

### Enrolment requirements

Successful completion of forty five (45) taught compulsory courses, five (5) elective courses and the foreign language course. Students also have to pursue a research thesis along with a four months internship in the private and public sector.

### Syllabus

1st Semester (Winter Term)

#### **OBLIGATORY COURSES**

COURSE
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CODE
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COURSE TITLE

LECTURING STAFF

Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S	.
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ΒΠ2401

Introduction in Agricultural Science

K. Polymeros	,	P. Panagiotaki
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BP0300

**Chemistry**

**I. Arvanitoyannis**

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**I. Boziaris**

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BP0500

**Physics**

**P. Berillis, C. Domenikiotis**

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BP0400

Zoology

M. Chatziioannou	,	D. Vafidis
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BP0101

Mathematics

P. Berillis	,	(A. Theodorou)
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Foreign language

2

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3

TOTAL: 30

### {xtypo\_info} «**Introduction in Agricultural Science**»

{/xtypo\_info}

Evolution and modern sectors of Agriculture. Economic and social aspects of Agricultural science. The global food issue and the contribution of plant, animal and aquatic production. The significance of Agricultural science in Aquaculture. European, mediterranean and Greek Aquaculture sector. Processing and primary production. Common Agricultural and Fisheries Policy of the European Union.

### {xtypo\_info}«**Mathematics**»

{/xtypo\_info}

The Derivative, Differentiation formulas, Derivatives of Higher Order, The indefinite integral, methods of integration, the definite integral, Taylor series, Vector Fields, Curl and Div, Double Integrals, Polar coordinates, Green's Theorem. Triple Integrals, Cylindrical and Spherical coordinates. Surface area, surface integrals, Divergence Theorem in 3-space. Gauss' theorem, Stokes' theorem, Differential Equations, Matrices, Determinants, Linear Systems, Lines, spheres, conic sections and their classification.

### {xtypo\_info} «**Chemistry**»

{/xtypo\_info}

Introduction to chemistry. Description of atomic structure, chemical bond, stoichiometry of chemical reactions, solutions, molarity, normality, chemical reactions, chemical equilibrium, acids-bases, reaction kinetics, Thermodynamics (entropy, enthalpy). Introduction in organic chemistry (isomers, nomenclature of organic compounds, functional groups, homologous series, alkanes, alkenes, alkynes (nomenclature of unsaturated hydrocarbons, reactions of unsaturated hydrocarbons), aromatic hydrocarbons (Benzene, ethers, alcohols, phenols, thiols), carbonyl compounds (aldehydes-ketones, redox properties, nomenclature. Carboxyl acids (nomenclature, lipids and their biological role, amines, aminoacids-proteins, sugars and their nomenclature).

{xtypo\_info} «**Zoology**»  
{/xtypo\_info}

Structure and function of cells, tissues and organs. Nomenclature and taxonomy of animal organisms. Types of reproduction of animal organisms. Theories of evolution of species. Description of sexes with emphasis on classes of aquatic species. Anatomy, physiology, taxonomy, life cycles and financial evaluation of animal organisms with emphasis on aquatic species.

{xtypo\_info} «**Physics**»  
{/xtypo\_info}

Classical mechanics, one dimension movements, forces, work, energy, power, velocity, momentum, circular motion, thermodynamics, electrodynamics, waves, optics, radioactivity, molecular spectroscopy.

{xtypo\_info}«**Foreign language**»  
{/xtypo\_info}

Students should choose one of the following languages: English, French, Italian, German.

{slide=2nd Semester (Summer Term) |grey|closed}

{xtypo\_sticky}**OBLIGATORY COURSES** {/xtypo\_sticky}

<b>COURSE</b>
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CODE

COURSE TITLE

LECTURING STAFF

Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S	.
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БП1700

Ichthyology

**N. Neofitou**

**and E. Golomazou**

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BP1400

**Geochemistry**

**K. Skordas**

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BP0600

Ecology

D. Vafidis	,	M. Chatziioannou
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BP0102

Statistics

S. Matsiori	,	G. Chalkos
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BP1100

Meteorology-Climatology

P. Berillis	,	C. Domenikiotis
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Foreign language

2

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3

TOTAL:	30
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{xtypo\_info} «**Ichthyology**»  
{/xtypo\_info}

Morphology and anatomy of fish, molluscs, crustaceans and other aquatic vertebrates. Introduction to the digestive, nervous, reproductive, respiratory, circulatory and endocrine system. Introduction to nutrition, nutritional, growth and reproduction. Zoogeography.

{xtypo\_info}«**Ecology**»  
{/xtypo\_info}

Introductory concepts and definitions. Autoecology (relations between living organisms and environmental factors). Population ecology (definition of population, population characteristics, mechanism of population control). Synecology: definition of ecosystem, structure and function analysis of ecosystems. Factors affecting ecosystem stability.

{xtypo\_info}«**Geochemistry**»  
{/xtypo\_info}

Distribution of elements on earth, Geochemistry of igneous rocks, Geochemistry of metamorphic rocks, Geochemistry of isotopes, The hydrological cycle – Surface processes – Soil geochemistry, Geochemistry of aquatic systems – Continental waters, Hydrochemistry and water quality, Marine geochemistry, Organic geochemistry, Geochemistry of sediments and sedimental rocks, Diagenesis – Inorganic and organic reactions, Geochemistry of marine metalliferous and non metalliferous sediments, Geochemistry and research in mineral exploration.

{xtypo\_info}«**Meteorology-Climatology**»  
{/xtypo\_info}

Meteorology: Definitions and Meteorology branches. Physical and chemical structure and composition of the atmosphere. Vertical variation of meteorological parameters. Solar and terrestrial radiation. Temperature (air, soil, water). Atmospheric pressure. Wind. Vapor pressure saturation, Absolute Humidity, Mixing ratio, Specific Humidity, Relative humidity and dew point. Evaporation and Evapotranspiration and methods for their measurement. Dew, frost and fog. Clouds. Precipitation. Atmospheric disturbances. Meteorological instruments. Climatology: Climate types. Climate variability.

