Aglaia Pappa, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 217**	**SEMESTER**	**Spring D (4th)**
COURSE TITLE	Physiology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		4	5
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01193/		

2. LEARNING OUTCOMES

Learning outcomes
Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Upon successful completion of the course the student is able to:

- Know the basic principles of homeostasis that are central to Physiology and the mechanisms that regulate them
- Know and understand the basic mechanisms of cell communication at the intercellular and multicellular level
- Know and understand how molecular mechanisms and cellular functions through clear causal sequences are integrated for the coordinated systems functioning and homeostasis of the organism
- Know and compare the functions of differentiated cell types of the body, as well as link their function to systemic physiology and specialized function
- Know and develop the basic principles of neuronal and hormonal communication
- Know and understand the functions of the mammalian nervous, muscular, cardiovascular, respiratory, renal, digestive and reproductive systems
- Understand and analyze endocrine regulation of metabolism and development
- Compose around the central idea of homeostasis concepts and information from the cellular to the systemic level
- Reflect, analyze and interpret physiological or pathophysiological responses
- Understand, through the introduction of new ideas and modern hypotheses, the rapid progress and dynamic nature of Physiology as a science and propose new methodological approaches based on developments in the field of Molecular Biology

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data information using the necessary methodologies
- Production of new research ideas
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Fundamental concepts in physiology
2. Homeostasis and mechanisms of regulation
3. Nervous system
4. General and special senses - Nervous system
5. Principles of function of hormonal control systems
6. Muscle tissue
7. Cardiovascular system
8. Respiratory system
9. Urinary system - Kidney functions
10. Digestive system
11. Endocrine and Nervous Control and Completion of Organic Metabolism of compounds
12. Controlling Growth and Development - Growth Hormonal Effects
13. Physiology of Reproduction - Sex Hormones

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	Lectures, use of e-class and new technologies, laboratory exercise in conjunction with Laboratory Course IV, study and analysis of literature

Learning outcome	**Activity**	**Workload (h)**
Know the basic principles of physiology and the regulation mechanisms	Lectures Study and analysis of bibliography	10
Know and understand the functions of the systems of the human body and the basic molecular and cellular mechanisms that regulate them	Lectures Study and analysis of bibliography	60

	Analyze and interpret physiological responses of systems to given stimuli based on the analysis of reflective homeostasis mechanisms	Lectures Interactive teaching Study and analysis of bibliography	30
	Compose around the central idea of homeostasis concepts and information from the cellular to the systemic level	Lectures Interactive teaching Study and analysis of bibliography	30
	Analyze and interpret experimental data in Physiology	Interactive teaching Study and analysis of bibliography	10
	Formulate hypotheses and design appropriate methodological approaches to current proposed science-related topics	Interactive teaching Study and analysis of bibliography	10
	Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of Evaluation**: Greek **Methods of evaluation** Written exams with multiple choice questionnaires, short/extended-answer questions, open-ended questions and problem solving Evaluation criteria are known to the students and are presented in the course work guide available on the course website.

5. SUGGESTED READING

Suggested Textbooks

- Introduction to Human Physiology (Greek translation). Lauralee Sherwood**.** Academic Publications J.Basdra & Co., 2014 (ISBN: 9786185135027). EUDOXOS code: 41959951.

- Human Physiology – The mechanisms of body function (Greek translation)**.** Vander A., Sherman J., Luciano D. BROKEN HILL PUBLISHERS LTD (ISBN: 9789604892259). EUDOXOS code: 13257031

Course notes and presentations are available through the e-class platform (https://eclass.duth.gr/courses/ALEX01193/.

COURSE OUTLINE	Gene Expression and Cell Signaling

INSTRUCTORS	Kolovos P., Assistant Professor Sandaltzopoulos R., Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 218**	**SEMESTER**	
COURSE TITLE	Gene Expression and Cell Signaling		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		4	5
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01214/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Course objectives:
• To understand the basic concepts of Molecular Biology related to eukaryotic gene expression and realise the multilevel and complex regulatory mechanisms.
• To develop analytical and critical synthesis skills.
• To understand the importance of the molecular mechanisms, by focusing on the understanding of the principles of regulatory phenomena, considering memorizing detailed information as of minor importance.
• To learn the basic principles of eukaryotic gene expression regulation in the context of the dynamic organization of chromatin structure.
• To learn the basic principles governing the molecular mechanisms of cellular signaling

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesis of data and information, using relevant technologies
Development of social, professional and moral responsibility
Autonomous work
Team work
Production of new research ideas
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. The structure of genetic material in eukaryotic organisms
2. The chromosome
3. Telomeres and structural stability of chromosomes
4. Structure and organization of genetic material in nucleosomes
5. Nucleosomes during DNA replication
6. Activation of transcription in eukaryotes
7. Families of transcription factors
8. Regulation of transcription factors
9. Regulation of chromatin structure
10. Chromatin structure and regulation of gene expression
11. Molecular basis of epigenetic phenomena
12. RNA splicing and processing
13. Alternative splicing

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	**Activity**	**Workload (h)**
Understand chromosome structure, its structural features, the mechanisms of ensuring equal separation of daughter cells during division and the role of telomeres in chromosome stability	Lectures and homework study	38
Understand the mechanism of transcription by the 3 RNA polymerases in eukaryotic organisms	Lectures and homework study	22
Understand the dynamic structure if nucleosome, its modifications and its role in regulating gene expression	Lectures and homework study	30
Understand the structure, mode of action and regulation of transcription factors	Lectures and homework study	30
Understand the mechanism of RNA splicing and the contribution of alternative splicing in its regulation	Lectures and homework study	30
Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Assessment language: Greek Assessment Method: • Written evaluation with multiple choice questions (Formative, Conclusive) • Written evaluation with short answer questions (Formative, Conclusive) • Written evaluation with extensive answer questions (Formative, Conclusive) • Homework (problem solving with written work)

5. SUGGESTED READING

1. GENES 8-Lewin, Greek edition
2. The Cell: A Molecular Approach, 7th Edition, Geoffrey M. Cooper & Robert E. Hausman,
3. Concepts of Genetics, 11th ed. Klug, Cummings, Spencer, Palladino.

COURSE OUTLINE	Laboratory Course IV

INSTRUCTORS	Aglaia Pappa, Associate Professor Maria Alexiou Chatzaki, Associate Professor Chrysa Tsikrikoni, Laboratory Teaching Staff

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 219**	**SEMESTER**	**Spring D (4th)**
COURSE TITLE	Laboratory Course IV		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	4	5	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course, Skills development		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01229/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Through the teaching processes (formulation of questions, classroom discussion, written assignments, laboratory practice and computer problem solving) and home study, the student will have achieved to:

A) At the level of knowledge/understanding:

- Become familiar with anatomy equipment and perform small manipulations for microscopic observation
- Recognize the basic structure and function of experimental models
- Develop experimental design skills
- Get familiar the key operating systems of organisms
- Understand the basic principles of cell physiology and the molecular mechanisms that regulate them as well as the basic principles of biological control systems

B) At the level of analysis/interpretation

- Develop, analyze, and evaluate experimental results
- Strengthen basic knowledge of organism physiology with the help of interactive surveillance tools and experimental training
- Compose and analyze comparatively human operating systems

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment

Team work *Work in an international environment*	*Development of social, professional and moral responsibility and gender sensitivity* *Promotion of free, creative and inductive thinking*

- Research, analysis and synthesize of data information using the necessary methodologies
- Autonomus work/Team work
- Production of new research ideas
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Drosophila anatomy
2. Muscular System – Movement function
3. Circulatory system
4. Digestive system
5. Reproductive system - Birth & death
6. Neurophysiology
7. Skeletal muscle physiology
8. Energetics of muscle contraction
9. Blood Cells: Hematocrit Determination, Erythrocyte Count, Hemostasis, Blood Coagulation, Leukocyte Count and Leukocyte Type Determination
10. Frog Cardiac System
11. Physiology of kidney function
12. Mammalian digestive enzymes
13. Instructions for writing laboratory reports

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	Use of e-class and new technologies, wet / dry lab, study and analysis of literature

Learning outcome	**Activity**	**Workload (h)**
Familiarity with handling anatomy tools and microscopy for microscopic observation and development of experimental lab skills	Laboratory practice	35
Identification of the basic structure and function of experimental models	Laboratory practice Study and analysis of bibliography	15

	Clarification and understanding of key operating systems of organisms	Laboratory practice Study and analysis of bibliography	30
	Understanding the physiology of organisms at the cellular and molecular level	Laboratory practice Study and analysis of bibliography	30
	Strengthening basic knowledge of organism physiology	Laboratory practice Study and analysis of bibliography	10
	Analysis, processing, evaluation and presentation of the experimental results	Laboratory practice Lab report Study and analysis of bibliography	30
	Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of Evaluation**: Greek **Methods of evaluation** • Written examination with multiple choice and short answer questions (50%) • Written-assignments/Lab reports (50%) Evaluation criteria are known to the students and are presented in the course work guide available on the course website.

5. SUGGESTED READING

Suggested Textbooks

- Introduction to Human Physiology (Greek translation). Author(s): Lauralee Sherwood**.** Publishing Company: Academic Publications J. Basdra & Co., 2014 (ISBN: 9786185135027). EUDOXOS code: 41959951.
- Human Physiology – The mechanisms of body function (Greek translation)**.** Author(s): Vander A., Sherman J., Luciano D. Publishing Company: BROKEN HILL PUBLISHERS LTD (ISBN: 9789604892259). EUDOXOS code: 13257031
- Physiology – Laboratory manual (in Greek). Author(s): A. Pappa. Publishing Company: Department of Molecular Biology & Genetics, Democritus University of Thrace Place & Year of Publishing: Alexandroupolis, 2018
- Laboratory practicals (in Greek). Author(s): Maria Alexiou Chatzaki

Course notes and presentations are available through the e-class platform https://eclass.duth.gr/courses/ALEX01229/.

COURSE OUTLINE	Molecular Biology Techniques

INSTRUCTORS	G. Skavdis, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 303**	**SEMESTER**	**A**
COURSE TITLE	Molecular Biology Techniques		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	3	5

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific Field
PREREQUISITE COURSES:	-
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/modules/auth/opencourses.php?fc=42

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The main objectives of the course are:
a) to learn the principles underlying the advanced techniques of Molecular Biology
b) to understand the applications of the advanced techniques of Molecular Biology in Basic and Applied Research
c) to understand the practical applications of the advanced techniques of Molecular Biology in various fields such as Health, Agriculture, enviornment etc.

Learning outcomes
Upon successful completion of the course the student is able:
• demonstrate an understanding of the principles underlying the advanced molecular biology techniques and methodologies
• demonstrate an understanding of the applications of the advanced molecular biology techniques and methodologies and explain their impact in research
• demonstrate an understanding of the applications of the advanced molecular biology techniques and methodologies and explain their impact in Health, Agriculture etc
• to analyze, evaluate and interpret experimental data of the advanced techniques and methodologies of molecular biology
• to design and propose experimental methodology to answer a complex question of molecular biology

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Development of research skills
- Production of new research ideas
- Development of critical thinking
- Promotion of free, creative and inductive reasoning
- Decision making
- Project design
- Exposure to the workplace environment of the Molecular Biologist-Geneticist

3. COURSE CONTENT

1. Gene Identification Methods [Part A]
2. Gene Identification Methods [Part B]
3. Expression and purification of proteins [Part A]
4. Expression and purification of proteins [Part B]
5. *In vitro* mutagenesis
6. Genetically modified animals (Part A: Mouse)
7. Genetically modified animals [Part B: Drosophila]
8. Genetically modified plants
9. Gene silencing methods
10. Microarrays
11. Next Generation sequencing
12. CRISPR and gene editing [Part A]
13. CRISPR and gene editing [Part B]

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	In order to support and develop the student's scientific thinking, participatory teaching methods are used. Therefore, the student not only acquires knowledge, but also develops experimental design and interpretation skills, while at the same time he cooperates with both his colleagues and the instructor.

Learning outcome	**Activity**	**Workload (h)**
demonstrate an understanding of the principles underlying the advanced molecular biology techniques and methodologies	Lectures, work in the classroom, private study	50
demonstrate an understanding of the applications of the advanced molecular biology techniques and methodologies and explain their impact in research	Lectures, work in the classroom, private study	25

	demonstrate an understanding of the applications of the advanced molecular biology techniques and methodologies and explain their impact in Health, Agriculture etc	Lectures, work in the classroom, private study	25
	to analyze, evaluate and interpret experimental data of the advanced techniques and methodologies of molecular biology	Lectures, work in the classroom, private study	20
	to design and propose experimental methodology to answer a complex question of molecular biology	Lectures, work in the classroom, private study	30
	Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Assessment methods:** Written Examination with Multiple Choice Questions (Formative, Concluding) The evaluation criteria are presented in the course guide available on the course's website.

5. SUGGESTED READING

1. Recombinant DNA, Watson D.A. (Greek translation) ISBN: 978-960-88412-5-3 Eudoxus Code: 2625.

2. Powerpoint presentations and handouts of the course (G. Skavdis, Alexandroupolis 2018)

COURSE OUTLINE	Bioinformatics

INSTRUCTORS	Antonis Giannakakis, Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 304**	**SEMESTER**	**Autumn**
COURSE TITLE	Bioinformatics		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	4	5

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course
PREREQUISITE COURSES:	No
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01101/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The course modules aim at:

- Understanding the basic principles of Bioinformatics.
- Understanding the basic bioinformatics algorithms.
- Gaining the ability to solve biological problems through the use of tools.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies
Production of new research ideas
Promotion of free, creative and inductive thinking
Decision making
Adaptation to new situations
Project design and management

3. COURSE CONTENT

1. Computer applications in Biology, definitions - Bioinformatics as a tool and research field
2. Algorithms, programs, the importance of the internet.
3. Databases: structure and information search, the most well-known databases.
4. Alignment of two sequences – Exhaustive algorithms: Needleman & Wunsch.
5. Smith & Waterman – Score matrices (PAM, BLOSUM).

6. Alignment of two Sequences - Heuristic algorithms - the algorithms used in the BLAST and FASTA programs.
7. Multi-Sequence Alignment - Problems, algorithms and widely used programs.
8. Phylogenetic Trees - Definitions, Tree Forms, Algorithms for Constructing Trees by Sequence Alignment.
9. Protein motifs - identification, search, databases and search tools.
10. Predicting open reading frames and gene recognition - Specifics and problems.
11. Predicting transcriptional regulatory elements - Specifics and problems.
12. Functional genomics and gene expression - cDNA microarrays - Problems, algorithms, programs.
13. Applications in Structural Biology - prediction of secondary protein and RNA structure.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Teaching using PowerPoint Announcements on the department's website Post lesson information on the e-course online platform Contact teacher directly by e-mail
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	The participatory teaching method is used to assist the development of the student's scientific thinking in the lesson. In this way, the student not only acquires knowledge, but also develops the skills of experimental design and interpretation of results, while at the same time working with both his colleagues and the teacher.

Learning outcome	**Activity**	**Workload (h)**
Understand the basic principles of Bioinformatics	Lectures, study at home, Practical work, lab exercises	50
Understand the basic bioinformatics algorithms	Lectures, study at home, Practical work, lab exercises	50
Solve Biological problems through the use of Bioinformatics tools	Lectures, study at home, Practical work, lab exercises	50
Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Assessment language: Greek Evaluation methods: I. Written test (75%) including: - Multiple choice questions - Analytical questions II. Presentation or report (25%)

5. SUGGESTED READING

Suggested Textbooks

1. Bioinformatics, Baxevanis & Ovellette.
2. Introduction to Bioinformatics algorithms, Neil C. Jones, Pavel A. Pevzner.
3. Bioinformatics, Sofia Kossida.
4. Computational Biology, Christoforos Nikolaou.
5. Creating bibliography: articles and reviews that are accessible online.

COURSE OUTLINE	Developmental Biology

INSTRUCTORS	M. Grigoriou, Professor P. Kolovos, Assistant Professor G. Skavdis, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 305**	**SEMESTER**	**A**
COURSE TITLE	Developmental Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		3	4
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific Field		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01137/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The main objectives of the course are:
a) to aquire a basic knowledge of the Embryology of invertebrates and vertebrates through the study of embryogenesis of model organisms (*C. elegans, D. melanogaster, Xenopus laevis*, Zebrafish, Chick, Mouse).
b) to study the molecular mechanisms underlying the development of animal model organisms and
c) to realize that the basic molecular pathways implicated in development have been conserved during Evolution.

Learning outcomes
Upon successful completion of the course the student is able:

• demonstrate an understanding of the Basic Embryology of the standard organisms
•demonstrate an understanding of the basic molecular mechanisms governing the development of model organizations
• Comparatively discuss the molecular mechanisms underlying vertebrate & invertebrate development
• To know and understand the experimental approaches in Developmental Biology and related basic and emerging technologies
• Analyze and interpret experimental methods used in Developmental Biology
• To propose solutions to problems / questions in Developmental Biology by formulating hypotheses and designing appropriate methodological approaches

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Development of research skills
- Production of new research ideas
- Development of critical thinking
- Promotion of free, creative and inductive reasoning
- Decision making
- Project design
- Exposure to the workplace environment of the Molecular Biologist-Geneticist

3. COURSE CONTENT

1. Basic concepts, model organisms & techniques for the study of Development.
2. Embryology of *C. elegans*.
3. Pattern formation in invertebrates /molecular mechanisms Part I: *C. elegans*.
4. Embryology of *D. melanogaster*
5. Pattern formation in invertebrates /molecular mechanisms Part II: *D. melanogaster*.
6. Embryology of *X. laevis*
7. Pattern formation in vertebrates /molecular mechanisms Part I: X. laevis.
8. Chick embryology - Pattern formation in vertebrates /molecular mechanisms Part II: Chick.
9. Embryology of the mouse
10. Pattern formation in vertebrates /molecular mechanisms Part III: Mouse - Human.
11. Organogenesis: Development of somites and their derivatives.
12. Organogenesis: Development of limbs and kidneys
13. Evolution and Development Mechanisms (Evo-Devo)

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	In order to support and develop the student's scientific thinking, participatory teaching methods are used. Therefore, the student not only acquires knowledge, but also develops experimental design and interpretation skills, while at the same time he cooperates with both his colleagues and the instructor.