{xtypo\_info}«**Statistics**»  
{/xtypo\_info}

*Course Description:* The course deals extensively with basic statistical concepts and methods and methods collecting data. *Course Objectives:* After completing this course, students should be able to: Explain and apply principles of study design and data collection, Use descriptive Statistics for displaying and describing data, Understand properties of the normal curve, Understand and use Confidence intervals, Hypothesis tests, Compare two samples, Compare three and more samples, Non-parametric methods, Simple and Multiple regression analysis and correlation

{xtypo\_info}«**Foreign language**»  
{/xtypo\_info}

Students should choose one of the following languages: English, French, Italian, German.

{slide=3rd Semester (Winter Term)|grey|closed}

{xtypo\_sticky}**OBLIGATORY COURSES**{/xtypo\_sticky}

COURSE

CODE

COURSE TITLE

LECTURING STAFF

Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S	.
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BP11300

**Oceanography: An Introduction to Marine Environment**

**D. Vafidis**

,

**K. Skordas, K Kormas,**

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ΔY0101

**Remote sensing – Geographical Information Systems**

**A. Psilovikos**

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**C. Domenikiotis**

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ΒΠ0800

**Microbiology**

**K. Kormas**

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ΥΔ0201

**Biology of aquatic vertebrates**

**I. Karapanagiotidis**

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BP1501

Biochemistry

A. Exadactylos	,	E. Mente	,
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Foreign language

2

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3
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<b>TOTAL: 30</b>
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{xtypo\_info}«**Oceanography: An Introduction to Marine Environment**»  
{/xtypo\_info}

Introduction. The Beginning and the Past of the Earth. The Planet Oceanus. Plate Tectonics. Sea Floor Bathymetry. Marine Sediments. Chemical Properties of Seawater. Physical Properties of Seawater. Air-Sea Interaction. Ocean Currents. Ocean Surface Circulation. Deep Ocean Circulation. Ocean Waves. Ocean Tides.

{xtypo\_info}«**Microbiology**»  
{/xtypo\_info}

Structure and function of the prokaryotic cell. Systematics and taxonomy of microorganisms. Microbial nutrition and metabolism. Microbial growth and populations. Viruses. Fungi. Microbiology techniques, classical and modern methodologies.

{xtypo\_info}«**Biochemistry**»  
{/xtypo\_info}

Designing life at the molecular level. Carbohydrate structure, Thermodynamics, specialized

products of amino acids, carbohydrate metabolism, aerobic metabolism, photosynthesis, lipid metabolism, nitrogen metabolism and the urea cycle, nucleotide metabolism, glycolysis strategy, gluconeogenesis, glycogen synthesis, Krebs cycle, electron transport chain, pentose phosphate pathway, oxidative phosphorylation, fatty acid catabolism, fatty acid anabolism, lipoproteins, glycoprotein synthesis, inborn errors in metabolism.

### {xtypo\_info}«**Biology of aquatic vertebrates**» {/xtypo\_info}

Systematic classification of aquatic vertebrates. Nomenclature, identification, biological and environmental characteristics of osteichthyes, cartilaginous fish, marine mammals and aquatic birds living in Greece.

### {xtypo\_info}«**Remote sensing – Geographical Information Systems**» {/xtypo\_info}

Geographical Information Systems: Introduction to spatial analysis. Raster and vector data bases. Spatial data analysis (e.g. proximity, overlay, generalization). Digital Elevation Models. Interpolation. Spatial statistics. Remote Sensing: An overview. Electromagnetic Radiation and its interaction with the matter. Satellite sensors and their characteristics. Satellite systems. Aerial Photography. Visible, Infrared, thermal and radar images and their characteristics. Preprocessing satellite images. Classification. Application of Remote Sensing and GIS to aquatic environment.

### {xtypo\_info}«**Foreign language**» {/xtypo\_info}

Students should choose one of the following languages: English, French, Italian, German.

{slide=4th Semester (Summer Term) |grey|closed}

{xtypo\_sticky}OBLIGATORY COURSES{/xtypo\_sticky}

COURSE

CODE

COURSE TITLE

LECTURING STAFF

Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S	.
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BP1701

Marine biology

D. Vafidis

3

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6

BP2402

EcoHydraulics- EcoHydrology- Limnology

A. Psilovikos

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6

AΛ0301

**Fisheries**

**P. Panagiotaki**

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ΒΠ1503

Molecular biology

A. Exadactylos

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BP2300

Histology

E. Golomazou

,

M. Chatziioannou

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Foreign language
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2
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3
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<b>TOTAL:</b>	30
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{xtypo\_info}«**Marine Biology**»  
{/xtypo\_info}

Geological history of earth and how the oceans were created. Physicochemical properties of water and how these properties influence the abundance, distribution, diversity, physiology, and behavior of marine organisms. Tides, waves, oceanic circulation and currents. Ecology of pelagic and benthic organisms. Marine invertebrates. Description, ecology and interactions between marine communities.

{xtypo\_info}«**EcoHYDRAULICS-EcoHYDROLOGY- LIMNOLOGY**»

{/xtypo\_info}

Laminar and turbulent flow. Continuity, momentum and energy equations. Stable and uniform flow. Supercritical and subcritical flow. Total and specific energy. Critical depth. Bernoulli equation. Hydraulic jump. Hydraulic structures for fish passage. Hydrological and geomorphologic processes in catchments. Calculation of flooding recharge values. Empirical methods (Fuller, Rational) and Hydrograph methods IDF curves. Erosion, transport and sediment deposition processes in rivers, lakes and estuaries. Basic principles of water quality. Conservative and non – conservative pollutants. Point and non – point sources. Advection and mass balance in hydro systems and aquatic ecosystems. Dissolved oxygen and nutrients balance. Correlation between abiotic and biotic parameters. Stagnation phenomena and stratification processes in Lake ecosystems. Eutrophication in Lake ecosystems. Mathematical models.