Learning outcome	**Activity**	**Workload (h)**
demonstrate an understanding of the Basic Embryology of the standard organisms	Lectures, work in the classroom, private study	25

	demonstrate an understanding of the basic molecular mechanisms governing the development of model organizations	Lectures, work in the classroom, private study	25
	Comparatively discuss the molecular mechanisms underlying vertebrate & invertebrate development	Lectures, work in the classroom, private study	15
	To know and understand the experimental approaches in Developmental Biology and related basic and emerging technologies	Lectures, work in the classroom, private study	20
	Analyze and interpret experimental methods used in Developmental Biology	Lectures, work in the classroom, private study	15
	To propose solutions to problems / questions in Developmental Biology by formulating hypotheses and designing appropriate	Lectures, work in the classroom, private study	20
	Total		**120**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Assessment methods:** Written Examination with Multiple Choice Questions (Formative, Concluding) • Written Examination with Short Response Questions (Formative, Concluding) • Written Examination with Extended Response Questions (Formative, Concluding) • Written Problem Solving (Formative, Concluding) The evaluation criteria are presented in the course guide available on the course's website.

5. SUGGESTED READING

Title: Essential Developmental Biology (greek translation), 3rd Edition Author: JMW Slack Eudoxus Code: 26242.

Course Notes

The course notes are available through the e-class platform.

1. Title: The Developmental Biology of *D. melanogaster* Author: G. Skadis - M. Grigoriou Place & Publication Year: Alexandroupolis, 2005.

2.Title: Early development of *C. elegans* Author: M. Grigoriou-G. Skadis Place & Publication Year: Alexandroupolis, 2005.

3.Title: Embryology and Molecular Development Biology - Course Presentations & handouts
Author: M. Grigoriou - G. Skadis Place & Publication Year: Alexandroupolis, 2018

COURSE OUTLINE	Population Genetics and Evolution

INSTRUCTORS	Aristotelis Papageorgiou, Associate Professor Chrysa Tsikrikoni, Laboratory Teaching Staff (Exercises)

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 306**	**SEMESTER**	**A**
COURSE TITLE	Population Genetics and Evolution		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	4	5	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01109/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The aim of the course is to introduce students to the basic elements of the sciences of population genetics and evolutionary biology, both through knowledge of the concepts, processes, mechanisms that control them and their effects, and the way scientific research approaches the key questions that arise regarding evolution and applications of genetic populations in a multitude of disciplines. Through an interdisciplinary approach, from molecular biology and genetics to mathematical models and philosophical implications of evolutionary theory, students cultivate their own viewpoints and critical thinking. Students who successfully complete the course will have achieved the following learning outcomes:

- They will know the basic concepts of Population Genetics.
- They will be familiar with the basic principles of genetic diversity.
- They will understand and be able to apply basic methods of quantification and analysis of genetic diversity.
- They will understand the evolutionary forces that shape genetic diversity at both the molecular and population levels.
- They will understand the effects of the combined action of evolutionary forces on populations.
- They will know the basic concepts of evolutionary biology and
- they will be familiar with the detailed methodology of studying species evolution.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Search, analyze and create data and information, using the necessary technologies Independent work Teamwork Working in an interdisciplinary environment Generation of new research ideas Awareness for the natural environment Promoting free, creative and inductive thinking

3. COURSE CONTENT

Lectures: 1. The Origin and Influence of Evolutionary Thinking. 2. Diversity (Hardy-Weinberg Theorem, Diversity in Quantitative and Qualitative Traits, Diversity at Genetic and Phenotypic Level). 3. Genetic diversity research (molecular markers, basic techniques and measures of diversity and differentiation, HW balance testing). 4. Non-selective evolutionary forces (inbreeding, genetic drift, founder effect, effective population size) 5. Non-selective evolutionary forces (mutation, gene flow, evolution theories, conservation genetics). 6. Natural Selection (directional selection, overdominance, polymorphism, examples). 7. Evolutionary genetics research (research questions, impact of evolutionary forces on diversity and differentiation, description of diversity patterns) 8. Macroevolution: adaptation (adaptation description, selection levels, adaptation theories, ecological genetics). 9. Macroevolution: speciation (speciation types: allopatric, sympatric, parapatric, genetic theories for speciation, time required for speciation, extinction) 10. The study of evolutionary history (classification, phylogeny based on morphological and molecular data, molecular clock). 11. Biogeography (geographical patterns, vicarianism, dispersion, endemism). 12. Molecular evolution (mutation rates of sequences, duplicate gene evolution, transposable elements, genome size evolution, evolution of polygenic families, evolution of genes and proteins, horizontal gene transfer). 13. Linkage disequilibrium and evolution (gene research, correlation studies, gene maps, quantitative genetics basics, examples). Mandatory exercises: 1. The genome and the databases (4 hours) 2. Introduction to software for nucleotide polymorphism analysis and linkage dissequilibrium calculation (4 hours) 3. Population Genetics exercises (5 hours)

4. TEACHING and LEARNING METHODS – EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching,*	

educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
To know the basic concepts of Population Genetics	Lectures Study	20
To be familiar with the basic principles of genetic diversity	Lectures Study Exercises	30
To be able to apply basic methods of quantification and analysis of genetic diversity	Lectures Study Exercises	20
To Understand the evolutionary forces that shape genetic diversity at both the molecular and population levels	Lectures Study	20
To Understand the effects of the combined action of evolutionary forces on populations	Lectures Study Exercises	20
To know the basic concepts of evolutionary biology	Lectures Study	20
To be familiar with the detailed methodology of studying species evolution	Lectures Study Exercises	20
Total		**150**

STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation (Language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Are evaluation criteria known to the students?

Evaluation language: Greek

Evaluation methods:
Written exam with short-answer questions and problem solving
Written exam with multiple choice questionnaires

5. SUGGESTED READING

1. Evolution, 4th edition, Oxford University Press, 2018
by Douglas Futuyma – Mark Kirkpatrick
Translated into Greek
Year: 2019
Utopia, Athens
ISBN: 978-618-5173-46-3

2. Evolution,
by Barton N, Briggs D, Eisen J, Goldstein D, Patel N,
Translated into Greek
Year: 2011

Utopia, Athens
ISBN: 978-960-99280-4-5,

3. Concepts of Genetics
by W. S. Klug, M. R. Cummings, C. A. Spencer, M. A. Palla (11th edition),
Year: 2015
Academic Editions I. Basdra & Co
ISBN: 978-618-5135-03-4

COURSE OUTLINE	Molecular Immunobiology

INSTRUCTORS	Katerina Chlichlia, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**MBG 308**	**SEMESTER**	**5th**
COURSE TITLE	Molecular Immunobiology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		4	5
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	SCIENTIFIC FIELD COURSE		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01125/		

2. LEARNING OUTCOMES

Learning outcomes
Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course are:

- To acquire knowledge on the field of Molecular Immunobiology
- To gain knowledge about the structure and organization of the immune system
- To understand the basic principles of the immune system's function and regulation
- To study and get insight into the complex mechanisms underlying the innate/natural and adapted/acquired/specific immune responses

LEARNING OUTCOMES:
After successfully completing the course, students will acquire the following knowledge, skills and competencies:

- They should know the basic principles of the structure, organization and function of the immune system
- They should know and understand the complex molecular mechanisms underlying immune responses
- They should be able to examine and analyze comparatively immune responses of innate immunity vs. adaptive immunity
- They should be able to examine, analyze comparatively immune responses underlying humoral vs. cell-mediated immunity
- They should know and understand the basic and novel strategies and experimental technologies used in Molecular Immunobiology
- They should be able to solve problem-based questions in the field of Molecular Immunobiology

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesis of data and information, using the necessary technologies
- Production of new research ideas
- Promotion of free, creative and inductive thinking
- Decision making
- Autonomous work
- Adaptation to new situations
- Project design and management

3. COURSE CONTENT

9. Overview of the immune system – Cells and Organs of the immune system
10. Innate/Natural immunity and Adapted/Acquired/Specific immunity: principles - mechanisms of recognition and function – Cytokines – Inflammation and inflammatory response
11. Antigens – Epitopes – Immunogenicity – Antigenicity – Haptens – Pattern Recognition Receptors (PRR) – Antibodies – Antibody structure, Antibody isotypes and Antibody functions – Polyclonal and Monoclonal antibodies – B cell receptor (BCR) and T cell receptor (TCR) – Antibody-Antigen interactions – principles and applications
12. Organization and Expression of immunoglobulin genes and lymphocyte receptor genes – mechanisms of generation of Diversity in antigen receptors – Somatic recombination – Somatic hypermutation – Isotype switch – antibody genes and engineering
13. Major histocompatibility complex (MHC) – Organization – Heredity – Polymorphisms – Cell distribution – MHC and immune response ability
14. Antigen Processing and Antigen Presentation – MHC restriction – Antigen-presenting cells (APC) – Dendritic cells - Endogenous (cytoplasmic) and exogenous route of antigen processing and presentation - Presentation of peptide and non-peptide antigens
15. T cell Development: Maturation, Activation and Differentiation of T cells – Thymus, Positive and Negative selection – Activation and Differentiation of Mature T cells – Immune Tolerance – T cell receptor: structure, organization, gene rearrangement – T cell receptor complex – T cell Alloreactivity
16. B cell Development: Generation, Activation and Differentiation of B lymphocytes – Maturation, Activation and Proliferation – Humoral immune responses – Germinal centers
17. Complement system – Pathways of Complement activation - Components of Complement – Functions of Complement – Regulation of Complement activity - Biological consequences of Complement activation
18. Cell-mediated immunity – Effector cells and Cell-mediated immune responses – Cytotoxic T lymphocytes – Natural killer cells – Circulation and Migration of lymphocytes
19. Primary and Secondary immune responses – T cell and B cell memory
20. Immune responses to Infectious agents (bacteria, viruses, yeast, protozoa, helminths) – Infectious diseases
21. Passive and Active Immunization – Vaccines – Vaccine Development

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with students

MODES OF DELIVERY

Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Instructional teaching in conjunction with collaborative teaching strategies and integrating technology

Learning outcome	Activity	Workload (h)
To know the basic principles of the structure, organization and function of the immune system	Lectures, study at home	30
To know and understand the complex molecular mechanisms underlying immune responses	Lectures, study at home	30
To be able to examine and analyze comparatively immune responses of innate immunity vs. adaptive immunity	Lectures, study at home	30
To be able to examine, analyze comparatively immune responses underlying humoral vs. cell-mediated immunity	Lectures, study at home	30
To know and understand the basic and novel strategies and experimental technologies used in Molecular Immunobiology	Lectures, assignments, study at home	15
To be able to solve problem-based questions in the field of Molecular Immunobiology	Assignments, study at home	15
Total		**150**

STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Are evaluation criteria known to the students?

Language: Greek

Evaluation methods:
Written exams with multiple-choice questionnaires
Written exams with short-answer questions
Written exams with open-ended questions

5. SUGGESTED READING

Translated in Greek language:

1. **'MOLECULAR and CELLULAR IMMUNOLOGY'** – Abbas AK, Lichtman AH, Pillai S, 9th edition 2017, translated in Greek language 2019, Utopia Publishing/Elsevier, p. 688, ISBN: 978-618-5173-39-5, *Eudoxus code*: 86197140
2. **'BASIC IMMUNOLOGY'-Functions and Disorders of the Immune system»** - Abbas A, Lichtman AH, Pillai S, 5th edition/2015, translated in Greek language 2018, Vasiliadis Medical Books/Broken Hill Publishers LTD, p. 520, ISBN: 978-996-327 4505, *Eudoxus code*: 77106913
3. **'IMMUNOLOGY'** - Goldsby R, Kindt T, Osborne B, Kuby J, 6th edition 2007, translated in Greek language 2013, Paschalidis Medical Publications/Broken Hill Publishers Ltd., p. 840, ISBN: 978-9963-716-14-2, *Eudoxus code*: 23076003
4. **'IMMUNOLOGY'** - Roitt I, Brostoff J, Male D, Roth DB, 8th edition/2012, translated in Greek language 2016, Parisianou Publications/Saunders, p. 468, ISBN: 978-960-583-123-3, *Eudoxus code*: 59396376
5. **'Lippincott's IMMUNOLOGY'** - Harvey RA, Doan T, Melvold R, Viselli S, Waltenbaugh C, 2nd edition/2012, translated in Greek language 2014, Parisianou Publications/Wolters Kluwer, p. 388, p. 386, ISBN: 978-960-394-98-62, *Eudoxus code*: 33134131
6. **'BASIC CLINICAL IMMUNOLOGY'** – Chapel H, Haeney M, Misbah S, Snowden N, 5th edition/2006, translated in Greek language 2013, Parisianou Publications/Wiley-Blackwell, p. 448, ISBN: 978-960-394-960-2, *Eudoxus code*: 33074641

In English language:

7. **'Kuby IMMUNOLOGY'** – Punt J, Stranford SA, Jones PP, Owen JA, 8th edition 2018, WH Freeman, p. 944, ISBN: 978-131-911-4701
8. **'Cellular and Molecular IMMUNOLOGY'** – Abbas Ak, Lichtman AH, Pillai, S, 9th edition 2017, Elsevier, p. 608, ISBN: 978-032-347-9783
9. **'Janeway's IMMUNOBIOLOGY'** – Murphy KM, Weaver C, 9th edition 2016, WW Norton, p. 924, ISBN: 978-081-534-5053

Course notes

Course lecture notes and lecture presentations are available through the *e-class* platform.

COURSE OUTLINE	**Methods in Molecular Biology**

INSTRUCTORS	A. Galanis, Associate Professor A. Giannakakis, Assistant Professor M. Grigoriou, Professor P. Kolovos, Assistant Professor A. Palaiologou, Assistant Professor G. Skavdis, Associate Professor C. Tsikrikoni, Laboratory Teaching Staff

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 309**	**SEMESTER**	**A**
COURSE TITLE	Methods in Molecular Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		1	1
Practicals		3	4
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific Field		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/modules/auth/opencourses.php?fc=88		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The main objectives of the course are:
a) To develop the students' skills in experimental design, formulation and testing of scientific hypotheses in Molecular Biology (application of the scientific method in Molecular Biology).
b) To learn and apply a number of basic methods and techniques used in molecular biology.
c) to aquire the necessary skills for the critical interpretation and assessement of experimental results.

Learning outcomes
Upon the completion of the course the student will:
• have acquired practical experimental skills in modern molecular biology
• be able to describe and analyze the principles underlying the basic techniques of molecular biology
• be able to perform a series of techniques of modern molecular biology
• have acquired necessary skills to analyze, evaluate and interpret experimental data for a series of molecular biology techniques
• be able to design / propose an experimental approach to answer a simple molecular biology question using appropriate techniques.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Development of research skills
- Production of new research ideas
- Development of critical thinking
- Promotion of free, creative and inductive reasoning
- Decision making
- Project design
- Exposure to the workplace environment of the Molecular Biologist-Geneticist
- Use of knowledge-based skills to solve practical problems
- Development of time management abilities
- Awareness regarding safety in the lab
- Teamwork
- Autonomous work
- Decision-making
- Adaptation to new situations
- Development of data evaluation skills
- Development of oral and written scientific communication skills

3. COURSE CONTENT

1. Transformation of *E.coli* bacteria.
2. Isolation & purification of plasmid DNA
3. Quantitation of DNA
4. Digestion with restriction enzymes
5. Electrophoresis of DNA on agarose gel.
6. PCR & Primer design
7. qPCR
8. Expression of proteins in the *E. coli*.
9. Methods of protein purification
10. Isolation and purification of proteins by affinity chromatography following overexpression in *E.coli* by affinity chromatography.
11. Hybridization *in situ*.
12. Anatomy of the mouse embryo.
13. Cell culture techniques
14. Next Generation Sequencing

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.*	Active exploratory approach through the implementation of a research scenario. Students will be evaluated by written examinations and / or reports of results at the end of each laboratory exercise and at the end of the course: A) by evaluating the laboratory book and B) by written examinations at the end of the semester.

The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
have acquired practical experimental skills in modern molecular biology	Lectures, work in the classroom, private study	50
will be able to describe and analyze the principles underlying the basic techniques of molecular	Lectures, work in the classroom, private study	25
be able to perform a series of techniques of modern molecular biology	Lectures, work in the classroom, private study	25
have acquired necessary skills to analyze, evaluate and interpret experimental data for a series of molecular biology techniques	Lectures, work in the classroom, private study	30
will be able to design/ propose an experimental approach to answer a simple molecular biology question using appropriate techniques.	Lectures, work in the classroom, private study	20
Total		**150**

STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Are evaluation criteria known to the students?

Assessment language: Greek

Assessment methods

Written Examination with Multiple Choice Questions (Formative, Concluding)

- Written Examination with Multiple Choice Questions (30%, Formative, Concluding)
- Written Examination with Short Response Questions (10%, Formative, Concluding)
- Written Examination with Extended Response Questions (25%, Formative, Concluding)
- Written Problem Solving (15%, Formative, Concluding)
- Laboratory book (labook), (20%, Formative, Concluding)

The evaluation criteria are presented in the course guide available on the course's website.

5. SUGGESTED READING

Title: Laboratory calculations in biotechnology (Greek Translation) Author: Lisa Seidman Eudoxus code: 5319

Course Notes

The course notes are available through the e-class platform.

COURSE OUTLINE	**Applied Biotechnology**

INSTRUCTORS	Ioannis Kourkoutas, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 311**	**SEMESTER**	**E**
COURSE TITLE	Applied Biotechnology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		3	4
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01115/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The course objectives of the course are:

e) Understanding of the basic principles governing the science of enzyme and microbial biotechnology.
f) Understanding the basic principles of enzyme purification technology.
g) Understanding the basic principles of enzyme and cell immobilization.
h) Understanding the basic principles of enzyme and bioreactor kinetics.
i) Understanding the bioprocesses for the production of improved bio-products and the provision of services in the fields of health, food production, environmental protection, production of energy and agriculture.

Learning results:

Upon successful completion of the course the student will:

• Know the basic principles of enzyme and microbial biotechnology.
• Know and understand the basic principles of enzyme purification technology.
• Know and understand the basic principles of enzyme and cell immobilization.
• Know and understand the basic principles of enzyme and bioreactor kinetics.
• Know and understand the bioprocesses for the production of improved bio-products and the provision of services in the fields of health, food production, environmental protection, production of energy and agriculture.
• Know and understand the emerging technologies in biotechnology.
• Suggest solutions to biotechnology problems / questions, formulating hypotheses and designing appropriate methodological approaches.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Analysis and synthesis of data and information.
- Creation of new research ideas.
- Promote free, creative and inductive thinking.
- Decision making.

3. COURSE CONTENT

1. **Introduction to Enzymatic and Microbial Biotechnology.**
2. **Enzyme Purification Technology:** Down Stream Processing, Chromatographic Techniques (Size-exclusion chromatography, Ion-exchange chromatography, Affinity chromatography), Scale-up of liquid chromatography, Product formation.
3. **Enzymatic Kinetics:** Kinetic equations, Enzymatic reaction inhibition, Effect of temperature and pH on enzymatic reactions.
4. **Immobilized Biocatalysts:** Enzyme immobilization techniques, Cell immobilization techniques, Advantages of immobilization, Requirements of immobilization supports, Effect of immobilization on enzyme molecular and kinetic characteristics, Effect of immobilization on cell.
5. **Bioreactors:** Bioreactor types (Stirred batch bioreactors, Continuous stirred-tank bioreactors, Tower bioreactors, Fluidized bed bioreactors), Bioreactors kinetics, Air supply systems, The problem of foaming, Sterilization systems.
6. **Biotechnological Applications in the Food Industry:** Applications in the wine, brewing, bakery, cheese-making, edible oil and fruit industry.
7. **Degradation of Agro-Industrial Wastes - Production of High-Added Value Products:** Production of potable and energy ethanol from agro-industrial wastes, Enzymatic hydrolysis of starch, Enzymatic hydrolysis of cellulosic materials, Whey exploitation, Animal feed production.
8. **Applications of Biotechnology in the Production of Protein Products:** Single cell protein production, Production of aminoacids.
9. **Biological Treatment:** Aerobic and anaerobic treatment.
10. **Biotechnological Applications in Paper, Textile and Tanning Industry.**
11. **Analytical Applications:** Biosensors, Homogeneous and heterogeneous ELISA.
12. **Therapeutic and Pharmaceutical Applications:** Genetic disorders, Cancer treatment, Cardiovascular system problems, Antibiotic production, Insulin production.
13. **Introduction to Industrial Quality Management Systems (ISO) and Food Safety Management Systems (HAACP).**

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-*	Interactive teaching methods are used to assist the development of the student's scientific thinking. In this way, the student not only acquires new information and knowledge, but also develops the skills of experimental design and interpretation of results, while working with both his colleagues and the teacher at the same time.

directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
Know the basic principles of enzyme and microbial biotechnology	Lectures, study at home	15
Know and understanding the basic principles of enzyme purification technology	Lectures, study at home	15
Know and understand the basic principles of enzyme and cell immobilization	Lectures, class work, study at home	20
Know and understand the basic principles of enzyme and bioreactor kinetics	Lectures, study at home	20
Know and understand the bioprocesses for the production of improved bio-products and the provision of services in the fields of health, food production, environmental protection, production of energy and agriculture	Lectures, class work, study at home	20
Know and understand the emerging technologies in biotechnology	Lectures, class work, study at home	20
Know and understand the emerging technologies in Microbiology	Lectures, class work, study at home	15
Suggest solutions to biotechnology problems / questions, formulating hypotheses and designing appropriate methodological approaches	Lectures, class work, study at home	15
Total		**120**

STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation language, methods of evaluation, types of exams, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Language of evaluation: Greek

Methods of evaluation
Written exams (multiple choice)
Written exams (short answer questions)
Written exams (extended answer questions)
Written exams (problem solving questions)

Are evaluation criteria known to the students?	The evaluation criteria are known to the students through the eclass platform.

5. SUGGESTED READING

22. Title: Enzyme Biotechnology.
Authors: I. Klonis.
Publisher: Foundation for Research and Technology-Crete University Press.
Publication year: 2010.
ISBN: 978-960-524-304-3.
Eudoxus code: 356.

2. Title: Biotechnology and Industrial Fermentations
Authors: H. Nerantzis, P. Tataridis, S. Logothetis.
Publisher: Stylianos Basileiadis.
Publication year: 2014.
ISBN: 978-960-8002-79-1.
Eudoxus code: 41956116.

Course Notes
Course notes are available through the e-class platform.
2. Title: Applied Biotechnology Notes.
Authors: I. Kourkoutas.
Publication date & place: Department of Molecular Biology & Genetics-DUTH, Alexandroupolis, 2010.

COURSE OUTLINE	Regulation of cell function

INSTRUCTORS	A. Galanis, Associate Professor A. Palaiologou, Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 315**	**SEMESTER**	**F**
COURSE TITLE	Regulation of cell function		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	4	4

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course
PREREQUISITE COURSES:	No
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01206/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Upon successful completion of the course the student will:

- Learn the basic principles of the molecular mechanisms of cell signaling, and understand the concepts of signal amplification, transduction and specificity.
- Develop critical thinking and understand the signaling pathways in different systems.
- Learn the phases of cell cycle.
- Learn and understand the molecular mechanisms of oncogenesis
- Learn the damage-DNA response and the repair pathways.
- Learn and understand the process of RNA interference

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Production of new research ideas
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

14. Introduction
15. G-proteins and protein kinases in signal transduction
16. MAP kinase signaling pathways. Specificity of MAP kinase signaling pathways
17. cAMP, JAK-STAT, SMAD signalling pathways
18. Cell cycle regulation

19. Apoptotic pathways
20. Cellular Oncogenes and Tumor Suppressor genes
21. p53 and DNA damage
22. Types of DNA damage
10. DNA repair
11. Repair of double strand breaks
12. Homologous recombination
13. RNA interference

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	**Teaching methods:** Lectures, study and analysis of bibliography, use of e-class

Learning outcome	**Activity**	**Workload (h)**
Learn the basic principles of the molecular mechanisms of cell signaling, and understand the concepts of signal amplification, transduction and specificity.	Lectures, study and analysis of bibliography	40
Learn the phases of cell cycle and the apoptotic pathways	Lectures, study and analysis of bibliography	20
Learn and understand the molecular mechanisms of oncogenesis	Lectures, study and analysis of bibliography	20
Learn the damage-DNA response and the repair pathways and the process of RNA interference	Lectures, study and analysis of bibliography	40
Total		**120**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, , problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of evaluation**: Greek **Methods of evaluation**: multiple choice questionnaires, short answer questions, open-ended questions The evaluation criteria are known to the students

5. SUGGESTED READING

- Genes VIII. Lewin
- The Cell: A molecular approach. Geoffrey M. Cooper & Robert E.

COURSE OUTLINE	Pedagogy

INSTRUCTORS	Kedraka Katerina, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 316**	**SEMESTER**	**4th**
COURSE TITLE	Pedagogy		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	2
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	BACKGROUND		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01185/		

6. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The cognitive objectives of the course are to get acquainted with the field of Pedagogy.
During the course, students will acquire basic knowledge and skills related to the specifications, structure and demands concerning scientific essays, papers and presentations.
In terms of attitudes and behaviors, the course aims to help students understand and familiarize with the role of teacher.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies
Team work
Respect for diversity and multiculturalism
Development of social, professional and moral responsibility and gender sensitivity
Production of new research ideas

7. COURSE CONTENT

1. Defining the field of Pedagogy
2. Basic terminology and the basic concepts of Education-Training
3. Alternative teaching approaches
4. Lifelong Learning
5. Effective teaching and learning
6. Educational policy issues

7. The education system and its goals
8. The functions of the school
9. The participants in the educational process
10. The work, role and personality of the teacher
11. The institutional framework and interpersonal relationships in the school unit.
12. Research Methods in Pedagogy
13. Introduction to scientific essays papers and presentations.

8. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face, case study, team work, use of arts in education
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Evaluation language: Greek Evaluation method: Semester exams with short-answer questions

Activity	**Workload (h)**
Lectures	20
Work at class	6
Study at home	34
Total	**60**

9. SUGGESTED READING

- Kedraka, K., & Gkotzaridis, Ch. (2016). Teaching and Professional Design in Biosciences. ISBN: 9786185135041. Athens: Academic Publications J. Basdra & Co., EVDOXUS CODE = 59396334

COURSE OUTLINE	Career development of bioscientists

INSTRUCTORS	Kedraka Katerina, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 317**	**SEMESTER**	**6th**
COURSE TITLE	Career development of bioscientists		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	2
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	BACKGROUND		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01186/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The cognitive goals of the course are to provide students with basic knowledge of career management and professional development theories.

At the skill level, aspects of the Bioscientific professional preparation in the modern workplace are approached, with the aim of acquiring job search skills (see CV, interview) and planning further studies and careers, elements that facilitate students' vocational rehabilitation.

At the attitudes / behaviors level, the course aims at introducing the students of the Department of Molecular Biology and Genetics to their career aspect, taking into account issues of gender equality and multiculturalism.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies
Autonomous work
Team work
Respect for diversity and multiculturalism
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1-2. Career development and career management issues in the modern workplace.
3. Action plan

4 - 6. Self-knowledge - determination of personal characteristics
7-8. Making professional decisions
9-10- Develop a personal strategy for career management
11 - 13 Practical Job Search Skills (CV / Professional Interview)

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face, role playing, brainstorming, case study, simulation
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Evaluation language: Greek Evaluation method: Short-answer questions

Activity	**Workload (h)**
Lectures	16
Work at class	10
Study at home	34
Total	**60**

5. SUGGESTED READING

- Kedraka, K., & Gkotzaridis, Ch. (2016). Teaching and Professional Design in Biosciences. ISBN: 9786185135041. Athens: Academic Publications J. Basdra & Co., EUDOXUS CODE:59396334

COURSE OUTLINE	**Genomics**

INSTRUCTORS	Boukouvala S., Associate Professor Maroulakou I., Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 318**	**SEMESTER**	
COURSE TITLE	Genomics		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*			
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	

Use of ICT in teaching, laboratory education, and in communication with the students	
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	

Learning outcome	**Activity**	**Workload (h)**
Total		

5. SUGGESTED READING

COURSE OUTLINE	**Laboratory course VI: immunobiology, protein structure & applied biotechnology**

INSTRUCTORS	Katerina Chlichlia, Associate Professor Vasiliki Fadouloglou, Associate Professor Ioannis Kourkoutas, Associate Professor Sotiris Malatos, Laboratory Teaching Staff Chrysa Tsirkikoni, Laboratory Teaching Staff

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**MBG 319**	**SEMESTER**	**6th**
COURSE TITLE	Laboratory course VI: immunobiology, protein structure & applied biotechnology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		4	5
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	SKILLS DEVELOPMENT COURSE		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01255/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course are:

- To understand the basic principles of selected technologies and methodologies in the fields of Immunobiology, Protein Structure and Applied Biotechnology
- To gain knowledge about the cells of the immune system (examination, isolation, identification, culture) and to understand the basic principles of experimental immunoassays
- To gain knowledge about the basic principles of organization and stability of proteins and nucleoprotein complexes.
- To acquire knowledge about the immobilization of microbial cells, the bioreactor kinetics and the technology of aerobic and anaerobic fermentations.

LEARNING OUTCOMES:
After successfully completing the practical course, students will acquire the following knowledge, skills and competencies:

- They should know the basic principles of selected technologies in Immunobiology, Protein Structure and Applied Biotechnology
- They should know the experimental procedures for examination, isolation, identification and culture of immune cells and understand the basic principles of selected immunoassays (ELISA, immunofluorescence, flow cytometry) in the field of Molecular Immunobiology.

- They should know and understand the basic principles of organization and stability of proteins in space, and the basic principles of the relationship between protein structure and function.
- They should know and understand the basic principles of microbial cell immobilization, the basic principles of enzyme kinetids and bioreactor kinetics, and know the basic principles of aerobic and anaerobic fermentations.
- They should be able to analyze and interpret experimental results in the fields of Immunobiology, Structural Biology and Biotechnology and to suggest solutions in problem-based questions, designing appropriate methodologies.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesis of data and information, using the necessary technologies
- Production of new research ideas
- Promotion of free, creative and inductive thinking
- Decision making
- Autonomous work
- Adaptation to new situations
- Project design and management

3. COURSE CONTENT

23. Morphological examination of blood leukocytes. Isolation of mononuclear cells from peripheral blood (L)
24. Immunoassays ELISA and Immunofluorescence (double practical course) (L)
25. Introduction into flow cytometry – Analysis of results with computational software (C)
26. Molecular graphics (C)
27. Introduction to protein chemistry and structure (C)
28. Secondary structure of proteins (C)
29. Super-secondary structure of proteins (C)
30. Single cell protein production: Aerobic fermentation of Molasses (L)
31. Yeast immobilization on natural supports (L)
32. Fermentation technology with immobilized yeast (L)
33. Visits to industrial units

All practicals consist of a theory part and a practical part.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face, practical education in small groups
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching,*	Instructional teaching in conjunction with collaborative teaching strategies and integrating technology

educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
To know the basic principles of selected technologies in Immunobiology, Protein Structure and Applied Biotechnology	Lab Practicals, study at home	15
To know the experimental procedures for examination, isolation, identification and culture of immune cells and understand the basic principles of selected immunoassays (ELISA, immunofluorescence, flow cytometry) in the field of Molecular Immunobiology	Lab Practicals, study at home	30
To know and understand the basic principles of organization and stability of proteins in space, and the basic principles of the relationship between protein structure and function	Practicals in computer room, study at home	30
To know and understand the basic principles of microbial cell immobilization, enzyme kinetids and bioreactor kinetics, and aerobic and anaerobic fermentations	Lab Practicals, study at home	30
To be able to analyze and interpret experimental results in the fields of Immunobiology, Structural Biology and Biotechnology and to suggest solutions in problem-based questions, designing appropriate methodologies	Practicals, reports, study at home	15
Total		**120**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language**: Greek **Evaluation methods:** Presentation of Lab course results Written Lab course reports Written test exams with multiple-choice questionnaires and/or short-answer questions

5. SUGGESTED READING

Books in Greek language:

1. **Title: Practical Laboratory course notes for Molecular Immunobiology and Applied Biotechnology**
   Authors: K. Chlichlia & I. Kourkoutas
   Molecular Biology and Genetics, D.U.Th., Alexandroupolis
   Year: 2018
2. **Title: IMMUNOLOGY**
   Authors: Goldsby R, Kindt T, Osborne B, Kuby J,
   Publishing company: Paschalidis Medical Publications Ltd.
   Year: 2013
   ISBN: 978-9963-716-14-2, *Eudoxus code*: 23076003
3. **Title: Microbiology & Microbial Technology**
   Author: Aggelis G.
   Publishing company: Stamoulis Publications
   Year: 2007
   ISBN: 978-960-351-717-7, *Eudoxus code: 22904*
4. **Title: Introduction to Protein Structure**
   Authors: Carl Branden and John Tooze
   Publising company: Academic publications
   Year: 2019
   ISBN: 978-618-5135-16-4, *Eudoxus code: 86054640*

Course notes

Practical Laboratory Course notes - presentations are available through the *e-class* platform (https://eclass.duth.gr/courses/ALEX01255/)

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COURSE OUTLINE	**Human Genetics**

INSTRUCTORS	Fakis G., Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ**	**SEMESTER**	
COURSE TITLE	Human Genetics		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*			
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice,*	

fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	**Learning outcome** / **Activity** / **Workload (h)** (empty) / (empty) / (empty) (empty) / (empty) / (empty) **Total** / (empty)
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	

5. SUGGESTED READING

COURSE OUTLINE	**Application of Molecular Biology in Medical Sciences**

INSTRUCTORS	Boukouvala S., Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 402**	**SEMESTER**	
COURSE TITLE	Application of Molecular Biology in Medical Sciences		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*			
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice,*	

fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Total		

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	

5. SUGGESTED READING

COURSE OUTLINE	Molecular Neurobiology

INSTRUCTORS	M. Grigoriou, Professor A. Palaiologou, Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES			
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS			
STUDY LEVEL	LEVEL 6			
COURSE CODE	**ΜΒΓ 403**	**SEMESTER**	**A**	
COURSE TITLE	Molecular Neurobiology			
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*			**HOURS/WEEK**	**ECTS CREDITS**
			3	4
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific Field			
PREREQUISITE COURSES:	-			
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No			
COURSE WEBSITE (URL)	https://eclass.duth.gr/modules/auth/opencourses.php?fc=42			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The main objectives of the course are:
a) To acquire basic knowledge of the molecular/cellular biology of the neurons
b) to aquire an understanding of the basic molecular mechanisms underlying the development and function of the Nervous System
c) to understand the molecular basis of a series of Nervous System diseases.

Learning outcomes
Upon successful completion of the course the student is able:
• to describe and analyze the basic principles of molecular/cellular biology of the neurons and of synaptic transmission.
• to understand the basic principles of nervous system development in vertebrates and invertebrates from induction to synaptogenesis and network development.
• comparatively analyze the molecular mechanisms of development between vertebrates and invertebrates
• to describe and analyze the molecular basis of the sense of smell in vertebrates and invertebrates and the molecular mechanisms of learning and memory.
• to gain an understanding of the experimental approaches in Molecular Neurobiology and emerging applications
• to analyze, evaluate and interpret experimental results in Molecular Neurobiology
• to propose solutions to problems / questions of Molecular Neurobiology.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity

Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Development of research skills
- Production of new research ideas
- Development of critical thinking
- Promotion of free, creative and inductive reasoning
- Autonomous work
- Use of knowledge-based skills to solve practical problems

3. COURSE CONTENT

1. The molecular and cellular biology of the neuron and the glial cell
2. Ion Channels - Membrane Potential - Action Potential: From Physiology to Molecular Biology
3. Molecular / cellular mechanisms in synaptic transmission
4. Transmission in thw neuromuscular junction
5. Synaptic transmission; Second messengers and signaling pathways
6. Neurotransmitters: Molecular / cellular mechanisms underlying in neurotransmitter release - Diseases of chemical transmission in neuromuscular junction: myasthenia gravis
7. Molecular / cellular mechanisms underlying the induction and organization of the nervous system and in the birth/survival of nerve cells
8. Molecular / cellular mechanisms underlying the formation and regeneration of synapses
10. Molecular biology of smell
11. Aging of the brain - molecular basis of Alzheimer's disease
12. Learning and memory
13. Cellular mechanisms of learning and memory

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	In order to support and develop the student's scientific thinking, participatory teaching methods are used. Therefore, the student not only acquires knowledge, but also develops experimental design and interpretation skills, while at the same time he cooperates with both his colleagues and the instructor.