{xtypo\_info}«**Fisheries**»  
{/xtypo\_info}

History and development of fisheries. Fisheries production per FAO region and ecosystem. Recording fisheries production systems (NSS, FAO, GFCM, ICCATT). Fisheries production forecast. Coastal, middle and distant water fisheries. Fisheries effort and operating standards. Overfishing and global stocks condition. Recreational, sporting and illegal fishing. Lateral and accidental fishing. Discharges. Diving in deep water. Fishing effect on organisms and ecosystems. Interaction between fishing seabirds, marine mammals and reptiles. The concept of maximum and optimal production. Fishing vessels: types, technical characteristics and electronic equipment. Principles of design and construction materials gear. Selectivity of fishing gear and methods of calculation. Long lines, lines, hooks, nets, sliding and tools. Traps, Volkan and traps. Electrofishing. Fishing field technologies (sonar, underwater monitoring, remote sensing). Use of FiSAT software in fisheries research.

{xtypo\_info}«**Histology**»  
{/xtypo\_info}

The microscopic anatomy of aquatic animals. Histological methods. Cell, tissue and organ microanatomy, relating structure to function. The four basic tissues (epithelium, connective tissue, muscle, and nerve), blood and the organ systems (integumentary, immune, circulatory, digestive, respiratory, urinary, male and female reproductive and sensory systems).

{xtypo\_info}«**Molecular biology**»  
{/xtypo\_info}

Introduction to organelles, membranes, membrane transport, fundamentals of protein structure, proteins as enzymes, protein transport and sorting, enzymes, enzyme catalytic mechanisms, enzyme kinetics, enzyme specificity and regulation, bioenergetics, cellular energetics, introduction to metabolic pathways, cell cycle regulation, cellular information, cell signaling. Introduction to molecular genetics, chromosome structure, genetic code, DNA replication mechanisms, transcription, RNA processing, translation, regulation of gene expression, DNA-protein interactions, gene targeting, control of gene expression, eukaryotic gene regulation, recombinant DNA and genomics.

{xtypo\_info}«**Foreign language**»  
{/xtypo\_info}

Students should choose one of the following languages: English, French, Italian, German.

{slide=5th Semester (Winter Term) |grey|closed}

{xtypo\_sticky}**OBLIGATORY COURSES**{/xtypo\_sticky}

<b>COURSE</b>
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<b>CODE</b>
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COURSE TITLE

LECTURING STAFF

Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S
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YΔ0401

Genetics

A. Exadactylos

3

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5

ΒΠ1800

**Economics and management in fisheries production**

**K. Polymeros**

3

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5

ΥΔ0503

**Aquatic animal physiology**

**E. Mente**

2

2

5

ΔΥ0203

**Ecotoxicology**

**K. Skordas**

2

2

5

ΥΔ0400

Gastropod, Amphibian and Reptile Farming

M. Chatziioannou

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2

5

Thesis

5

TOTAL:	30
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{xtypo\_info}«Genetics»  
{/xtypo\_info}

Inheritance of genetic material: structure of DNA and RNA, differential gene expression, gene regulation, genetic linkage, protein synthesis and RNA, Meiosis-process, Meiosis-genetic diversity,  $\chi^2$  test, Mendelian genetics-genotype & phenotype, Mendelian genetics-monohybrid & dihybrid crossing, chromosomes X and Y, genetic mutations-types of mutation, genetic mutations-polyploidy & mutation frequency, selective breeding. Population and evolutionary genetics: gene pool, Hardy-Weinberg equilibrium, Wahlund effect and F-statistics, genetic drift, genetic bottlenecks, founder effects, gene flow, mate selection, local adaptation, natural selection-types of selection, stabilizing natural selection, directional selection, diversifying selection. Quantitative genetics: response to selection in a quantitative trait, divergence of DNA sequences, population effective size in aquaculture.

### {xtypo\_info}«**Aquatic animal physiology**» {/xtypo\_info}

Endocrine system of aquatic animals. Hormones and their actions. Mechanisms of hormone actions. Formation of eggs and sperm, gonadal function and control. Male and female reproductive system. Hormones manipulation in reproduction. Physiology of aquatic vertebrates and aquatic invertebrates, mainly crustaceans. Circulatory system. The swim bladder. Respiratory system. Musculoskeletal system.

### {xtypo\_info}«**Ecotoxicology**» {/xtypo\_info}

Planet earth in danger – Global pollution, Environmental toxicology – Classification of chemical substances and toxicity tests, Study of the impact of chemical pollutants on organisms and evaluation of ecological risks, Nutrient cycles and ecosystems, Ecotoxicology – Effects of chemical contaminants on living organisms and ecosystems, Methodology of ecotoxicological investigations, Management and protection of ecosystems.

### {xtypo\_info}«**Gastropod, Amphibian and Reptile Farming**» {/xtypo\_info}

The edible snails of Greece. Anatomy and Physiology of gastropods. Reproduction, nutrition and feeding of wild and farmed gastropods. Snail Farming (Heliciculture). The commercial frogs

with accent in Greek species. Frog, Alligator and Crocodile Farming (Aquaculture)

**Economics and management in fisheries production»**

Principles in Economic theory. Production economics. Supply and Demand of fisheries products. Market theory, elasticities and prices of fisheries products. Production management: product, revenue and profit maximization. Decision making in fisheries production.

{slide=6th Semester (Summer Term) |grey|closed}

<b>COURSE</b>
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<b>CODE</b>
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<b>COURSE TITLE</b>
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<b>LECTURING STAFF</b>
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**Theory part**

**(hours)**

**Tutorial**

**(hours)**

**Laboratory work**

**(hours)**

<b>E</b>	.	<b>C</b>	.	<b>T</b>	.	<b>S</b>
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**ΔY0800**

**Biodiversity**

**D. Vafidis**

**3**

**1**

5

ΥΔ0301

**Aquaculture constructions**

**N. Neofitou**

3

1

5

ΥΔ0303

**Aquaculture I**

**P. Panagiotaki**

3

1

5

MT0305

**Food science and technology**

**I. Boziaris**

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**I. Arvanitoyannis**

2

2

5

ΥΔ0504

**Nutritional physiology**

**E. Mente**

2

2

5

Internship

3

Thesis

2

TOTAL:	30
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**OBLIGATORY COURSES**

**«Food Science and Technology»**

Composition, analysis and nutritional value of foods. Microorganisms and microbial contamination of foods. Factors affecting growth and survival of microorganisms in foods. Unit operations in food technology. Food packaging.

**«Aquaculture constructions»**

Constructions for the culture of aquatic organisms with open, semi-closed and closed systems.

**«Biodiversity»**

What is biodiversity. Evolution of life through time. How do we measure biodiversity. Global distribution of biodiversity and Biogeography. Benefits and threats. Conservation of biodiversity

**«Aquaculture I»**

Marine aquaculture: production of seafood from hatchery fish which are grown to market size in tanks, cages, or raceways focused mainly on Mediterranean cultivated species sea bream and seabass. Crustacean farming.

{xtypo\_info}«**Nutritional physiology**»  
{/xtypo\_info}

Introduction. Digestive and sensory organs anatomy. Metabolic fate of ingested nutrients and their essentiality. The effects of nutrient deficiency, nutrient interaction and imbalance. Digestion and absorption of nutrients. Bioenergetics. Protein and amino acid metabolism. Carbohydrates, major and minor pathways of glucose utilization. Lipids and fatty acids of fish. Metabolic modification of dietary lipids. Vitamins, requirements, deficiency diseases, functional role. Minerals. Control and regulation of digestion.

{slide=7th Semester (Winter Term) |grey|closed}

{xtypo\_sticky}**OBLIGATORY COURSES** {/xtypo\_sticky}

COURSE
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CODE
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COURSE TITLE
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LECTURING STAFF
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**Theory part**

**(hours)**

**Tutorial**

**(hours)**

**Laboratory work**

**(hours)**

<b>E</b>	.	<b>C</b>	.	<b>T</b>	.	<b>S</b>
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YΔ0302

**Aquatic animal nutrition**

**I. Karapanagiotidis**

2

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YΔ0305

**Aquaculture II**

**P. Panagiotaki**

3

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5

ΔY0901

**Environmental and Resource Economics and Economic Valuation**

**S. Matsiori**

2

2

5

MT0301

**Fish and seafood hygiene and preservation**

**I. Boziaris**

3

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ΔY0201

**Sustainable water resources management**

**A. Psilovikos**

3

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5

Thesis

5

<b>TOTAL:</b>	30
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{xtypo\_info}«**Aquatic animal nutrition**»  
{/xtypo\_info}

Principles of fish nutrition. Principles of metabolism, nutrients (proteins, fats, carbohydrates, minerals, vitamins). Nutrient requirements of fish. Energy requirements. Nutrition of farmed fish. Lives feeds.

{xtypo\_info}«**Aquaculture II**»  
{/xtypo\_info}

Freshwater aquaculture in ponds and in on-land systems such as recirculating aquaculture systems. Trout, salmon, eel, carp, sturgeon, polyculture. Production of mussels and oysters.

### {xtypo\_info}«**Fish and Seafood Hygiene and Preservation**» {/xtypo\_info}

Biological and chemical hazards of fish and seafood. Post-mortem changes in fish flesh, autolytic, chemical and microbiological changes. Spoilage of fish and seafood. Specific Spoilage Organism. Fish freshness and quality indices. Hurdle theory. Principles of preservation methods by heating, chilling, freezing, curing and MAP. Quality and safety assurance of fish and seafood and related legislation. GHP's and HACCP principles.

### {xtypo\_info}«**Sustainable water resources management**» {/xtypo\_info}

Introduction to water resources. Availability of water resources. Droughts and floods extreme phenomena. Integrated and sustainable management. Monitoring of water quality and quantity parameters in lakes, rivers and coastal zones. Scenarios in water resources management. Water quality parameters' balance. Connection between river basin processes with the coastal zone.

### {xtypo\_info}«**Environmental and Resource Economics and Economic Valuation**» {/xtypo\_info}

*Course Description:* This course analyses the economic and public policy principles underlying their effects to environmental degradation or to the overexploitation of natural resources.

*Course Objectives:* Students will acquire an understanding of: basic principles behind the economics of natural resource use, how the economy and the environment are linked, how various market failures may lead to environmental degradation or the overexploitation of natural resources and how economic policies can counteract such market failures.theory for environmental valuation,environmental policy instruments,important ethical questions linked to

the use and protection of environmental resources, the economic theory and principles for developing new environmental policies and evaluating current policies for environment and natural resources.

{slide=8th Semester (Summer Term) |grey|closed}

{xtypo\_sticky}α) **OBLIGATORY COURSES** {/xtypo\_sticky}

COURSE
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CODE
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COURSE TITLE
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LECTURING STAFF
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Theory part
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(hours)
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**Tutorial**

**(hours)**

**Laboratory work**

**(hours)**

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$\Delta$ Y0900

**Microbial ecology of aquatic systems**

**K. Kormas**

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2

4

MT0400

**Food processing technologies**

**I. Arvanitoyannis**

2

1

1

4

AA0305

**Fisheries management**

**D. Vafidis**

3

1

4

YΔ0308

**Aquafeed technology**

**I. Karapanagiotidis**

4

**Elective I**

4

**Internship**

3

**Thesis**

7
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<b>TOTAL:</b>	<b>30</b>
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{xtypo\_info}«**Microbial ecology of aquatic systems**»  
{/xtypo\_info}

Methodologies to investigate aquatic microorganisms. Survival of microorganisms in the aquatic environment. Impact of abiotic parameters on aquatic microorganisms. Aquatic biogeochemical cycling of carbon, nitrogen, sulfur and phosphorous. Microbial loop. Aquatic fungi and viruses. Symbiotic microorganisms. Aquatic microorganisms in public health.