Learning outcome	**Activity**	**Workload (h)**
to describe and analyze the basic principles of molecular/cellular biology of the neurons and of synaptic transmission	Lectures, work in the classroom, private study	35
to understand the basic principles of nervous system development in vertebrates and invertebrates from induction to synaptogenesis	Lectures, work in the classroom, private study	25
comparatively analyze the molecular mechanisms of development between vertebrates and invertebrates	Lectures, work in the classroom, private study	15

	to describe and analyze the molecular basis of the sense of smell in vertebrates and invertebrates and the molecular mechanisms of learning and memory	Lectures, work in the classroom, private study	10
	to gain an understanding of the experimental approaches in Molecular Neurobiology and emerging applications	Lectures, work in the classroom, private study	20
	Total		**120**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Assessment methods** Written Examination with Multiple Choice Questions (Formative, Concluding) • Written Examination with Multiple Choice Questions (30%, Formative, Concluding) • Written Examination with Short Response Questions (10%, Formative, Concluding) • Written Examination with Extended Response Questions (25%, Formative, Concluding) • Written Problem Solving (15%, Formative, Concluding) • Laboratory book (labook), (20%, Formative, Concluding) The evaluation criteria are presented in the course guide available on the course's website.

5. SUGGESTED READING

1. Title Principles of neural science Author: Kandel Eric R., Schwartz James H., Jessell Thomas M. Eudoxus Code: 45097.

2. Title: Neuroscience and Behavior Author: Kandel Eric R., Schwartz James H., Jessell Thomas M. Eudoxus Code: 467

Course Notes

Title: Molecular Neurobiology –Powerpoint presentations and handouts.
Author: M. Grigoriou – K. Paleologou, Place & Publication Year: Αλεξανδρούπολη, 2017

COURSE OUTLINE	**Proteomics**

INSTRUCTORS	Katsani A., Assistant Professor

1.GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ** 404	**SEMESTER**	**A**
COURSE TITLE	Proteomics		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	4
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01210/		

2.LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The comprehension of the main principles and the significance of the proteomic analysis inBiosciences.
After the successful completion of the course the student will be able to:

- Comprehend the main concepts of protein manipulation and analysis.
- Describe the methods of protein determination
- Interprete a chromatogram or graph i.e a kinetic study.
- Plan a theoretical experiment of a proteomic analysis.

General Competencies

- Research, analysis and synthesize of data and information, using the necessary technologies
- Autonomous work
- Teamwork
- Promoting of free, creative and inductive thinking

3.COURSE CONTENT

1) Basic principles. The proteomic analysis in modern biology : an holistic picture
2) Heterologous protein expression: Prokaryotic expression Systems (*E.coli*)
3) Heterologous protein expression: Eukaryotic expression systems (*baculovirus, P.Pastoris,* CHO, Hek)
Methodologies for protein analysis
4) Cell extraction and fractionation. Protein solutions. Analytical centrifugation.
5) Spectroscopic analysis (OD, Bradford, bca, Lowry)
6) Electrophoretic methods (SDS-PAGE, 2D-DE, IEF, native)
7) Chromatographic methods (fplc, HPLC)
8) Immunoassays (Western Blot, ELISA, Protein arrays)
9) Mass spectrometry in proteomics

10) Identification and quantification of peroteins by mass spec (maldi-TOF, ESI, LC-ms/Ms, Itrap, Silac)
11) Protein-protein interactions: theoretical concepts
12) Protein-protein interactions: methodologies (pulldowns, IP, Y2H, SPR, ITC, ChIP and ChIP-seq)
13) Bioinformatic tools and databases

4.TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, laboratory education, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation* *language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	• Evaluation in Greek • multiple choice questionnaires • short-answer questions YES

Activity	**Workload (h)**
Lectures	26
student's study hours	112
tutorials	12
Total	**150 (=5** ECTS)

5.SUGGESTED READING

Αρχές Πρωτεωμικής
Κωδικός Βιβλίου στον Εύδοξο: 86053346
Έκδοση: 1/2020
Συγγραφείς: Twyman Richard M.
ISBN: 9789925575169

Τύπος: Σύγγραμμα
Διαθέτης (Εκδότης): BROKEN HILL PUBLISHERS LTD

καθως και τα παλαιοτερα (e-συγγραματα)

Protein Analysis and Purification [electronic resource]
Κωδικός Βιβλίου στον Εύδοξο: 173189
Έκδοση: Second Edition./2006

Fundamentals of Protein Structure and Function [electronic resource]
Κωδικός Βιβλίου στον Εύδοξο: 179286
Συγγραφείς: Buxbaum, Engelbert.

Basic Methods for the Biochemical Lab [electronic resource]
Κωδικός Βιβλίου στον Εύδοξο: 175245
Έκδοση: First English Edition./2006

COURSE OUTLINE	Systems Biology

INSTRUCTORS	Petros Kolovos, Assistant Professor

6. GENERAL

SCHOOL	HEALTH SCIENCES			
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS			
STUDY LEVEL	LEVEL 6			
COURSE CODE	**ΜΒΓ 406**	**SEMESTER**	7th semester	
COURSE TITLE	SYSTEMS BIOLOGY			
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*			**HOURS/WEEK**	**ECTS CREDITS**
			3	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	SCIENTIFIC FIELD COURSE			
PREREQUISITE COURSES:	NONE			
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO			
COURSE WEBSITE (URL)	https://eclass.duth.gr/coursed			

7. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The overall objective of the course is to provide to the students the theoretical background and to familiarize them with the methodologies and applications of Systems Biology.
The objectives of the course are:

- To understand the complexity that defines the field of Systems Biology.
- To familiarize with the approaches applied in big scale datasets.
- To study the basic principles of constructing biological networks.
- To study the holistic approaches and basic principles of chromatin organization and gene regulation.
- To understand that in modern biology, holistic approaches are applied in order to decode the complexity of biological systems, which are based on the notion that networks are a sum of their units. Thus, Systems Biology is studying a “forest” and not a single “tree”.

Learning outcomes
Upon the successful completion of the course, the students will be able:

- To know the basic theories and principles of Systems Biology and their impact on Biosciences.
- To understand that the combination of the experimental and computational biology can provide the answer on various complex questions.
- To understand the basic principles of the chromatin organization and compartmentalization (1D -> 4D), their relationship to transcription factories, chromatin re-organization, regulatory elements, transcription factories and their role in various biological processes with emphasis on gene regulation.
- To familiarize with the basic methodologic approaches of Systems Biology and to appreciate and understand the obtained results.
- To identify the various biological networks and to be able to apply the basic principles of constructing biological networks

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Development of critical and self-critical thinking
- Promotion of free, creative and inductive thinking
- Production of new research ideas
- Work in an interdisciplinary environment
- Research analysis and synthesize of data and information, using the necessary technologies
- Application of the knowledge in solving questions

8. COURSE CONTENT

1. Introduction in Systems Biology: Models, networks, data integration, model organisms and general principles.
2. Access in sequence data: Databases and familiarize with them. Data acquisition and analysis.
3. Next generation sequencing.
4. Analysis of next generation sequencing data: Fastq, alignment, SAM/BAM/BED, peak calling, count exons, variant calling, visualization and interpretation of the results.
5. Transcription factors: Properties of transcription factors. Methods to identify transcription factors (ChIP-seq), analysis and interpretation. Motif analysis and interpretation in relation to network development. How transcription factors control gene regulation?
6. Chromatin organization: From the 1D structure of DNA up to the 3D and 4D structure of chromatin. Principles of chromatin organization and structure. Nucleosomes. RW/GL, MLS, Fractal Globule, RL. Chromosome territories. Chromatin architecture. TADs and LADs. What they regulate? How to interpret 3D and 4D structure? Relationship between gene regulation and nucleus organization.
7. Chromatin remodeling: Epigenetics. Euchromatin. Heterochromatin. Histones. Methylation, acetylation and other histone modifications. Relationship between histones and transcription factor binding on DNA. Polycomb proteins and other protein complexes. PRC1/2 and gene regulation.
8. Analysis of transcriptome. Methods to analyze transcriptome and gene expression (RNA-seq, DNA microarrays, etc). Differential expression analysis. PCA and hierarchical clustering.
9. Analysis of gene expression. Gene categorization. Gene ontologies. Biological pathways. GO, GSEA, SEA, MEA
10. Proteomics: Structure and techniques.
11. Biological networks: Types of biological networks, regulatory networks, metabolic networks, signalling networks, protein networks, interactions between networks. Feedback and feed-forward loops. Density of network and node degree.
12. Big dataset biology. Full scale genomics. Complexity of gene expression. Identification of genome wide binding positions of transcription factors. Genome wide epigenetic modifications. Genome wide chromatin structure. Organization and visualization of the information. Identification of peaks from ChIP-seq. Networks of transcriptional regulation.
13. Systems Biology with an example

9. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY	

Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Each chapter will be presented and analysed in the form of PowerPoints. Particular emphasis will be on the participation of students (e.g. in the form of answering questions, interpreting real experimental datasets, discussing and criticizing results) in order to develop a critical spirit and a profound knowledge. Moreover, during teaching, selected publications relevant to the course, will be presented.

Learning outcome	**Activity**	**Workload (h)**
To know and understand the basic principles and concepts of Systems Biology and their impact on Biosciences.	Lectures, seminars, interactive teaching, study and analysis of bibliography	20
The students to understand that the combination of experimental and computational biology can interpret complex biological questions.	Lectures, seminars, interactive teaching, study and analysis of bibliography	35
The students to know the basic principles and theories for chromatin architecture and compartmentalization (1D -> 4D), their relationship with transcription factories, regulatory elements, transcription factors and their role in various and complex biological processes with emphasis on gene regulation	Lectures, seminars, interactive teaching, study and analysis of bibliography	35
To know the basic methodological approaches of Systems Biology and to be in the position to appreciate and understand the datasets acquired from them.	Lectures, seminars, interactive teaching, study and analysis of bibliography	30

	To know the types of biological networks and to be able to apply the basic principles in constructing biological networks	Lectures, seminars, interactive teaching, study and analysis of bibliography	30
	Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of evaluation**: Greek **Methods of evualation** • Written exams with open-ended questions • Written exams with short-answer questions • Written exams with multiple choice questions • Written exams to answer scientific questions • Voluntary presentation of selected publications The methods of evaluation are also available at eclass.duth.gr

10. SUGGESTED READING

1. Bioinformatics and Functional Genomic. Eudoxus: 86054818. Academic publications.
2. Recombinant DNA. Eudoxus: 2625. Academic publications.
3. Computational Biology. Eudoxus: 320114. Hellenic Academic Books. Kallipos repository

DESCRIPTION OF OPTIONAL MODULES

Course descriptions by the instructors

COURSE OUTLINE	Molecular Ecology

INSTRUCTORS	M. Chatzaki, Associate Professor

11. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 501**	**SEMESTER**	**A**
COURSE TITLE	Molecular Ecology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01124/		

12. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

A. Learning outcomes:

- Understand the principles in ecology, biogeography and evolution as well as in molecular ecology
- Understand the importance of developing and the ways to use new markers for molecular ecology

B. Synthesis, interpretation and analysis:

- Analyse the relationship between ecology, evolution and molecular ecology
- Create ideas and critical thinking about choosing the right molecular markers judging upon specific scientific questions
- Synthetically combine information to formulate possible research concepts and ideas in the framework of molecular ecology

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Searching, data and information analysis and composition with the use of necessary technologies

- Autonomous and team work
- Production of new research ideas
- Awareness for the natural environment
- Promoting free, creative and inductive thinking

13. COURSE CONTENT

14. Principles of ecology in relation to other biological fields
15. Evolutionary theory – Genetic variation schools – Adaptation – Speciation
16. Ecological definition of evolution. Molecular ecology
17. Molecular markers in ecology
18. Molecular systematics and phylogenetics
19. Population genetics
20. Phylogeography
21. Molecular evolution and adaptation
22. The molecular basis of behavior
23. Conservation ecology and genetics
24. Literature handling (searching, reading, storing)
25. Special topics – oral presentations I
26. Special topics – oral presentations II

14. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students, scientific literature searching
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Description of main principles in ecology, biogeography and evolution	Lectures Study	19
Description of main principles in molecular ecology – molecular markers	Lectures Study	30
Relationship of ecology and evolution	Lectures Study Discussions and Interaction in Class	7
Choosing the right molecular marker according to the question posed	Lectures Study Discussions and Interaction in Class	20
Research fields in molecular ecology	Lectures Study Discussions and Interaction in Class Team work	14

	Total	**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Assessment methods** Short answer questions Problem solving Essay/report Oral examination Public presentation

15. SUGGESTED READING

- An Introduction to Molecular Ecology. Travor J.C. Beebee & Graham Rowe. Oxford University Press, 2
- Η Πανίδα της Ελλάδας-Βιολογία και Διαχείριση της Άγριας Πανίδας κ.ά 1η έκδοση 2020. Εκδόσεις Broken Hill Publishers Ltd Κύπρος, 2020 (κωδικός ΕΥΔΟΞΟΥ 86055696 και ο ISBN: 9789925575053)
- Molecular Markers, Natural History, and Evolution. John C. Avise, 2nd edition, Sinauer Associates, 2004
- Advances in Molecular Ecology. Gary R. Carvalho, IOS Press, 1998
- Εξελικτική οικολογία. Eric R. Pianka, Παν. Εκδ. Κρήτης, 2006

COURSE OUTLINE	**Virology**

INSTRUCTORS	Katerina Chlichlia, Associate Professor Penelope Mavromara, Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES			
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS			
STUDY LEVEL	LEVEL 6			
COURSE CODE	**MBG 502**	**SEMESTER**	**A (7th)**	
COURSE TITLE	Virology			
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*			**HOURS/WEEK**	**ECTS CREDITS**
			2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	SCIENTIFIC FIELD COURSE			
PREREQUISITE COURSES:	NO			
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO			
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01126/			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course are:

- To acquire knowledge about the basic principles in Virology and to get familiar with the Biology of selected families of viruses
- To gain knowledge about the basic molecular mechanisms underlying the virus-host interactions and to get familiar with the molecular basis of pathogenicity mediated by viral infections
- To get acquainted with the utilization of viruses in Translational Medicine (gene therapy – development of vaccines)

LEARNING OUTCOMES:
After successfully completing the course, students will acquire the following Knowledge, skills and competencies:

- They should know the main characteristics of viruses: Main properties of viruses – Structure of viruses – Nature and Transcription of viral genomes – Classification – Life cycle
- They should know about the basic virus-host interactions, with emphasis in the host antiviral immune responses and the basic strategies of viral immune evasion – To understand the link to pathogenicity of viral infections
- They should know about the Biology of selected viral families, Clinical manifestations, ways of viral spread, and about the prevention, diagnosis and treatment of viral infections, and molecular basis of pathogenicity
- They should know and understand the strategies used in the design and construction of recombinant viruses as well as their importance for Translational Medicine (gene therapy, development of vaccines

They should be able to combine and utilize the acquired knowledge, in order to be able to solve virology-related problem-based questions and to analyze experimental results in Virology.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesis of data and information, using the necessary technologies
- Production of new research ideas
- Promotion of free, creative and inductive thinking
- Decision making
- Autonomous work
- Adaptation to new situations
- Project design and management

3. COURSE CONTENT

1. Introduction – General properties of viruses: structure, classification, proliferation, life-cycle
2. Mechanisms of pathogenicity – host-virus interactions – antiviral actions
3. Positive-sense RNA viruses: family of picornaviruses (Picornaviridae)
4. Positive-sense RNA viruses: family of flaviviruses (Flaviviridae)
5. Negative-sense RNA viruses: Influenza virus
6. Positive-sense RNA viruses: family of retroviruses (Retroviridae)
7. DNA viruses: family of papillomaviruses (Papillomaviridae)
8. DNA viruses: family of herpesviruses (Herpesviridae)
9. Hepatitis viruses (HAV, HBV, HCV, HDV
10. Vectorology – DNA recombinant viruses for gene transfer in gene therapy and immunotherapya
11. Special topics – Tumor viruses – Presentation of assignments/reports
12. Special topics - Virome– Presentation of assignments/reports
13. Special topics – Vaccines – Oncolytic viruses – Presentation of assignments/reports

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	Instructional teaching in conjunction with collaborative and interactive teaching strategies

Learning outcomeq	Activity	Workload (h)
To know the main characteristics of viruses: Main properties of viruses – Structure of viruses – Nature and Transcription of viral genomes – Classification - Life cycle	Lectures, study at home	15
To know about the basic virus-host interactions, with emphasis in the host antiviral immune responses and the basic strategies of viral immune evasion – To understand the link to pathogenicity of viral infections	Lectures, study at home, assignments	15
To know about the Biology of selected viral families, Clinical manifestations, ways of viral spread, and about the prevention, diagnosis and treatment of viral infections, and molecular basis of pathogenicity	Lectures, assignments, study at home,	30
To know and understand the strategies used in the design and construction of recombinant viruses as well as their importance for Translational Medicine (gene therapy, development of vaccines	Lectures, assignments, study at home	15
To be able to combine and utilize the acquired knowledge, in order to be able to solve virology-related problem-based questions and to analyze experimental results in Virology	Assignments, study at home	15
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language**: Greek **Evaluation methods:** Evaluation of presentations and written assignments/reports Written exams with multiple-choice questionnaires Written exams with short-answer questions

5. SUGGESTED READING

in Greek language:

1. **«ΙΟΛΟΓΙΑ: έγχρωμο εικονογραφημένο εγχειρίδιο»,** Korsman SNJ, Van Zyl GU, Nutt L, Andersson MI, Preiser AW, 1st edition/2017, translated in Greek language 2017, Parisianou Publications, ISBN: 978-960-286-977-2, *Eudoxus code*: 68401258
2. **«ΙΟΛΟΓΙΑ: Κατανοώντας τους Ιούς»,** Shors Teri, 3rd edition/2016, translated in Greek language 2020, Broken Hill Publishers Ltd., ISBN: 978-992-557-5176, *Eudoxus code*: 86053314
3. **«ΙΟΛΟΓΙΑ»** Καλκάνη-Μπουσιάκου Ε., 1st edition/2008, Ellin Publications G. Parikos & Co., ISBN: 978-960-286-977-2, *Eudoxus code*: 16445
4. **«ΙΑΤΡΙΚΗ ΜΙΚΡΟΒΙΟΛΟΓΙΑ & ΙΟΛΟΓΙΑ»** των Παπαπαναγιώτου ΙΚ, Κυραζοπούλου-Δαλαΐνα Β, 2nd edition/2004, University Studio Press, ISBN: 978-960-12-1007-0, *Eudoxus code:* 17328

Course notes

Course lecture notes and lecture presentations are available through the *e-class* platform.