{xtypo\_info}«**Fisheries management**»  
{/xtypo\_info}

Historical background and meaning of the stock. The purpose of inventory management. Mortality, exploitation rate and recruitment. Performance curves and biomass. Optimum performance per recruitment. Population Growth. Calculation abundance and distribution of stocks. Methods of assessing and forecasting. Excess production models and dynamic models. Monospecies and multispecies management of fish stocks. Fisheries regulation and management of fisheries in Greece.

{xtypo\_info}«**Food processing technologies**»  
{/xtypo\_info}

Part A - Classical Methods of Food Preservation: Thermal treatments (Canning, Blanching, Pasteurization, Sterilization), Other treatments [(Evaporation, Distillation, Extrusion, Dehydration, Drying, Salting, Smoking, Treatment of foods at low temperatures (refrigerating temp., freezing)]. Part B - Novel Methods for Food Processing: Irradiation [Ionizing, Ultraviolet (UV), Microwaves and Radiofrequencies, Pulsed Light] and Ultrasounds. Other Novel Food Processing Methods: Ohmic, High Hydrostatic Pressures, Aseptic Treatment, Hurdle Technology, Ozonation and Additives. Part C: Food Packaging [Packaging under Modified Atmosphere Packaging/under Vacuum (MAP/Sous Vide), Active/Smart Packaging, Edible films, Biodegradable films, Migration from Packaging Materials to foods, Food Packaging Materials [paper, carton, synthetic polymers (PE, PP, PVOH, PS, PET etc.), glass, etc.]. Part D -Manufacturing Technologies of foods of animal origin (Salting fish and seafood, Processing of frozen and boiled shrimps/prawns, Fish Processing and Canning, Fish oil production technology, Edible snails processing technology.

{xtypo\_info}«**Aquafeed technology**»  
{/xtypo\_info}

Aquafeed production - world and national data. Nutrients and non-nutrient substances in aquafeeds. Conventional and unconventional feedstuffs. Feed formulation. Linear programming. Equipment of aquafeed manufacture. Material flow in manufacture. Feed milling process. Pelleting and extrusion. Nutritional value of feedstuffs and aquafeeds.

{xtypo\_sticky}β) **ELECTIVE COURSES** {/xtypo\_sticky}

<b>COURSE</b>
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<b>CODE</b>
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<b>COURSE TITLE</b>
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<b>LECTURING STAFF</b>
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Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S	.
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MT0401

New trends in microbiological quality and safety of foods

I. Boziaris

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4

ΥΔ0505

Heliculture

M. Chatziioannou

2

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ΥΔ0309

Ornamental aquaculture

I. Karapanagiotidis

2

1

4

ΔΥ0902

**Methodology of Natural Resources Economic Valuation**

**S. Matsiori**

2

1

4

ΒΠ2403

**Marine mammals conservation biology**

**A. Exadactylos**

2

1

4

ΥΔ0506

**Aquaculture Biosecurity**

**E. Golomazou**

2

1

4

MT0402

Environmental management systems and methods focused on waste of food industries (EMS, IS

I. Arvanitoyannis

2

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4

ΓΠ0601

Co-operation – Co-operative Economics

K. Polymeros

2

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4

ΔΥ0302

**Hydroinformatics**

**A. Psilovikos**

2

1

4

ΥΔ0306

**Management of aquaculture enterprises**

**P. Panagiotaki**

2

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BP2404

Dynamical Oceanography and Marine Ecosystems

D. Vafidis	(	A. Theodorou	)
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GP0200

Aquatic entomology

E. Mente, (X. Roubos)

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ΓΠ0602

Research methodology

P. Panagiotaki	,	A. Exadactylos
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MT0304

Business Plan Development

Skayannis	2	1	4
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{xtypos\_info}«New trends in microbiological quality and safety of foods»  
{/xtypos\_info}

Emerging food borne pathogens. Bacterial injury and response. Predictive food microbiology. Biofilms in food industry. Quorum sensing. Modern non-thermal methods for microbial inactivation in foods (HP, pulsed electric fields, non-thermal plasma, ozone, sonication, UV. Biopreservation. Antimicrobial packaging. Molecular methods in food microbiology (PCR, next generation sequencing). Instrumental methods in food microbiology (FTIR, Maldi-tof MS)

### {xtypo\_info}«**Ornamental Aquaculture**» {/xtypo\_info}

Historical data of ornamental aquaculture - current production and value of the sector. The natural environment of ornamental fish. Water quality of ornamental aquarium. Construction, equipment, function and maintenance of aquarium. Biology of ornamental fish - freshwater and seawater. Ornamental plants. Reproduction of ornamental fish. Nutrition of ornamental fish. Diseases of ornamental fish

### {xtypo\_info}«**Management of aquaculture enterprises**» {/xtypo\_info}

Business planning, management by objectives, project of production system, natural and personnel resources, regulatory aspects.

### {xtypo\_info}«**Hydroinformatics**» {/xtypo\_info}

Connection between hydraulic, hydrologic and hydrogeologic models using hydroinformatics software and GIS. Application of time and space analysis solving hydrologic and hydraulic scientific issues. Trend analysis. Spearman's criterion. Application in water resources balance in catchments' areas of rivers and lakes. Introduction to finite difference method. Simulation model MODFLOW in groundwater resources. The method of linear and non-linear programming. Optimization model MODMAN.

### {xtypo\_info}«**Aquatic Entomology**» {/xtypo\_info}

Introductory general entomology elements. Anatomy, biology, physiology, ethology and systematic of the main provisions of the Insecta class. Concept and methods to limit pest populations. Their role in aquatic ecosystems. Indicators purity of the waters and their economic importance.