COURSE OUTLINE	**Radiobiology**

INSTRUCTORS	Zisimopoulos A., Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 503**	**SEMESTER**	
COURSE TITLE	Radiobiology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*			
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice,*	

fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Total		

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	

5. SUGGESTED READING

COURSE OUTLINE	Advanced themes of Computational Biology

INSTRUCTORS	Nicholas M. Glykos, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 506**	**SEMESTER**	**Spring, D'**
COURSE TITLE	Advanced themes of Computational Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	2	3	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01191/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

- Gain a basic understanding of Structural Computational Biology
- Understand the principles of the various methods for determining the atomic resolution structures of biomolecules.
- Understand the intricacies and complexities of the protein folding problem.

After completing the course, the student will be able to

- Understand the basic principles of Structural Computational Biology
- Understand the fundamental ideas behind X-ray crystallography and the electron microscopical three-dimensional reconstruction.
- Understand the basic ideas and problems associated with the protein folding problem

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Promotion of free, creative and inductive thinking
- Research, analysis and synthesize of data and information, using the necessary technologies
- Decision making
- Autonomous work
- Production of new research ideas
- Project design and management

3. COURSE CONTENT

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

A non-mathematical introduction to crystallography: waves, crystals, scattering, diffraction, the phase problem, the crystallographic experiment, production of X-rays, interaction between matter and Xrays, 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.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Active use of ICT in teaching, laboratory education, and in communicating with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	**Activity**	**Workload (h)**
Understand basic principles of Structural Computational Biology	Lectures, Laboratory practice, homework	30
Understanding X-ray crystallography and three-dimensional reconstruction	Lectures, Laboratory practice, homework	30
Understanding the protein folding problem	Lectures, Laboratory practice, homework	30
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation Language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Language: Greek Methods of evaluation: • multiple choice questionnaires • short-answer questions • problem solving • written work The evaluation criteria are known. It is known.

5. SUGGESTED READING

A non-mathematical introduction to X-ray Crystallography, N.M.Glykos
Principles of Protein X-Ray Crystallography, Drenth Jan.

COURSE OUTLINE	Mechanisms of oncogenesis

INSTRUCTORS	A. Galanis, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 508**	**SEMESTER**	**G**
COURSE TITLE	Mechanisms of oncogenesis		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01128/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Upon successful completion of the course the student will:

- Learn and understand the molecular mechanisms and the basic principles of oncogenesis.
- Develop critical thinking, understand cancer research study design and evaluate results.
- Learn the main therapeutic strategies for cancer treatment.
- Develop presentation and writing skills for cancer research papers.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Production of new research ideas
- Team work
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Introduction
2. Cancer Epidemiology
3. Cellular Oncogenes
4. Tumor Suppressor Genes
5. Cell Cycle deregulation and Cancer

6. Hypoxia and Angiogenesis
7. Metastasis
8. Molecular diagnostics in the evaluation of Cancer
9. Rational Cancer Therapeutics
10. Microarrays in Cancer research
11. Cancer research paper presentation
12. Cancer research paper presentation
13. Cancer research paper presentation

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	**Teaching methods:** Lectures, study and analysis of bibliography, use of e-class, presentations

Learning outcome	**Activity**	**Workload (h)**
Learn and understand the molecular mechanisms and the basic principles of oncogenesis	Lectures	20
Understand cancer research study design, evaluate results and develop presentation skills for cancer research papers	Study, analysis of bibliography and presentation of cancer research papers	35
Understand cancer research study design, evaluate results and develop writing skills for cancer research papers	Study, analysis of bibliography and essay writing	35
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, , problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of evaluation**: Greek **Methods of evaluation**: Written work (50%) and public presentation (50%) The evaluation criteria are known to the students

5. SUGGESTED READING

- Cancer Biology. Kitraki and Trougkos (2006)
- Recombinant DNA. Watson J.D. (2006)

COURSE OUTLINE	Principles of entrepreneurship in biosciences

INSTRUCTORS	Ioannis Kourkoutas, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 4		
COURSE CODE	**ΜΒΓ 509**	**SEMESTER**	**Spring**
COURSE TITLE	Principles of entrepreneurship in biosciences		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	2	3

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	General knowledge
PREREQUISITE COURSES:	No
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01252/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The course aims to activate students in the business field related to life sciences (pharmaceutical companies, biotechnology industry, health services, etc.). Additionally, the regulatory framework governing business activities in life sciences is outlined and strategies for developing innovation and technology transfer from research to industrial production, leading to commercially viable products and services, are described. Finally, lectures by experienced / well established scientists and professionals in the field of biosciences are available to students.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

• Analysis and synthesis of data and information.
 Team work.
• Creation of new research ideas.
• Promote free, creative and inductive thinking.
• Promotion of free, creative and inductive thinking.

3. COURSE CONTENT

• Biotechnological research & development.
• Career choices except education.
• Entrepreneurship and connection to the life sciences. Business plan. Invited speaker from the Chamber of Evros.
• National Organization of Medicine and the pharmaceutical industry.

• Innovation and inventions.
• Standards and legal framework for medical devices.
• Management and overall quality management. Scientific support and marketing.
• Biotech entrepreneurship & innovation.
• Clinical development of Medicines. Invited speaker from the pharmaceutical industry.
• Research and development in the pharmaceutical industry. Invited speaker from the pharmaceutical industry.
• Interviewing a prospective employer (drafting a cover letter and resume, interviewing, good professionalism and ethics).

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Familiarize and activate students in the business field related to life sciences (pharmaceutical companies, biotechnology industry, health services, etc.)	Lectures	20
Understanding the regulatory framework governing business activities	Class work	6
Develop strategies for innovation and technology transfer from research to industrial production	Study at home	64
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of evaluation**: Greek **Methods of evaluation** Team written work Public presentation/seminar The evaluation criteria are known to the students through the *e-class* platform.

5. SUGGESTED READING

1. Title: Innovation and Enterpreneurship.
Authors: I. Karagiannis, I. Mpakouros.

Publisher: Sofia S.A.
Publication year: 2010.
ISBN: 978-960-6706-33-2.
Eudoxus code: 1104.

COURSE OUTLINE	Principles of laboratory animal management

INSTRUCTORS	Petros Ypsilantis, Associate Professor of Experimental Surgery – Laboratory Animal Science

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 511**	**SEMESTER**	**7th**
COURSE TITLE	Principles of laboratory animal management		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	2	3	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	BACKGROUND		
PREREQUISITE COURSES:	NONE		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01151/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Objectives of the course:

a) To introduce students to the basic principles of Laboratory Animal Science,
b) to provide students with general information on the management of a laboratory animal facility, and
c) to provide students with species-specific information on biology, husbandry, anesthesia, euthanasia and non-surgical experimental procedures of laboratory animals.

After successful completion of the course, students will:

- have aquired knowledge on basic principles of Laboratory Animal Science and on species-specific biology, handling, substances administration, collection of biologic material, anesthesia and euthanasia of the most commonly used laboratory animal species.
- have completed practical training on restraining and handling techniques, substances administration, blood collection, anesthesia, euthanasia and necropsy of small laboratory animals
- be able to understand special requirements on laboratory animal handling, substances administration, as well as calculation and administration of anesthetics

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies

Autonomous work Team work Production of new research ideas Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. The use of animals in biomedical research, Code of Ethics and Deontology on the use of animals in experiments
2. Alternative methods, Legislation
3. Basic principles of laboratory animal husbandry
4. Administration of drugs and other substances
5. Collection of body fluids
6. Anesthesia, Recognition and treatment of pain and distress
7. Euthanasia, Health monitoring, Methodology of examination
8. Zoonoses
9. Rabbit (biology, husbandry, handling, restrain, administration of substances, body fluid collection, anesthesia, euthanasia)
10. Mouse, rat (biology, husbandry, handling, restrain, administration of substances, body fluid collection, anesthesia, euthanasia)
11. Hamster, guinea pig, carnivores, ungulates (biology, husbandry, handling, restrain, administration of substances, body fluid collection, anesthesia, euthanasia)
12. Demonstration of live rabbits (handling, restraining, administration of substances, blood collection, euthanasia, anatomy)
13. Demonstration of live mice and rats (handling, restraining, administration of substances, blood collection, euthanasia, anatomy)

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face Lectures using slides, videos Laboratories – practical training: demonstration of handling and restraining, administration of substances, blood collection, anesthesia, euthanasia and necrotomy techniques on animals. Practical training of students on live animals
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Slides (Power Point), Videos, Study of Videos contained in DVDs enclosed in the book that is distributed to the students, e-class

MODES OF DELIVERY

Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
Acquiring knowledge on basic principles of Laboratory Animal Science and on species-specific biology, handling, substances administration, collection of biologic material, anesthesia and euthanasia of the most commonly used laboratory animal species.	Lectures	58

	Practical training on restraining and handling techniques, substances administration, blood collection, anesthesia, euthanasia and necropsy of small laboratory animals	Fieldwork	10
	Study of literature, study of videos on techniques	Homework	22
	Total		**150**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Language of evaluation: Greek Methods of evaluation: short answer questions The students are informed on the evaluation criteria

5. SUGGESTED READING

"Principles of Laboratory Animal Handling." "Rotonda" Medical Publications, Thessaloniki, Greece, Thessaloniki-Greece 2011, Author: Petros Ypsilantis,

ISBN: 978-960-6894-20-6
EUDOXOS code: 127429

COURSE OUTLINE	Principles of pharmaceutical chemistry and chemistry of natural compounds

INSTRUCTORS	

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 512**	**SEMESTER**	**Winter E (5th)**
COURSE TITLE	Principles of pharmaceutical chemistry and chemistry of natural compounds		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Pharmaceutical Chemistry is generally related to the discovery, identification of the chemical structure and synthesis of new drugs and/or optimization of existing drugs, and is one of the major disciplines of the pharmaceutical sciences. As the chemical structure and more generally the physical, chemical and physicochemical properties of the drugs are inextricably linked to their beneficial-therapeutic abilities, knowledge of pharmaceutical chemistry is considered essential. At the same time, it is well known that natural products (herbal or animal origin) are an important source of origin and/or production of a high amount of the drugs used nowadays. For this reason, knowledge of their chemical properties-characteristics in relation to their biological actions is of great importance for the discovery and development of new therapeutic-pharmaceutical products against various diseases.

Course objectives:
A) Introduction of students to the subject of Pharmaceutical Chemistry and its connection to the general context of the pharmaceutical sciences and the production of new drugs
B) Understanding the contribution of natural products to pharmaceutical technology and pharmaceutical sciences based on their chemical structure-properties

Teaching targets:
Upon successful completion of the course students will be able to:
• Know the basic principles underlying the criteria and modern methodologies related to the synthesis, development and optimization of guide compounds and drugs, as well as the general contribution of the pharmaceutical sciences to human health
• Know the biosynthetic pathways of the most important secondary metabolites

• Recognize and explain the relationship between the chemistry of bioactive natural compounds and their biological actions against human diseases and generally their role in the discovery and development of novel drugs
• Develop critical thinking and analytical ability of the acquired knowledge, through presentation and discussion of selected scientific literature topics

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data information using the necessary methodologies
- Autonomous work/Team work
- Production of new research ideas
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Introduction in Pharmaceutical chemistry and chemistry of natural compounds
2. Methods of design and discovery of drugs
3. Methods for development and optimization on new drugs
4. New generation drugs
5. Methods for drug testing and clinical trials
6. Classes of natural compounds and classification based on their origin, chemical structure, biosynthesis and bioactivity
7. Biosynthesis of bioactive natural compounds through acetate pathway and biological activities
8. Biosynthesis of bioactive natural compounds through shikimic pathway and biological activities
9. Biosynthesis of bioactive natural compounds through mevalonic acid pathway and biological activities
10. Biosynthesis and biological activities of alkaloids
11. Relation between chemical structure and biological activities of natural compounds against several diseases
12. Presentation and analysis of work following selection between several scientific papers related to the general context of pharmaceutical chemistry, chemistry of natural compounds and their use in the development of new drugs
13. Presentation and analysis of work following selection between several scientific papers related to the general context of pharmaceutical chemistry, chemistry of natural compounds and their use in the development of new drugs

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching,*	Lectures, use of e-class and new technologies. Study and analysis of scientific literature-reviews, essay writing and work presentation

educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
Know basic principles and disciplines of Pharmaceutical Chemistry. Know and understand the contribution of natural products in pharmaceutical technology and pharmaceutical sciences based on their chemical structure and properties	Lectures Study and analysis of bibliography	10
Know and understand basic principles, criteria and modern methodologies in synthesis, development, optimization and evaluation of drugs	Lectures Study and analysis of bibliography	20
Know the main categories and classification of natural compounds. Know and understand the most important biosynthetic pathways of bioactive natural compounds and their biological activities	Lectures Study and analysis of bibliography	20
Know and understand the relation between the chemical structure of bioactive natural compounds and their biological activities against human diseases	Lectures Study and analysis of bibliography	10
Understand, analyze and evaluate scientific articles on the subject of Pharmaceutical chemistry and chemistry of natural compounds	Interactive teaching Study and analysis of bibliography	20
Develop oral and written presentation skills in a research topic related to the subject of Pharmaceutical chemistry and chemistry of natural compounds	Interactive teaching Study and analysis of bibliography	10
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation /language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of Evaluation**: Greek **Methods of evaluation** • Written assignment (Formative, Conclusive) (50%) • Oral presentation (Formative, Conclusive)(50%) Assignments and presentations will be related to a range of topics selected by the students from a list provided by the instructor

5. SUGGESTED READING

Suggested Textbooks

- Drugs of Natural Origin (Greek translation). Samuelsson Gunnar. Crete University Press, 2004 (ISBN: 978-960-524-015-8). Eudoxos code: 469.
- Scientific and review articles

Course notes and presentations are available through the e-class platform

COURSE OUTLINE	**Molecular biotechnology and nutrition**

INSTRUCTORS	I. Kourkoutas, Associate Professor A. Galanis, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 513**	**SEMESTER**	**G**
COURSE TITLE	Molecular biotechnology and nutrition		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	2	3

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course
PREREQUISITE COURSES:	No
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01150/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Upon successful completion of the course the student will:

- Learn and understand the basic principles of Molecular Biotechnology and Nutrition.
- Develop critical thinking, understand Molecular Biotechnology and Nutrition research study design and evaluate results.
- Be familiar with complex scientific terminology related to Molecular Biotechnology and Nutrition
- Develop presentation and writing skills for research papers.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Creation of new research ideas
- Team work
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1.Introduction
2.The role of the gut microbiota in energy metabolism and metabolic disease
1.Nutrigenomics and Personalized Nutrition
2.Molecular pharming

3.Reviewing classical and molecular techniques regarding profiling of probiotic character of microorganisms
4.Probiotics and prebiotics and their role in nutrition
5.Essential oils and plant extracts with biological activity
6.Nutraceuticals: Facts and future trends
7.Genetically modified foods: Genetic modification techniques, application in food industry and social issues
8.Effect of nutrition on human intestinal microbiome
9.Paper presentation
10. Paper presentation
11. Paper presentation

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	**Teaching methods:** Lectures, study and analysis of bibliography, use of e-class, presentations

Learning outcome	**Activity**	**Workload (h)**
Learn and understand the basic principles of Molecular Biotechnology and Nutrition.	Lectures	20
Understand research study design, evaluate results and develop presentation skills for research papers in Molecular Biotechnology and Nutrition.	Study, analysis of bibliography and presentation of research papers	35
Understand research study design, evaluate results and develop writing skills for research papers in Molecular Biotechnology and Nutrition.	Study, analysis of bibliography and essay writing	35
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, , problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of evaluation**: Greek **Methods of evaluation**: Written work (50%) and public presentation (50%) The evaluation criteria are known to the students

5. SUGGESTED READING

- Advanced Nutrition and Human Metabolism. (2008) Gropper S., Smith J., Groff J.
- Introduction to Human Nutrition (2013) Gibney M. J., Vorster H. H., Kok F. J.

COURSE OUTLINE	Genetics of Aquired Disease and Translational Medicine

INSTRUCTORS	Maroulakou I., Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 514**	**SEMESTER**	
COURSE TITLE			

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	
PREREQUISITE COURSES:	
LANGUAGE OF TEACHING AND EXAMINATIONS:	
THE COURSE IS OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice,*	

fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc. *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	**Learning outcome** / **Activity** / **Workload (h)** (empty) / (empty) / (empty) (empty) / (empty) / (empty) **Total** / (empty)
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	

5. SUGGESTED READING

COURSE OUTLINE	Teaching Practicum Course II (Teaching in schools)

INSTRUCTORS	Kedraka Katerina, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 515**	**SEMESTER**	**7th**
COURSE TITLE	Teaching Practicum Course II (Teaching in schools)		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	6
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	SKILLS DEVELOPMENT		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01203/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Teachning Practicum Course II is implemented in collaboration with local educational units or other educational contexts for familiarizing students with teaching praxis.
The course aims at developing skills in the preparation, design and implementation of teaching in order to avoid possible mistakes related to methods, forms, teaching and learning methods.
At the attitudes level, they will develop a positive aspect for students coming from different socio-economic and cultural backgrounds, as schools in Thrace have many Muslims' minority children as well as refugees and immigrants. They will also develop the ability to effectively collaborate and communicate with the school environment, and in particular with their Mentors, who have been assigned to support students during their attendance and teaching at Thrace School Units.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Project design and management
Research, analysis and synthesize of data and information, using the necessary technologies
Autonomous work
Team work
Development of social, professional and moral responsibility and gender sensitivity
Respect for diversity and multiculturalism
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Students are briefed on how to implement their teaching knowledge and skills intro real classrooms that they will attend. Teaching Practicum Course II is supported by mentors, local teachers who lead MBG students at their classrooms.
2-13. Students at first pay observation visits and secondly, they teach in various school units in Thrace.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face. Teaching implementation
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Evaluation language: Greek Evaluation method: 60% of the grade comes from the professor, 30% from the mentor and 10% from the pupils of each school unit.