### {xtypo\_info}«**Business Plan Development**» {/xtypo\_info}

Introduction to marketing, market research, the role of advertisement (brand names, trademarks). <http://business-plans.moke.uth.gr/>

### {xtypo\_info}«**Dynamical Oceanography and Marine Ecosystems**» {/xtypo\_info}

Introduction. The Historical Setting. Density and Stability of Water Column. Marine kinematics. Conservation of Volume. Equations of Frictionless Motion. Geostrophic Currents. Mixing Processes. Equations of Motion with Friction. Vorticity. Wind-driven Currents. Wind-driven ocean circulation. Equatorial processes and circulation. Marine Modelling. Deep circulation, climate change and effects on marine ecosystems.

### {xtypo\_info}«**Co-operation – Co-operative Economics**» {/xtypo\_info}

Principles in Co-operation. Subject, goals and functions of Co-operatives. Benefits from Co-operatives: Production scales, bargaining power. Review and structure of Co-operatives in Greece and globally. Co-operatives and modern challenges in fisheries production.

### {xtypo\_info}«**Research methodology**» {/xtypo\_info}

Sampling in aquatic ecosystems. Care, handling, and examination of experimental aquatic organisms. Collection, processing, and identification of plankton and benthos. Design and analysis of tagging studies. Length, weight, age, growth and associated indices. Gut content. Experimental design. Data management and statistical techniques.

### {xtypo\_info}«**Heliculture**» {/xtypo\_info}

Productive properties of terrestrial gastropods species. Reproduction methods of terrestrial gastropods. Breeding methods of terrestrial gastropods. Systems of rearing snails. General principles of construction of snail – farm. Hygiene of snail – farms and hatcheries. Principles of exploitation of farmed snails, in conditions of prosperity, with ultimate aim to increase their productivity. Economic importance and structure of breeding snails worldwide, and especially in European Union and Greece.

### {xtypo\_info}«**Aquaculture Biosecurity**» {/xtypo\_info}

Measures and methods adopted to secure a disease free environment in all phases of aquaculture practices for improved profitability. Biosecurity protocols are intended to maintain the "security" of a facility. Major biosecurity goals are discussed: Animal management for obtaining healthy stocks, optimizing their health and immunity through good husbandry. Pathogen management for preventing, reducing or eliminating pathogens. People management for educating and managing staff and visitors.

### {xtypo\_info}«**Methodology of Natural Resources Economic Valuation**» {/xtypo\_info}

Course Description: This course analyses the economic and public policy principles underlying

their effects to environmental degradation or to the overexploitation of natural resources.

Course Objectives: On completion of this course students should be able to: understand the concept of environmental values and how their can be incorporated into economic decision-making, understand the role of environmental valuation methods, understand the difficulties of applying economic valuation methods, understand the strengths and weaknesses of non-market valuation methods and be able to select an appropriate method, understand the basic concepts and principles of conventional non-market valuation methods, understand how to design non-market valuation survey questionnaires, understand how to design non-market valuation research

{xtypo\_info}«**Marine mammals conservation biology**»  
{/xtypo\_info}

Marine mammals' biology, dolphins, whales, seals, sea lions. Evolution, anatomy, ecology. Behavior & interaction with their natural environment. Evaluation of natural populations & their distribution. Management, threatened species conservation. Marine parks & rehabilitation centers.

{xtypo\_info}«**Environmental management systems and methods focused on waste of food industries (EMS, ISO 14001)**»  
{/xtypo\_info}

INTRODUCTION (NECESSITY FOR AWARENESS OF ENVIRONMENTAL CONDITIONS, ENVIRONMENTAL MANAGEMENT SYSTEM, ISO 14000; A NEW APPROACH, ISO 14001: WHAT IT IS AND WHAT IT IS NOT, ADVANTAGES OF APPLYING ISO 14000. REVIEW OF ISO 14000 STANDARDS AND THEIR CERTIFICATION (STATISTICS). PRESENTATION AND ANALYSIS OF ISO 14001 PARAGRAPHS [ERMS & DEFINITIONS, REQUIREMENTS OF EMS (ENVIRONMENTAL MANAGEMENT SYSTEM), ANNEX A (REQUIREMENTS, ENVIRONMENTAL SIMILARITI, PLANNING, INSTALLATION & FUNCTIONING, CONTROL & CORRECTIVE ACTIONS, MANAGEMENT REVIEW. COMPARISON OF ISO 14001 WITH OTHER SYSTEMS OF ENVIRONMENTAL MANAGEMENT (CERES, EMAS, BS7750). QUESTIONNAIRE FOR PRELIMINARY AUDITING OF ISO 14001 (GAS RELEASE, LIQUID WASTE, SOLID WASTE). LIFE CYCLE ASSESSMENT (ISO 14040), ECO-LABELLING, ECO-LABELLING OF ISO 14020, APPLICATION OF ISO 14000 TO THE WASTE OF THE FOODS AND DRINKS INDUSTRY.

{slide=9th Semester (Winter Term)|grey|closed}

{xtypo\_sticky}α) **OBLIGATORY COURSES** {/xtypo\_sticky}

COURSE

CODE

COURSE TITLE

LECTURING STAFF

Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S	.
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ΥΔ0502

**Aquatic animal diseases**

**E. Golomazou**

2

3

5

ΥΔ0304

**Aquaculture and environment**

**N. Neofitou**

2

1

1

5

MT0307

**Quality Control and Techniques for determining adulteration of Foods**

**I. Arvanitoyannis**

2

2

5

**ELECTIVE I**

4
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<b>ELECTIVE II</b>
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4
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<b>Thesis</b>
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7
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<b>TOTAL:</b>	30
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{xtypo\_info}«**Aquatic animal diseases**»  
{/xtypo\_info}

Specific diseases are studied in freshwater culture and mariculture, especially where there is an economic impact. Students receive training in the wide range of disciplines and skills necessary for the investigation, preparation and control of aquatic animal diseases. There is a review of the main bacterial, viral, parasitic and fungal diseases of aquatic organisms and their diagnosis and treatment. Moreover, non-infectious diseases are discussed. Practical sessions focus on sampling sessions and case studies, isolating and identifying aquatic animal pathogens using advanced and specialized identification techniques.

### {xtypo\_info}«**Aquaculture and Environment**» {/xtypo\_info}

Aquaculture environmental interactions. Site selection. Environmental effects from the installation and the operation of aquaculture facilities. Better management practices for the reduction of environmental impacts.

### {xtypo\_info}«**Quality Control and Techniques for determining adulteration of Foods**» {/xtypo\_info}

PART I - Introduction to food analysis, US and EU regulations and ISO regarding food analysis, Nutrition Labelling, Sampling and sample preparation. PART II - Moisture and Total Solids Analysis, Ash Analysis, Crude Fat Analysis, Protein Analysis, Carbohydrate Analysis, Vitamin Analysis, Mineral Analysis. PART III - pH and Titratable acidity, Protein Separation and Characterization Procedures, Application of Enzymes in Food Analysis, Immunoassays, Agricultural Biotechnology (GMO) Methods of Analysis, Analysis of Pesticides, Mycotoxins and Drug Residues in Foods, Analysis for Extraneous Matter. PART IV - Basic Principles of Spectroscopy, Ultraviolet, Visible, and Fluorescence Spectroscopy, Infrared Spectroscopy, Atomic Absorption, Mass Spectroscopy. PART V - Basic Principles of Chromatography, High Performance Liquid Chromatography, Gas Chromatography PART VI - Rheological Principles for Food Analysis, Thermal Analysis, Colour Analysis.

### {xtypo\_sticky}β) **ELECTIVE COURSES** {/xtypo\_sticky}

COURSE
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CODE
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COURSE TITLE
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LECTURING STAFF

Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S	.
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ΔY0903

Environmental geochemistry

K. Skordas

2

1

4

BP0501

**Basic principles of light microscopy**

**P. Berillis**

2

4

ΔY0801

**Marine Benthic Ecosystems**

**D. Vafidis**

2

4

MT0103

**Investment Evaluation**

**S. Matsiori**

2

1

4

MT0403

Συστήματα Διαχείρισης ολικής ποιότητας (ΔΟΠ), ποιότητας και ασφάλειας στις βιομηχανίες τροφίμων

**I. Arvanitoyannis**

2

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4

BP2405

Applications of aquatic microorganisms

K. Kormas

2

1

4

YΔ0403

Evolution

**A. Exadactylos**

2

1

4

ΔΥ0205

**Environmental Planning**

**N. Neofitou**

2

1

4

**Introduction to Entrepreneurship**

**Skayannis**

2

1

4

{xtypo\_info}«**Environmental geochemistry**»  
{/xtypo\_info}

Distribution of data and diadohic substitution, Geochemical prospecting methods, Weathering and soil formation, Dispersion processes in surface environment, Secondary dispersion: Eh / pH and absorption, Surficial dispersion patterns, Trace elements in soils, Trace elements in plants, Natural waters composition and the process of weathering, Trace elements in water and sediments, Heavy metal pollution because of mining activities and metallurgy – Consequences for humans and the environment, Geochemical mapping of natural and anthropogenic sources of pollution, Geochemical engineering.

{xtypo\_info}«**Basic principles of light microscopy**»  
{/xtypo\_info}

Basic optic physics principles, image formation, lenses, light microscope, light microscopes types, sample preparation for light microscopy, lenses errors.

### {xtypo\_info}«**Marine Benthic Ecosystems**» {/xtypo\_info}

Detailed description of the different types of benthic ecosystems in the marine environment. Ecology and functional diversity. Trophic cascades. Inter- and Intra-specific relationships within communities and among assemblages.

### {xtypo\_info}«**Investment Evaluation**» {/xtypo\_info}

*Course Description:* The course deals extensively with the scope, techniques and objectives of investment appraisal, as well as risk assessment and funding investments

*Course Objectives:* Students will acquire an understanding of: Methods of investments evaluation, Basic investment principles for evaluation, Investment decisions in practice, Break Even Point Theory, Risk assessment theory, Theoretical Framework for Using Sensitivity Analysis

### {xtypo\_info}«**Environmental Planning**» {/xtypo\_info}

Principles of environmental planning. Description, registration and planning of the existing condition of the environment. Estimation, valuation and confrontation of environmental impacts. Planning and inventory of protected areas under national and international conventions.

### {xtypo\_info}«**Introduction to Entrepreneurship**» {/xtypo\_info}

The main objective of this course is to help students understand the basic concepts related to innovation and entrepreneurship, as well as the opportunities, prospects and the possibility to offer to society through business and innovation efforts. At the same time, it seeks to help them develop the necessary skills and confidence to bring these efforts to a successful outcome. ([link to the course](#))

### {xtypo\_info}«**Evolution**» {/xtypo\_info}

Evolution theories, evolutionary forces and genetic diversity, evolution of populations, phylogeny, Systematics and Cladistics, measuring variation of polygenic traits, molecular and morphological data in systematic studies, phylogenetic tests of evolutionary processes, phylogeny programs, evolution of developmental genes. Speciation, rates of speciation, species interactions, species concepts, variation within-between species. Socio-philosophical aspects of the evolutionary theory.

### {xtypo\_info}«**Applications of aquatic microorganisms**» {/xtypo\_info}

Aquatic prokaryotes and unicellular eukaryotes with metabolic traits of biotechnological interest. Microbial biocative and pharmaceutical substances. Biofuels. Food and aquatic microorganisms. Microorganisms as indicators of ecological quality and pollution in aquatic systems. Waterborne infections. Microbiology of drinking water and drinks. Domestic sewage treatment plant. Subsurface microorganisms. Isolation strategies of microorganisms with special interest to humans.