Activity	**Workload (h)**
Lectures	4
Education visit	6
Teaching at schools	16
Preparation at home	154
Total	**180**

5. SUGGESTED READING

COURSE OUTLINE	Adult Education

INSTRUCTORS	Kedraka Katerina, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 516**	**SEMESTER**	**7th**
COURSE TITLE	Adult Education		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	BACKGROUND		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01201/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The course aims to introduce the students of the Department of Molecular Biology and Genetics to the modern principles, theories and educational approaches of Adults' Education.
At the skill level, students will become familiar with presenting small projects to their peers in order to become able to plan, organize and evaluate adult learning.
At the level of attitudes and behaviors students will gain a better understanding and empathy through interdisciplinary teaching.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies
Project design and management
Autonomous work
Team work
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Presentation of the field of Adult Education
2. Brief review of the field in Greece
3. Open and distance education
4. Institutes and organizations of Adult Education

5. Introduction to the Basic Concepts, Principles and Methods of Adult Education
6. Major Theories of Adult Learning
7. Professionalization of adult trainers
8. Using Active Learning Techniques
9. The role of Arts in Adult Education
10. Use of evaluation methods

11-13. The adult educator as a researcher and / or designer, who deals with the basic principles of qualitative research, by conducting small surveys, which students conduct, on their own or in small groups, using interview techniques or / and observation, and present in plenary.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face, peer teaching
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	**Activity** / **Workload (h)** Lectures: 4 Work at class: 22 Study at home: 64 **Total: 90**
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Evaluation language: Greek Evaluation method: Written work and public presentation

5. SUGGESTED READING

- Kedraka, K., & Phillips, N. (2017). Designing educational programs. Practical guide for elementary adult trainers. Thessaloniki: Kyriakidis Publications. EVDOXUS CODE = 68407482
- Kedraka, K. (2017). Adult trainers in Greece. Their professional development. Thessaloniki: Kyriakidis Publications. EVDOXUS CODE = 68407476

COURSE OUTLINE	Organizational Psychology

INSTRUCTORS	Kedraka Katerina, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 517**	**SEMESTER**	**7th**
COURSE TITLE	Organizational Psychology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	2	3	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	GENERAL		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01202/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The cognitive goals of the course are to familiarize the students with the structures of working organizations.

At the skill level, students will become familiar with presenting small thematic work to the public.

At the level of attitudes and behaviors students will gain a better understanding and empathy through interdisciplinary teaching.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies
Project design and management
Autonomous work
Team work
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Personality / Intelligence Dimensions
2. Staff Selection
3. Personnel Management
4. Employees' motivation
5. Work values
6. Job satisfaction

7. Relationships and communication in the workplace
8. Organizational Commitment
9. Positive Work Behaviors
10. Leadership Models
11. Motivation in the Work Environment (Adams Equity Theory, Herzberg's 2 Factors Theory, Alderfer's ERG Motivation Theory, Vroom's Theory of Expectations)
12. Employee evolution and mobility
13. Barriers and difficulties at work (stress, burnout)

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face, peer teaching
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Evaluation language: Greek Evaluation method: Written work, public presentation

Activity	**Workload (h)**
Lectures	4
Work at class	22
Study at home	64
Total	**90**

5. SUGGESTED READING

- Vakola, M., & Nikolaou, I. (2012). Organizational Psychology and Behavior. Athens: Rosili. EVDOXUS CODE = 12257495
- Poulopoulos, Ch., & Tsimpoukli, A. (2015). Dynamics in groups and change in organizations. Athens: Motivo Publications - Topos. EVDOXUS CODE = 41959430

COURSE OUTLINE	Advanced Themes of Structural Biology

INSTRUCTORS	Vasiliki Fadouloglou, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 519**	**SEMESTER**	**G**
COURSE TITLE	Advanced Themes of Structural Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	no		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/HEALTH114/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Course objectives

- The structural perspective of Biology
- Achievements of the modern Structural Biology through the study of selected systems and mechanisms

Learning outcomes

After the successful completion of the course the student can

- Understand advanced concepts of Structural Biology
- Understand specific elements of protein structure architecture
- Analyze molecular biology problems to their structural basis and seek/understand the atomic/molecular base of biological mechanisms (for example diseases, metabolic pathways, signaling, secretion)

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Analysis and synthesis of data and information
Production of new research ideas
Promotion of free, creative and inductive thinking
Decision making
Adaptation to new situations
Project design and management

3. COURSE CONTENT

Structural basis of drugs and toxins activity
Protein complexes with inhibitors and activators. Principles of structure based drug design
Structural basis of molecule recognition by immune system
Structural basis of bacterial resistance to antibiotics
Secretion molecular machines. Supermolecular structures i.e. ATP synthase, bacterial secretions systems.
Structural basis of protein synthesis and nucleoproteins complexes. The structure of ribosome.
Aminoacyl-tRNA synthases, recognition and specificity mechanisms
Structural biology of viruses

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	Students are encouraged to actively participate in the delivery process through an interactive teaching procedure. Thus, students acquire in depth knowledge of the field and develop the skills of experimental design and interpretation of the results. Moreover, students learn how to collaborate with their colleagues and teacher.

Learning outcome	**Activity**	**Workload (h)**
To understand advanced concepts of Structural Biology	Lectures, non-directed study, study and analysis of bibliography, essay writing	30
To understand specific elements of protein architecture	Lectures, non-directed study, study and analysis of bibliography, essay writing	30
To understand the relationship between biological pathways and the structure of the participating molecules	Lectures, non-directed study, study and analysis of bibliography, essay writing	30
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report,*	Evaluation language: greek Methods of evaluation: written examination by multiple choice questions written examination by short-answer questions written examination by problem solving written examination by open-ended questions

oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Are evaluation criteria known to the students?*	

5. SUGGESTED READING

Introduction to Protein Structure, Carl Branden & John Tooze
A no mathematic introduction to protein crystallography, Nicholas Glykos

COURSE OUTLINE	Histology

INSTRUCTORS	Lambropoulou Maria, Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**MBG 601**	**SEMESTER**	**S**
COURSE TITLE	Histology		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	2	3

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course
PREREQUISITE COURSES:	
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01140/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

•

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies
Production of new research ideas
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

The objectives of the course are:
The aim of Histology is to study the texture of biological material and the ways in which its individual ele
are structurally and functionally related. Initially, the course introduces the structure and function of the
well as the cell division. Afterwards, the basic tissue types (connective tissue, epithelial tissue, muscular tiss
neural tissue) are analyzed. In the last part, the course focused in the following systems: circulatory, im
respiratory, central neural system, male and female reproductive system, skin, gastrointestinal, liver, pa
and endocrine glands.
• All methods of tissue processing and study are reported, as well as molecular methods used in the diagno
prognosis of diseases.

Lectures

1. Gross anatomy and special techniques in Histology. Cell (function and structure).
2. Histochemistry, Cytochemistry, Immunohistochemistry and others Molecular techniques
3. Epithelial tissue.
4. Connective tissue.
5. Fat & Chondrus tissue.
6. Bone connective tissue
7. Muscular & Neural system.
8. Gastrointestinal tract.
9. Respiratory Tract.
10. Skin
11. Male Reproductive system.
12. Female Reproductive system.
13. Breast

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching, laboratory education, and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	**Activity**	**Workload (h)**
49		
	41	
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other*	Language: GREEK Type of exams: multiple choice questionnaires
Are evaluation criteria known to the students?	Yes

5. SUGGESTED READING

1. **HISTOLOGY**: Tallitsch, EDITORS: GHAVALES A – CHATZISYMEON K OE, Year: 2011, ISBN: 9789606894282, Evdoxos: **7950625**
2. **HISTOLOGY**: LESLIE P. GARTNER, EDITORS: PARISIANOU, 4TH EDITION 2019, ISBN: 9789605833022, Evdoxos: **77114885**
3. ***Histology notes, D.U.TH prints***

COURSE OUTLINE	Pharmacology

INSTRUCTORS	Aglaia Pappa, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 602**	**SEMESTER**	**Winter F (7th)**
COURSE TITLE	Pharmacology		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	2	3

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course
PREREQUISITE COURSES:	No
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01132/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Upon successful completion of the course the student is able to:

- Know and understand basic concepts and principles of Pharmacology and Drug Development and recognize the dynamics of emerging Molecular Pharmacology, Pharmacogenetics/ Pharmacogenomics disciplines with the contribution of Molecular Biology and Genetics sciences
- Know and understand basic principles of pharmacokinetics
- Know and understand basic principles of pharmacodynamics
- Understand and describe the basic principles of drug action
- Analyze the molecular mechanisms of action of drugs through examples of drugs that affect various systems (autonomic nervous system, central nervous system cardiovascular system)
- Know and understand the basic principles of chemotherapy and chemoresistance
- Analyze the molecular mechanisms of action of microbial chemotherapeutic drugs
- Analyze the molecular mechanisms of action of cancer chemotherapeutic drugs
- Know the stages of drug development
- Explore new promising molecular targets for the development of new drugs for targeted therapies through a literature search
- Present and analyze cutting-edge research topics in the field of Molecular Pharmacology

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data information using the necessary methodologies

- Team work
- Production of new research ideas
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Introduction to Pharmacology - Basic Principles of Therapeutics
2. Principles of pharmacokinetics (routes of administration, mechanisms of absorption and distribution, metabolism and excretion of drugs)
3. Principles of pharmacodynamics (mechanisms of drug actions, drug-receptor interactions)
4. Pharmacogenetics – Pharmacogenomics
5. Drugs acting on the Autonomous Nervous System
6. Drugs acting on thw Central Nervous System
7. Drugs acting on the Cardiovascular System
8. Principles of chemotherapy and chemoresistance
9. Microbial chemotherapeutic drugs
10. Cancer chemotherapy drugs
11. Development of new drugs and targeted therapies
12. Presentation and analysis of scientific literature
13. Presentation and analysis of scientific literature

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	Lectures, use of e-class and new technologies, study and analysis of literature, essay writing and work presentation

Learning outcome	**Activity**	**Workload (h)**
Know basic principles (pharmacokinetics, pharmacodynamics, pharmacogenomics) and disciplines of Pharmacology	Lectures Study and analysis of bibliography	10
Know and understand the general principles of drug action and analyze the molecular mechanisms of action of selected drug classes	Lectures Study and analysis of bibliography	20
Know and understand basic principles of chemotherapy and development of chemoresistance	Lectures Study and analysis of bibliography	10

	Know the stages of drug development and new developments in targeted therapies	Lectures Study and analysis of bibliography	10
	Understand, analyze and evaluate scientific articles on the subject of Molecular Pharmacology	Interactive teaching Study and analysis of bibliography	30
	Develop oral and written presentation skills in a research topic related to the subject of Molecular Pharmacology	Interactive teaching Study and analysis of bibliography	10
	Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of Evaluation**: Greek **Methods of evaluation** Written exams with short/extendeda-answer questions, open-ended questions and problem solving • Written comprehensive examination) (60%) • Written work (20%) • Oral Presentation (20%) Evaluation criteria are known to the students and are presented in the course work guide available on the course website.

5. SUGGESTED READING

Suggested Textbooks

- PHARMACOLOGY (Greek translation). HUMPHRY P. RANG, MAUREEN M. DALE, JAMES M. RITTER, ROD FLOWER, GRAEME HENDERSON. PARISIANOS A.E., 2014 (ISBN: 9789603949237). EUDOXOS code: 41959371
- PHARMACOLOGY (Greek translation). HARVEY A. RICHARD, KAREN WHALEN, RICH. FINKEL,T H.A.PANAVELIL. PARISIANOS A.E., 2015 (ISBN: 9789605830854). EUDOXOS code: 50660148

Course notes and presentations are available through the e-class platform (https://eclass.duth.gr/courses/ALEX01132/)

COURSE OUTLINE	Advanced themes of Bioinformatics

INSTRUCTORS	Nicholas M. Glykos, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 603**	**SEMESTER**	**Spring, F'**
COURSE TITLE	Advanced themes of Bioinformatics		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01103/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

- Gain a basic understanding of the Perl programming language
- Understand the principles of designing an algorithm
- Become capable of solving simple biological problems with the Perl programming language

After completing the course, the student will be able to

- Understand the basic principles of the Perl programming language
- Design simple algorithms aiming to solve a biologically relevant problem
- Apply the coding knowledge together with the designed algorithm to solve biological problems

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Promotion of free, creative and inductive thinking
- Research, analysis and synthesize of data and information, using the necessary technologies
- Decision making
- Autonomous work
- Production of new research ideas

- Project design and management

3. **COURSE CONTENT**

Perl: the de facto scripting language for Bioinformatics

Introduction to the language, my first perl program, Scalars, for, while, 1st exercise, arrays and 2D-3D arrays, foreach, sort, reading from standard input, split, 2nd exercise, Input/output from named files, hash arrays, 3rd exercise, functions and parameters, 4th exercise, Regular expressions, 5th exercise, A longer application: writing a perl program that will find and print the longest common subsequence of a set of sequences, 6th exercise.

1st practical exercise
Analyse the function ñ = f(x,y) = [10.0 - sqrt(x^2+y^2)] · cos[sqrt(x^2+y^2)] using a perl script.

2nd practical exercise
Write a perl script to implement the Bradford method for determination of protein concentration.

3rd practical exercise
Write a perl script to determine a protein's molecular weight from its sequence.

4th practical exercise
Write a perl script which will read a PDB file and will determine the dimensions (in the orthogonal frame and in Angstrom) of the corresponding macromolecule.

5th practical exercise
Write a perl script which will read a FASTA file containing all swissprot (protein) sequences, and will determine the length and identification code of the longest sequence.

6th practical exercise
Write a perl script which given a set of sequences, will find all their common subsequences (and their positions in the original sequences).

9. **TEACHING and LEARNING METHODS - EVALUATION**

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Active use of ICT in teaching, laboratory education, and in communicating with the students

MODES OF DELIVERY

Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
Understand basic principles of programming in Perl	Lectures, Laboratory practice, homework	30
Designing computer algorithms for solving biological problems	Lectures, Laboratory practice, homework	30
Solving biologically relevant problems using Perl	Lectures, Laboratory practice, homework	30
Total		**90**

STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation Language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Are evaluation criteria known to the students?

Language: Greek

Methods of evaluation:

- multiple choice questionnaires
- short-answer questions
- problem solving
- written work

The evaluation criteria are known. It is known.

10. **SUGGESTED READING**

Sams Teach yourself Perl in 24 Hours, Pierce Clinton.

Pro Perl (e-book), Wainwright, Peter.

COURSE OUTLINE	Advanced techniques and applications in Cell Biology

INSTRUCTORS	Koffa Maria, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 604**	**SEMESTER**	**S**
COURSE TITLE	Advanced techniques and applications in Cell Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific Field Course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01133/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course:

- In-depth understanding of modern techniques of Molecular Cell Biology and especially of microscopy
- Group study and presentation (by the students) of the relevant literature. The teaching method is based on problem-based learning, with the aim of developing information seeking and knowledge acquiring skills individually, and through the collaboration of a small group. The teaching is done in groups of 6-7 people.

Learning outcomes:

Upon successful completion of the course the student acquires the following skills and knowledge to:

- Understand the key questions in the field of Cell Biology, and propose experimental designs for approaching such questions
- Understand the principles behind the operation of modern cell biology technologies
- Work both within a group as well as individually to search for new concepts
- Find and evaluate research materials
- Demonstrate the basic principles of new technologies in a simple and understandable way as part of a teamwork
- Improve critical thinking, problem-solving abilities and communication

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesis of data and information, using the necessary technologies

- Team work
- Autonomous work
- Exercising criticism and self-criticism
- Production of new research ideas
- Promotion of critical, problem-solving thinking
- Adaptation to new situations

3. COURSE CONTENT

PBL approach is used over the entire semester as the primary method of teaching. The course takes place weekly, separately for each group (6-7 students) who choose the question / problem they will follow through the proposed Modern Techniques and Applications topics of Cell Biology (with emphasis on microscopy technologies).
The central idea and principle is taught in the course, followed by a problem that is assigned to students to help them learn that concept. The learning objectives that students should meet when they work through the problem are listed each week.
The problem is introduced in stages so that students are able to identify learning issues that will lead them to research the targeted concepts.
This is followed by identifying key resources for the students, group-discussions and a final presentation of the selected topic

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face, through small groups
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students, as well as key resources
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	Workload (h)
Interactive teaching, work in the classroom	26
Study & analysis of literature, student's study	20
Project writing	20
Essay presentation	24
Total	**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Evaluation methods**: Weekly Oral Examination and Public Presentation of Final Work. The final grade is based on the student's participation in the weekly meetings, as well as the evaluation of the group's performance through the presentation of their final work. Evaluation criteria are known to the students at the beginning of the semester

5. SUGGESTED READING

3. Molecular Biology of the Cell Bruce Alberts, Alexander Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter, 2008
   ISBN: 978-618-5173-29-6, Evdoxos code: 68401319

2. Molecular Cell Biology, Harvey Lodish, Arnold Berk, Chris Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelica Amon, Kelsey Martin
   ISBN: 978-618-5173-39-5, Evdoxos code: 77113296

Course Notes:
Scientific articles and reviews, related websites, articles and videos are posted on the course's e-class website

COURSE OUTLINE	Stem Cell and Regenerative Biology

INSTRUCTORS	M. Grigoriou, Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 605**	**SEMESTER**	**S**
COURSE TITLE	Stem Cell and Regenerative Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific Field		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.duth.gr/modules/auth/opencourses.php?fc=42		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The main objectives of the course are:
a) to acquire basic knowledge of Molecular Biology of the Regenaration
b) to study the basic molecular mechanisms underlying stem cell biology and
c) to realize the potential to develop innovative cell-based stem cell therapies for regenaration

Learning outcomes
Upon successful completion of the course the student:
• have an understanding of the basic principles of regeneration biology and tissue engineering
• is able to describe and analyze the characteristics of the different stem cell types and the basic molecular mechanisms underlying their maintenance
• Identify basic applications of stem cells and be able to propose new ones
• Identify key ethical and legal issues emerging from stem cell applications.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Development of research skills
- Production of new research ideas
- Development of critical thinking
- Promotion of free, creative and inductive reasoning
- Decision making
- Project design

- Exposure to the workplace environment of the Molecular Biologist-Geneticist
- Use of knowledge-based skills to solve practical problems
- Development of time management abilities
- Awareness regarding safety in the lab
- Teamwork
- Autonomous work
- Decision-making
- Adaptation to new situations
- Development of data evaluation skills
- Development of oral and written scientific communication skills

3. COURSE CONTENT

1. Stem cells, cloning and regeneration biology
2. Isolation and culture of embryonic stem cells.
3. Differentiation of embryonic stem cells.
4. The Molecular Basis of Multiplicity.
5. Embryonic stem cell applications.
6. Isolation and culture of tissue-specific stem cells.
7. Differentiation and applications of tissue-specific stem cells.
8. Applications of Tissue Stem Cells.
9. Induced stem cells, methods of creation and their applications.
10. Gene therapy, cloning and stem cells - emerging applications.
11. Cancer Stem Cells.
12. Principles of Mechanical Tissue.
13. Research, applications and bioethics - the example of stem cells

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	The lesson is based on active learning. In each module the basic concepts are presented by the instructor while the students, working in groups in the classroom, "follow" the research of a scientific group with a key-role in the specific field of science, through selected experiments and key scientific publications. Teaching involves the analysis and interpretation of real experimental data, the formulation of new hypotheses, and the design of the experiments needed to test them. In this way the student not only acquires knowledge but also understands, evaluates and processes primary experimental results, formulates assumptions, designs experiments to test them, while at the same time co-operates with his colleagues and the instructor in an environment which, to a large extent, simulates the way a scientific research group operates in the lab.

Learning outcome	**Activity**	**Workload (h)**
have an understanding of the basic principles of regeneration biology and tissue engineering	Lectures, work in the classroom, private study	20

	to understand the basic is able to describe and analyze the characteristics of the different stem cell types and the basic molecular mechanisms underlying their	Lectures, work in the classroom, private study	40
	Identify basic applications of stem cells and be able to propose new ones	Lectures, work in the classroom, private study	15
	Identify key ethical and legal issues emerging from stem cell applications	Lectures, work in the classroom, private study	15
	Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Assessment methods** 1. Work in the room and oral presentation (10%, Formal, Concluding) 2. Extensive Response Questions (30%, Configuration, Conclusion) 3. Work in the room with problem solving (30%) 4. Working in the Chamber with Short Response Questions (30%, Formative, Concluding). The evaluation criteria are presented in the course guide available on the course's website.

5. SUGGESTED READING

Title: The stem cells Author: Georgatos Sp et al. Eudoxus code: 2519

The book covers part of the material, the rest is covered by original publications and notes distributed electronically

Course Notes
Title: Stem cell biology –Powerpoint presentations and handouts.
Author: M. Grigoriou Place & Publication Year: Alexandroupolis, 2019

COURSE OUTLINE	Behavioral Biology

INSTRUCTORS	G. Skavdis, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 606**	**SEMESTER**	**S**
COURSE TITLE	Behavioral Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	2	3	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific Field		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/modules/auth/opencourses.php?fc=42		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The main objective of the course is to familiarize the students with basic questions of Behavioral Biology. Particular emphasis is given to the design and logic of the experiments in order to cultivate critical scientific thought.

Learning outcomes
Upon successful completion of the course the student:
• will have an understanding of the the mechanisms involved in altruistic, aggressive and sexual behavior and their molecular basis
• will know and understand the key points of gaming theory and its application to problems of behavioral biology
• will understand the nature or nurture question and its implications for biology and the organization of human societies.
• be able to analyze and interpret behavioral phenomena in model organisms

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information
- Use of knowledge-based skills to solve practical problems
- Autonomous work
- Development of critical thinking
- Production of new research ideas

- Development of critical thinking
- Promotion of free, creative and inductive reasoning
- Adaptation to new situations
- Development of data evaluation skills

3. COURSE CONTENT

1. Introduction to the biology of behavior
2. Love and sex to the minicots
3. Sexual behavior of Drosophila
4. Altruistic behavior [Part A]
5. Altruistic behavior [Part B]
6. Altruistic behavior [Part C]
7. Nature vs. Parenting [Part A]
8. Nature versus nursing [Part B]
9. Nature vs upbringing [Part C]
10. Game Theory [Part A]
11. Game Theory [Part B]
12. Game Theory [Part C]
13. Aggressive behavior

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT technology for teaching and communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	The lesson is based on active learning. In each module the basic concepts are presented by the instructor while the students, working in groups in the classroom, "follow" the research of a scientific group with a key-role in the specific field of science, through selected experiments and key scientific publications. Teaching involves the analysis and interpretation of real experimental data, the formulation of new hypotheses, and the design of the experiments needed to test them. In this way the student not only acquires knowledge but also understands, evaluates and processes primary experimental results, formulates assumptions, designs experiments to test them, while at the same time co-operates with his colleagues and the instructor in an environment which, to a large extent, simulates the way a scientific research group operates in the lab.

Learning outcome	**Activity**	**Workload (h)**
will have an understanding of the the mechanisms involved in altruistic, aggressive and sexual behavior and their molecular basis	Lectures, work in the classroom, private study	20
will know and understand the key points of gaming theory and its application to problems	Lectures, work in the classroom, private study	40

	will understand the nature or nurture question and its implications for biology and the organization of human societies.	Lectures, work in the classroom, private study	15
	be able to analyze and interpret behavioral phenomena in model organisms	Lectures, work in the classroom, private study	15
	Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Assessment language**: Greek **Assessment methods** 1. Written Exam Questions Exam (70%, Formulation, Concluding) 2. Written examinations with Short Answer Questions (30%, Formative, Concluding). The evaluation criteria are presented in the course guide available on the course's website.

5. SUGGESTED READING

There is no suitable book, matter is covered by notes distributed electronically.

COURSE OUTLINE	Bioethics

INSTRUCTORS	

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 607**	**SEMESTER**	**A**
COURSE TITLE	Bioethics		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course (Optional module)		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01215/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Upon successful completion of the course students will be able to:

- familiarize and understand the subject of bioethics
- gain critical insights of the relationship between modern bioscience and ethics
- analyze and investigate bioethical issues
- develop critical thinking skills by presenting clear arguments, justifying and defending their views on bioethics

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies
Autonomous and team work
Respect for diversity and multiculturalism
Respect for the natural environment
Promotion of free, creative and inductive thinking
Development of social, professional and moral responsibility and gender sensitivity

3. COURSE CONTENT

Introduction to Ethics: Basic Ethical Concepts
Ethical Issues in Research
The Ethics of Clinical Trials
Bioethics and the Principle of Life
Bioethics at the end of Life
Genetic Ethics
Regenerative medicine: Stem cells research, Cell therapies & Cloning
Reproductive Ethics
Organ Donation and Transplantation
Environmental Ethics
The Ethics of Genetically Modified Organisms
Ethics and data protection
Bioethics and the Law. The legal framework in Greece and Europe

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING
Face-to-face, Distance learning, etc..

Face to face

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, and in communication with the students

Use of ICT in teaching and in communication with the students

MODES OF DELIVERY

Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
Knowledge of bioethical issues	Lectures	15
To get critical insight and develop arguments on ethical dilemmas	Attendance and active participation in class	20
To search, analyze and synthesize data and information, using the current literature	Study and analysis of bibliography	15
To develop teamwork and oral presentation skills. To gain critical thinking by presenting clear arguments, justifying and defending their views on contemporary issues of bioethics.	Debates	40
Total		**90**

STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation Language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation,

Assessment language: Greek
Assessment methods:

- Assessment is based on the evaluation of the participation of the students on the concerns and the discussion during the review of the sci entific dilemmas, but mainly on their performance

laboratory work, clinical examination of patient, art interpretation, other *Are evaluation criteria known to the students?*	in the debates. Students are divided into smaller groups and support opposing scientific dilemmas using the technique of rhetorical debates. The evaluation is based on their performance on the technique of debates. - Alternatively, written examinations are conducted.

5. SUGGESTED READING

2. BIOETHICAL ISSUES. Author(s): Stavroula Tsinorema & Kitsos Louis (editors)--Publishing Company: Crete University Press--Year of Publishing:2013

COURSE OUTLINE	Practical Exercise/Internship

INSTRUCTORS	Katerina Paleologou, Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**MBG 608**	**SEMESTER**	**S** (3rd & 4th year of studies)
COURSE TITLE	Practical Exercise (internship)		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	-	3

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Skills Development course
PREREQUISITE COURSES:	No
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01226/ Information on the course can also be found on the Department's website: http://www.mbg.duth.gr/index.php/undergraduate/praktiki-askisi

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The course/internship aims at:

- Prompting students to (a) apply the various scientific and technical skills they have acquired during their studies and (b) explore their professional interests.
- Providing students the opportunity to (a) experience a real working environment, (b) develop a good work ethic, and (c) explore a potential future career.

Upon successful completion of the course/internship, the students should have developed new

- Scientific and technical skills.
- Professional skills.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information using the necessary technologies, autonomous and team work, adaptation to new situations, demonstration of professional responsibility, exercise judgment and self-judgment, work in an interdisciplinary environment, promotion of free, creative and inductive thinking, production of new research ideas.

3. COURSE CONTENT

Students work for two (2) months either in public or private institutions (hospitals, research and diagnostics centres, pharmaceutical companies, *etc*.), where they practise and specialize in subjects related to their field of study and the field of specialization of the employer.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Practical training
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students, and in laboratory education depending on the employer.
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	**Activity**	**Workload (h)**
Development of new scientific and technical skills	Practical training, final report writing	50
Development of new professional skills	Practical training	40
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of evaluation:** Greek Upon successful completion of the internship, students are required to submit within a specified time: a) A detailed report describing what was achieved during the internship. (b) The properly completed Internship Certificate signed and stamped by the representative of the institution. c) The Student Evaluation Questionnaire completed and signed by the internship supervisor. The grade is based on the student's performance during internship and their consistency at work, as well as their written report. The grade is given by the internship supervisor provided they are a professor or a researcher. If the internship supervisor is not a professor or a researcher, the grade is given by both the internship supervisor and the professor from the Department responsible for the internship (PRI), and is calculated based on the equation: Final grade = Grade given by the Internship Supervisor x 0.6 + Grade given by the PRI x 0.4 *The evaluation criteria can be found on the Rules of Procedure of the "Practical Exercise", which are available on the Department's website.*

5. SUGGESTED READING

Depending on the subject of the internship.

COURSE OUTLINE	Forensic Genetics

INSTRUCTORS	Fakis G., Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE		**SEMESTER**	**6**
COURSE TITLE	Forensic Genetics		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*			
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:			
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

COURSE OUTLINE	Plant Molecular Biology & Genetics

INSTRUCTORS	Galanis, A., Associate Professor Papageorgiou, A., Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE		**SEMESTER**	**4**
COURSE TITLE	Plant Molecular Biology & Genetics		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

COURSE OUTLINE	Advanced Themes of Structural Biology

INSTRUCTORS	Fadouloglou V., Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE		**SEMESTER**	**7**
COURSE TITLE	Advanced Themes of Structural Biology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS			
COURSE WEBSITE (URL)			

COURSE OUTLINE	Special topics in Immunobiology

INSTRUCTORS	Katerina Chlichlia, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**MBG 611**	**SEMESTER**	**S (6th)**
COURSE TITLE	Special topics in Immunobiology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	2	3	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	SCIENTIFIC FIELD COURSE		
PREREQUISITE COURSES:	NO		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01207/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The objectives of the course are:

- To acquire knowledge and to understand the role of the immune system in health and disease
- To gain knowledge about the dysregulations of the immune system
- To get knowledge about the mechanisms involved in the induction or suppression of specific immune responses that lead to prevention and/or therapy of diseases
- To acquire knowledge about the development of novel immune strategies (vaccines, anticancer immunotherapy)

LEARNING OUTCOMES:

After successfully completing the course, students will acquire the following Knowledge, skills and competencies:

- They should know the mechanisms underlying the dysregulations of the immune system (autoimmunity, immunodeficiency, hypersensitivity reactions) and ways of treatment
- They should know and understand the immune reactions and mechanisms involved in transplantation
- They should know the immune reactions and mechanisms involved in cancer, the interaction of immune cells with cancer cells, as well as the mechanisms used by cancer cells to avoid the immune system (immune evasion) - They should understand how cancer immunotherapy strategies work
- They should know the mechanisms involved in the induction or suppression of specific immune responses that lead to prevention and/or therapy of diseases
- They should know about the development of novel immune strategies (vaccines, immunotherapy)

They should combine and utilize the acquired knowledge, in order to be able to comprehend and analyze the immune reaction mechanisms and function of the immune system

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesis of data and information, using the necessary technologies
- Production of new research ideas
- Promotion of free, creative and inductive thinking
- Decision making
- Autonomous work
- Adaptation to new situations
- Project design and management

3. COURSE CONTENT

1. Introduction – The Immune system in Health and Disease - Dysregulations of the immune system
2. Immune prevention and Immunotherapy - Strategies
3. Vaccines: Design of novel Vaccines for active immunization
4. Immunodeficiencies – Primary and Secondary Immunodeficiencies – The Human Immunodeficiency virus (HIV)
5. Autoimmunity – Organ-specific and Systemic autoimmune diseases – Experimental animal models of Autoimmunity – Immune mechanisms - Therapy
6. Hypersensitivity reactions – Classification (Type I, II, III, IV) – Allergies, DTH – Immune mechanisms - Therapy
7. Immunology of Transplantation – Immune mechanisms of transplant/graft rejection – Clinical stages of rejection – Immunologically privileged sites – Graft versus host disease – Immunosuppression – Immune tolerance in allografts
8. Cancer and the Immune system – Immune surveillance – Oncogenes – Cancer/Tumor antigens – Escape of cancer cells from immune surveillance – Immune prevention and Immunotherapy
9. Special topics in Autoimmunity – Presentation of assignments/reports
10. Special topics in Immunodeficiency – Presentation of assignments/reports
11. Special topics in Transplantation – Presentation of assignments/reports
12. Special topics in Hypersensitivity reactions – Presentation of assignments/reports
13. Special topics in Vaccines and Cancer Immunotherapy – Presentation of assignments/reports

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching,*	Instructional teaching in conjunction with collaborative and interactive teaching strategies

educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	**Activity**	**Workload (h)**
To know the mechanisms underlying the dysregulations of the immune system (autoimmunity, immunodeficiency, hypersensitivity reactions) and ways of treatment	Lectures, study at home	15
To know and understand the immune reactions and mechanisms involved in transplantation	Lectures, study at home, assignments	15
To know the immune reactions and mechanisms involved in cancer, the interaction of immune cells with cancer cells, as well as the mechanisms used by cancer cells to avoid the immune system (immune evasion) - They should understand how cancer immunotherapy strategies work	Lectures, study at home, assignments	15
To know the mechanisms involved in the induction or suppression of specific immune responses that lead to prevention and/or therapy of diseases	Lectures, assignments, study at home	15
To know about the development of novel immune strategies (vaccines, immunotherapy)	Lectures, assignments, study at home	15
To combine and utilize the acquired knowledge, in order to be able to comprehend and analyze the immune reaction mechanisms and function of the immune system	Assignments, study at home	15
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language**: Greek **Evaluation methods:** Evaluation of presentations and written assignments/reports Written exams with multiple-choice questionnaires Written exams with short-answer questions

5. SUGGESTED READING

Translated in Greek language:

1. **'MOLECULAR and CELLULAR IMMUNOLOGY'** – Abbas AK, Lichtman AH, Pillai S, 9th edition 2017, translated in Greek language 2019, Utopia Publishing/Elsevier, p. 688, ISBN: 978-618-5173-39-5, *Eudoxus code*: 86197140
2. **'BASIC IMMUNOLOGY'-Functions and Disorders of the Immune system»** - Abbas A, Lichtman AH, Pillai S, 5th edition/2015, translated in Greek language 2018, Vasiliadis Medical Books/Broken Hill Publishers LTD, p. 520, ISBN: 978-996-327 4505, *Eudoxus code*: 77106913
3. **'IMMUNOLOGY'** - Goldsby R, Kindt T, Osborne B, Kuby J, 6th edition 2007, translated in Greek language 2013, Paschalidis Medical Publications/Broken Hill Publishers Ltd., p. 840, ISBN: 978-9963-716-14-2, *Eudoxus code*: 23076003
4. **'BASIC CLINICAL IMMUNOLOGY'** – Chapel H, Haeney M, Misbah S, Snowden N, 5th edition/2006, translated in Greek language 2013, Parisianou Publications/Wiley-Blackwell, p. 448, ISBN: 978-960-394-960-2, *Eudoxus code*: 33074641
5. **'CLINICAL IMMUNOLOGY'** – Boura P et al., 3rd edition/2015, University Studio Press, ISBN: 978-960-12-2192-2, *Eudoxus code*: 41963815
6. **'Lippincott's IMMUNOLOGY'** - Harvey RA, Doan T, Melvold R, Viselli S, Waltenbaugh C, 2nd edition/2012, translated in Greek language 2014, Parisianou Publications/Wolters Kluwer, p. 388, p. 386, ISBN: 978-960-394-98-62, *Eudoxus code*: 33134131

In English language:

7. **'Kuby IMMUNOLOGY'** – Punt J, Stranford SA, Jones PP, Owen JA, 8th edition 2018, WH Freeman, p. 944, ISBN: 978-131-911-4701
8. **'Cellular and Molecular IMMUNOLOGY'** – Abbas AK, Lichtman AH, Pillai, S, 9th edition 2017, Elsevier, p. 608, ISBN: 978-032-347-9783
9. **'Janeway's IMMUNOBIOLOGY'** – Murphy KM, Weaver C, 9th edition 2016, WW Norton, p. 924, ISBN: 978-081-534-5053

Course notes

Course lecture notes and lecture presentations are available through the *e-class* platform.

COURSE OUTLINE	Counseling and Educational Psychology

INSTRUCTORS	Kedraka Katerina, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 612**	**SEMESTER**	**S (4th)**
COURSE TITLE	Counseling and Educational Psychology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	BACKGROUND		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01189/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The lesson at the knowledge level focuses on the study of basic learning theories and the emotional parameters involved in the learning process that influence the psychosocial climate of the classroom. It also aims to gain insights into the most common behavioral and emotional difficulties that the teacher is facing in practice.
At the skill level, the goal is to acquire the skills to apply methods, strategies and techniques for handling behavioral and emotional difficulties, as well as cooperating with the family. Small projects presentation skills are also cultivated.
At the attitudes and behaviors level, particular emphasis is placed on understanding issues of early identification, referral and / or intervention deriving from teachers' professional role.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies
Autonomous work
Team work
Respect for diversity and multiculturalism
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Learning theories.

2-6. Common behavioral difficulties: school aggression, attention deficit / hyperactivity disorder (ADHD), shyness and social dysfunction, learning disabilities, developmental disorders, etc.
7. Regarding teacher's role, the course deals with the study of intra-individual variables such as personality, values, beliefs, work stress, self-concept, and self-esteem.
8-9 An illustrative application of methods, strategies and techniques for handling behavioral and emotional difficulties, as well as basic counseling skills are presented.
10-13 Presentation of essays.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Evaluation language: Greek Evaluation method: Written work & public presentation

Activity	**Workload (h)**
Lectures	10
Work at class	16
Study at home	64
Total	**90**

5. SUGGESTED READING

- Larentzaki E., Gkogka, K., & Pavlou V. (2008). The questions of modern teacher. Athens: ION-ELLIN. EVDOXUS CODE= 32045

COURSE OUTLINE	Didactics Methodology

INSTRUCTORS	Kedraka Katerina, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 613**	**SEMESTER**	**S (6th)**
COURSE TITLE	Didactics Methodology		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	5
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Background		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01187/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The course aims at acquiring knowledge and acquainting students with the basic concepts of teaching and new theoretical trends.
At the attitudes / behaviors level, students develop skills on several aspects of the educational process, including teacher's self-assessment and reflection.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Autonomous work
Respect for diversity and multiculturalism
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking
Project design and management

3. COURSE CONTENT

- Teaching preparation
- Teaching design
- Teaching methods
- Teaching technics
- Course organizing in the classroom
- Curriculum
- Design and usage of teaching material

- Teaching time management
- Evaluation
- Self-evaluation of the teacher
- Project method
- Student centered method
- Implementation of small projects

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face, lecture, case studies and simulations
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT int teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	**Activity** / **Workload (h)** Lectures: 10 Work at class: 16 Study at home: 124 **Total: 150**
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Evaluation Language: Greek Evaluation method: Short-answer questions

5. SUGGESTED READING

- Kedraka, K., & Gkotzaridis, Ch. (2016). Teaching and Professional Design in Biosciences. ISBN: 9786185135041. Athens: Academic Publications J. Basdra & Co. EVDOXOS CODE = 59396334
- Larentzaki, E., & Gkogka, K., & Pavlou, V. (2008). The questions of modern teacher. Athens: Ion-Ellin. EVDOXOS CODE = 32045

COURSE OUTLINE	Teaching Practicum Course I (Microteaching)

INSTRUCTORS	Kedraka Katerina, Associate Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 614**	**SEMESTER**	**S (6th)**
COURSE TITLE	Teaching Practicum Course I (Microteaching)		

INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**
	2	6

COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	SKILLS DEVELOPMENT
PREREQUISITE COURSES:	-
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01188/

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The purpose of Teaching Practicum Course I is to acquire teaching skills as students are trained in microteaching (teaching simulation) in teaching skills so that they can then effectively use them.
They will also develop the ability to provide positive feedback to their peers, by sending their opinion on their micro-teaching.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

Research, analysis and synthesize of data and information, using the necessary technologies
Autonomous work
Team work
Project design and management
Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. The theoretical prerequisites, the basic elements of micro-teaching and its contribution to the education and training of teachers.
2-13. Individual exercise of the students: preparation, implementation, observation, discussion and evaluation of each micro-lesson.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face. Teaching simulation

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	Evaluation language: Greek Evaluation method: Public presentation

Activity	**Workload (h)**
Lectures	2
Work at class	24
Study at home	154
Total	**180**

5. SUGGESTED READING

COURSE OUTLINE	The RNA World

INSTRUCTORS	Antonis Giannakakis, Assistant Professor

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 615**	**SEMESTER**	**S**
COURSE TITLE	The RNA World		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*	**HOURS/WEEK**	**ECTS CREDITS**	
	2	3	
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.duth.gr/courses/ALEX01259/		

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.
• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework
• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

The course modules aim at:

- An understanding of the mechanisms by which RNA is involved in the control of cellular processes.
- Deepening the regulatory role of different RNA classes, with emphasis on regulating gene expression; and
- Familiarity with the latest research approaches and discoveries in the field of RNA biology.

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data and information, using the necessary technologies
- Decision making
- Team work
- Work in an international environment
- Work in an interdisciplinary environment
- Production of new research ideas
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

RNA is the primary product of any organism's genome. In the last two decades, the perception of the role of RNA in the flow of genetic information has changed significantly. Research based on "-omic" approaches (genomics, proteomics, transcriptomics, systematic biology and bioinformatics) has highlighted the regulatory role of a number of known and currently unknown, functional RNA species.

The aim of the course is to cover recent research discoveries and new knowledge in the field of RNA biology. At the same time, the course will highlight the rapidly emerging role of non-coding RNA molecules in the evolution of genes and species.

The course "The RNA World" is a scientific field course and consists of the following topics:
1. The theory of evolution based on RNA catalytic molecules - The function and structure of RNA double helix - RNA molecules as coenzymes, ribozymes, regulatory and structural molecules–
2. Study of RNA biopolymers (induction, biogenesis, structure and deposition in subcellular spaces) at genome, tissue or organism level - The place of transcriptomics in Molecular Biology and Genetics. The functional classes of RNA biopolymers.
3. Gene expression analysis methodology with next-generation RNA sequencing - Experimental methods for creating quantitative and qualitative gene expression analysis libraries with next-generation RNA sequence identification – Examples of well-defined large-scale biological queries and biological problems.
4. Quality control, mapping, computational analysis of expression reads, detection of isoforms or regulatory regions of transcripts - Analysis and experimental confirmation of data for clear biological inference.
5. The world of non-coding regions of the genome - Their significance in the evolution of genome complexity and in gene evolution - What is an up-to-date definition of a gene? Categories, structure / patterns, and functions of non-coding RNA molecules in transcriptional and translational regulation of gene expression.
6. The RNA binding proteins - RNA-RNA, RNA-protein interactions. The dominant role of RNA in protein biogenesis and evolution. Next-generation identification of RNA sequences binding proteins and RNA binding proteins: Ribonomics. The RIBO-seq and CLIP-seq methodologies.
7. What are the ribonucleoprotein complexes and what are their functions in the nucleus and cytoplasm? what is their functional interface with all the steps of gene expression (replication-transcription-translation).
8. The role of RNA modification in metabolism, neuronal plasticity and memory function - Targeted against stochastic RNA modification.
9. Epi-transcriptomics: Description of the basic post-transcriptional regulation mechanisms for gene regulation - RNA stability, transmembrane and intercellular transfer / RNA accumulation and RNA modifications - The importance of the environment in epitranscriptomics and the importance of regulating transcript levels in medicine. Membrane-less organelles and rare diseases - Methodologies for studying the above biological phenomena at the genome level.
10. Transcriptomics of stress: The study of the genome's response to biotic and non-biotic, extracellular and intracellular stimuli, the dynamic balance of transcriptional induction of DNA and the effects of induced transcripts on the regulation of cellular stress response. The search for molecular fingerprints of stress in evolution and adaptation.
11. Methodologies and computational tools for predicting molecular targets (DNA, RNA, proteins) of non-coding RNA molecules and functional characterization. Creation of post-transcriptional and translational regulatory networks.
12. Emerging scientific fields and technologies in transcriptomics - meta-transcriptomics - single-cell sequencing. Gene modification by the CRISPR technique.
13. Interface of transcriptomics with all other "-omics" methods for holistic and functional studies of biological models - The direction towards pangenomics - The RNA revolution in the field of toxico/ pharmaco genomics.

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Teaching using PowerPoint Announcements on the department's website Post lesson information on the e-course online platform Contact teacher directly by e-mail
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice,*	

fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.
The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS

Learning outcome	Activity	Workload (h)
Understanding the mechanisms by which RNA is involved in the control of cellular processes.	Lectures, study at home, Practical work, lab exercises.	30
Deepening the regulatory role of different RNA classes, with emphasis on gene expression regulation.	Lectures, study at home, Practical work, lab exercises.	30
Familiarity with the latest research approaches and discoveries in the field of RNA biology.	Lectures, study at home, Practical work, lab exercises.	30
Total		**90**

STUDENT PERFORMANCE EVALUATION

Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other

Are evaluation criteria known to the students?

Assessment language: Greek

Evaluation methods:
I. Written test (75%) including:
- Multiple choice questions
- Analytical questions
II. Presentation or report (25%)

5. SUGGESTED READING

Suggested Textbooks

1. Bioinformatics & Functional Genomics (3rd Edition Wiley-Blackwell, 2015) – Jonathan Pevsner.
2. Long Non-coding RNAs in Human Disease (Springer, 2016) – Kevin V. Morris.
3. Long Non-coding RNA biology (Springer, 2017) – M.R.S. Rao
4. Creating bibliography: books, articles and reviews that are accessible online.

COURSE OUTLINE	Modeling of Physical-chemical processes in Biology

INSTRUCTORS	Georgios Boulougouris

1.GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ**	**SEMESTER**	**A 5ο**
COURSE TITLE	**Modeling of Physical-chemical processes in Biology**		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Expertise Course		
PREREQUISITE COURSES:	-		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	Under contraction (eclass)		

2.LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study – refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Course objectives

The teaching method is based beyond the classical lectures in the learning process of problem / topic, where students are asked to implement, in groups, specific applications that they will choose, combining individual study with the ability to search and compile information within collaboration. In small groups. The teaching is initially done with lectures on the basic concepts to all students, then students ate divided into groups (with a small number of people). Each group is unsigned with the implementation of a specific problem of modeling in the field of Biology.

The course aims to familiarize students with the natural laws governing biological systems and how they can be used to model processes through:

- -the development of the appropriate mathematical model.
- -the implementation (or use) of software to solve the model
- - the extraction of information, with simultaneous evaluation and export of proposals for redesign of the whole process.

  Examples of modeling physicochemical properties and processes that you modify in the course include:
- Measures of hydrophobicity.
- Modeling of Ligand-macromolecular interactions.
- Examples of computer–aided drug design, CADD
- Population models (e.x. *Predator-Pray)*
- *Epidemiology models (e.x. SIR Susceptibles, Infectives, Removed)*
- *Dynamic models in systems biology and neuroscience*

Basic mathematical tools : Linear Algebra, numerical analysis, stochastic processes, stability analysis.

Learning Outcomes After the successful completion of the course the student acquires the ability and knowledge:

- To understand the basic questions in the field of modeling of biological processes, and to be able to make and implement corresponding models.

- *Understand the process of modeling through the stages of "inventing" the mathematical model, developing or using computational tools to solve the model, drawing conclusions based on the original model and finally the process of reviewing / expanding the model based on comparison with experimental observation*
- *To work in groups and individually to search for new concepts.*

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

3.COURSE CONTENT

1) Introduction to modeling.
2) Numerical modeling tools.
3) Computational modeling tools.
4) Connection of microcosm to macrocosm through modeling.
5) Self-organization, and Entropy.
6) Hydrophobicity.
7) Cooperative models of bio-molecule binding.
8) Binding of Drug.
9) Free energy Gibbs, chemical potential, microscopic and macroscopic reversibility.
10) Dynamical modeling in systems biology
11) Dynamic stability
12) Examples of modeling I
13) Examples of modeling II

4.TEACHING and LEARNING METHODS – EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of multimedia , interactive computational experiments
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Learning outcome	Activity	Workload (h)
Knowledge and understanding of basic mathematical tools.	Lectures study,projects	20
Knowledge and understanding of basic computational tools.	Lectures, literature research, project, study at home	20
Achieving Computational modeling	Study at home	30
Developing scientific reasoning	Lectures, literature research, project, study at home	20
Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	*Written Report , public presentation*

5.SUGGESTED READING

(online free ebooks)
-Title :"Μαθηματική Μοντελοποίηση" ,Authors "Σταύρος Κομηνέας, Ευάγγελος Χαρμανδάρης" ebook: "ΚΑΛΛΙΠΟΣ", 2016, ISBN: 978-960-603-425-1
-Title :"Βασικές Αρχές Σχεδιασμού και Ανάπτυξης Φαρμάκων", Authors: Βασίλειος Δημόπουλος, Άννα Τσαντίλη-Κακουλίδου, "ΚΑΛΛΙΠΟΣ", 2015, ISBN: 978-960-603-190-8
-Title :"Εισαγωγή στον Προγραμματισμό με Αρωγό τη Γλώσσα Python", Authors: "Γεώργιος Μανής" ebook: "ΚΑΛΛΙΠΟΣ", 2015, ISBN: 978-960-603-415-2.

COURSE OUTLINE	Degree Dissertation Thesis

INSTRUCTORS	Academic Faculty Members, Researchers

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 405**	**SEMESTER**	
COURSE TITLE	Degree Dissertation Thesis		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:			
LANGUAGE OF TEACHING AND EXAMINATIONS:	GREEK		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes		

COURSE OUTLINE	Principles of pharmaceutical chemistry and chemistry of natural compounds

INSTRUCTORS	

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY & GENETICS		
STUDY LEVEL	LEVEL 6		
COURSE CODE	**ΜΒΓ 512**	**SEMESTER**	**Winter E (5th)**
COURSE TITLE	Principles of pharmaceutical chemistry and chemistry of natural compounds		
INDIVIDUAL EDUCATIONAL ACTIVITIES *In case credits are awarded to individual components of the course eg. Lectures, laboratory practicals, etc. If credit units are awarded for the whole course, indicate the weekly teaching hours and total credits*		**HOURS/WEEK**	**ECTS CREDITS**
		2	3
COURSE TYPE *General, Background, Scientific field course, Expertise Course, Skills Development etc*	Scientific field course		
PREREQUISITE COURSES:	No		
LANGUAGE OF TEACHING AND EXAMINATIONS:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

Learning outcomes

Describe the learning outcomes of the course, the specific knowledge, skills and competencies that students will acquire after successfully completing the course. Refer to Appendix A.

• Description of learning outcomes for the course according to the level of study - refer to the European Higher Education Area Qualifications Framework

• Descriptive Indicators of Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Annex B Curriculum Vitae Summary Guide

Pharmaceutical Chemistry is generally related to the discovery, identification of the chemical structure and synthesis of new drugs and/or optimization of existing drugs, and is one of the major disciplines of the pharmaceutical sciences. As the chemical structure and more generally the physical, chemical and physicochemical properties of the drugs are inextricably linked to their beneficial-therapeutic abilities, knowledge of pharmaceutical chemistry is considered essential. At the same time, it is well known that natural products (herbal or animal origin) are an important source of origin and/or production of a high amount of the drugs used nowadays. For this reason, knowledge of their chemical properties-characteristics in relation to their biological actions is of great importance for the discovery and development of new therapeutic-pharmaceutical products against various diseases.

Course objectives:

A) Introduction of students to the subject of Pharmaceutical Chemistry and its connection to the general context of the pharmaceutical sciences and the production of new drugs

B) Understanding the contribution of natural products to pharmaceutical technology and pharmaceutical sciences based on their chemical structure-properties

Teaching targets:

Upon successful completion of the course students will be able to:

• Know the basic principles underlying the criteria and modern methodologies related to the synthesis, development and optimization of guide compounds and drugs, as well as the general contribution of the pharmaceutical sciences to human health
• Know the biosynthetic pathways of the most important secondary metabolites
• Recognize and explain the relationship between the chemistry of bioactive natural compounds and their biological actions against human diseases and generally their role in the discovery and development of novel drugs
• Develop critical thinking and analytical ability of the acquired knowledge, through presentation and discussion of selected scientific literature topics

General Competencies

Which of the general competencies that the student will have acquired on the completion of the studies (see also the Diploma Supplement and below) are relevant to this course?

Research, analysis and synthesize of data and information, using the necessary technologies
Adaptation to new situations
Decision making
Autonomous work
Team work
Work in an international environment
Work in an interdisciplinary environment
Production of new research ideas
Project design and management
Respect for diversity and multiculturalism
Respect for the natural environment
Development of social, professional and moral responsibility and gender sensitivity
Promotion of free, creative and inductive thinking

- Research, analysis and synthesize of data information using the necessary methodologies
- Autonomous work/Team work
- Production of new research ideas
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

1. Introduction in Pharmaceutical chemistry and chemistry of natural compounds
2. Methods of design and discovery of drugs
3. Methods for development and optimization on new drugs
4. New generation drugs
5. Methods for drug testing and clinical trials
6. Classes of natural compounds and classification based on their origin, chemical structure, biosynthesis and bioactivity
7. Biosynthesis of bioactive natural compounds through acetate pathway and biological activities
8. Biosynthesis of bioactive natural compounds through shikimic pathway and biological activities
9. Biosynthesis of bioactive natural compounds through mevalonic acid pathway and biological activities
10. Biosynthesis and biological activities of alkaloids
11. Relation between chemical structure and biological activities of natural compounds against several diseases
12. Presentation and analysis of work following selection between several scientific papers related to the general context of pharmaceutical chemistry, chemistry of natural compounds and their use in the development of new drugs
13. Presentation and analysis of work following selection between several scientific papers related to the general context of pharmaceutical chemistry, chemistry of natural compounds and their use in the development of new drugs

4. TEACHING and LEARNING METHODS - EVALUATION

TYPE OF TRAINING *Face-to-face, Distance learning, etc..*	Face-to-face

USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, and in communication with the students*	Use of ICT in teaching and in communication with the students
MODES OF DELIVERY *Describe the teaching methods in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, practicum, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	Lectures, use of e-class and new technologies. Study and analysis of scientific literature-reviews, essay writing and work presentation

Learning outcome	Activity	Workload (h)
Know basic principles and disciplines of Pharmaceutical Chemistry. Know and understand the contribution of natural products in pharmaceutical technology and pharmaceutical sciences based on their chemical structure and properties	Lectures Study and analysis of bibliography	10
Know and understand basic principles, criteria and modern methodologies in synthesis, development, optimization and evaluation of drugs	Lectures Study and analysis of bibliography	20
Know the main categories and classification of natural compounds. Know and understand the most important biosynthetic pathways of bioactive natural compounds and their biological activities	Lectures Study and analysis of bibliography	20
Know and understand the relation between the chemical structure of bioactive natural compounds and their biological activities against human diseases	Lectures Study and analysis of bibliography	10
Understand, analyze and evaluate scientific articles on the subject of Pharmaceutical chemistry and chemistry of natural compounds	Interactive teaching Study and analysis of bibliography	20

	Develop oral and written presentation skills in a research topic related to the subject of Pharmaceutical chemistry and chemistry of natural compounds	Interactive teaching Study and analysis of bibliography	10
	Total		**90**

STUDENT PERFORMANCE EVALUATION *Describe of the methods of evaluation (Language, methods of evaluation, types of exams, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Are evaluation criteria known to the students?*	**Language of Evaluation**: Greek **Methods of evaluation** • Written assignment (Formative, Conclusive) (50%) • Oral presentation (Formative, Conclusive)(50%) Assignments and presentations will be related to a range of topics selected by the students from a list provided by the instructor

5. SUGGESTED READING

Suggested Textbooks

- Drugs of Natural Origin (Greek translation). Samuelsson Gunnar. Crete University Press, 2004 (ISBN: 978-960-524-015-8). Eudoxos code: 469.
- Scientific and review articles

Course notes and presentations are available through the e-class platform

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).

8. Student Psychosocial Support Service

The Student Psychosocial Support Service of Democritus University of Thrace operates since 2016 and offers free and confidential support.

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

DEMOCRITUS UNIVERSITY OF THRACE

DEPARTMENT OF MOLECULAR BIOLOGY & GENETICS

UNDERGRADUATE PROSPECTUS

2020 - 2021

Alexandroupolis 2020