{xtypo\_info}«Συστήματα Διαχείρισης ολικής ποιότητας (ΔΟΠ), ποιότητας και ασφάλειας στις βιομηχανίες τροφίμων (TQM, ISO 9001, ISO 22000)»

{/xtypo\_info}

{slide=10th Semester (Summer Term) |grey|closed}

{xtypo\_sticky}α) **OBLIGATORY COURSES** {/xtypo\_sticky}

COURSE

CODE

COURSE TITLE

LECTURING STAFF

Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S	.
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MT0106

Accounting and Estimation in Fisheries and Aquaculture

S. Matsiori

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MT0104

Marketing and Policy in Fisheries Production

**K. Polymeros**

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ΔY0107

**Electron microscopy and image analysis in histology and to aquatic ecosystems**

**P. Berillis**

2

2

5

**Elective I**

4

**Elective II**

4

**Thesis**

7

<b>TOTAL:</b>	<b>30</b>
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{xtypo\_info}«**Accounting and Estimation in Fisheries and Aquaculture**»  
{/xtypo\_info}

*Course Description:* The course deals extensively with the scope, techniques and objectives fish farm appraisal methods and fish farm accounting

*Course Objectives:* Students will acquire an understanding of: Concepts of price and value, Basic concepts and method farm appraisal, Method of assessing the worth of a company, Concepts and methods of Depreciation, Accounting result and Accounts, Day book and Day book entries, Balance of the general ledger, Day book entries of the closing and opening of ledgers, Analysis of accounting sheets, Use of accounting data in making entrepreneurial decisions

### {xtypo\_info}«**Marketing and Policy in Fisheries Production**» {/xtypo\_info}

Principles in Marketing Management. Marketing functions in primary production. Marketing environment, mix and plan for fisheries products. Principles, objectives and review of the Common Fisheries Policy of the E.U. Modern trends in the global agro food sector.

### {xtypo\_info}«**Electron microscopy and image analysis in histology and to aquatic ecosystems**» {/xtypo\_info}

Basic electron microscopy principles, observation of cells and tissues under S.E.M and T.E.M., viruses under T.E.M., preparation of cells and tissues for T.E.M observation, preparation of cells and tissues for S.E.M observation, tissues and cells image formation in the electron microscopes, water column microorganisms under S.E.M., energy-dispersive X-ray spectroscopy analysis with S.E.M., image analyses.

□

### {xtypo\_sticky}β) **ELECTIVE COURSES** {/xtypo\_sticky}

<b>COURSE</b>
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CODE

COURSE TITLE

LECTURING STAFF

Theory part

(hours)

Tutorial

(hours)

Laboratory work

(hours)

E	.	C	.	T	.	S	.
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MT0401

New trends in microbiological quality and safety of foods

I. Boziaris

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YΔ0505

Heliculture	
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M. Chatziioannou	(	C. Neofitou	)
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2

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4

YΔ0309

**Ornamental aquaculture**

**I. Karapanagiotidis**

2

1

4

ΔY0902

**Methodology of Natural Resources Economic Valuation**

**S. Matsiori**

2

1

4

ΒΠ2403

Marine mammals conservation biology

A. Exadactylos

2

1

4

ΥΔ0506

Aquaculture Biosecurity

E. Golomazou

2

1

4

MT0402

Environmental management systems and methods focused on waste of food industries (EMS, IS

I. Arvanitoyannis

2

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ΓΠ0601

Co-operation – Co-operative Economics

K. Polymeros

2

1

4

ΔΥ0302

**Hydroinformatics**

**A. Psilovikos**

2

1

4

ΥΔ0306

**Management of aquaculture enterprises**

**P. Panagiotaki**

2

1

4

ΒΠ2404

**Dynamical Oceanography and Marine Ecosystems**

**D. Vafidis, (A. Theodorou)**

4

ΓΠ0200

**Aquatic entomology**

**E. Mente, (X. Roubos)**

2

1

4

ΓΠ0602

Research methodology

P. Panagiotaki	,	A. Exadactylos
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2

1

4

MT0304

Business Plan Development	Skayannis	2	1
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{xtypo\_info}«**New trends in microbiological quality and safety of foods**»  
{/xtypo\_info}

Emerging food borne pathogens. Bacterial injury and response. Predictive food microbiology. Biofilms in food industry. Quorum sensing. Modern non-thermal methods for microbial inactivation in foods (HP, pulsed electric fields, non-thermal plasma, ozone, sonication, UV. Biopreservation. Antimicrobial packaging. Molecular methods in food microbiology (PCR, next generation sequencing). Instrumental methods in food microbiology (FTIR, Maldi-tof MS)

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{xtypo\_info}«**Management of aquaculture enterprises**»  
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Business planning, management by objectives, project of production system, natural and personnel resources, regulatory aspects.

{xtypo\_info}«**Hydroinformatics**»  
{/xtypo\_info}

Connection between hydraulic, hydrologic and hydrogeologic models using hydroinformatics software and GIS. Application of time and space analysis solving hydrologic and hydraulic scientific issues. Trend analysis. Spearman's criterion. Application in water resources balance in

catchments' areas of rivers and lakes. Introduction to finite difference method. Simulation model MODFLOW in groundwater resources. The method of linear and non-linear programming. Optimization model MODMAN.

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### {xtypo\_info}«**Co-operation – Co-operative Economics**» {/xtypo\_info}

Principles in Co-operation. Subject, goals and functions of Co-operatives. Benefits from Co-operatives: Production scales, bargaining power. Review and structure of Co-operatives in Greece and globally. Co-operatives and modern challenges in fisheries production.

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### {xtypo\_info}«**Aquaculture Biosecurity**» {/xtypo\_info}

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{xtypo\_info}«**Marine mammals conservation biology**»  
{/xtypo\_info}

Marine mammals' biology, dolphins, whales, seals, sea lions. Evolution, anatomy, ecology. Behavior & interaction with their natural environment. Evaluation of natural populations & their distribution. Management, threatened species conservation. Marine parks & rehabilitation centers.

{xtypo\_info}«**Environmental management systems and methods focused on waste of food industries (EMS, ISO 14001**»  
{/xtypo\_info}

INTRODUCTION (NECESSITY FOR AWARENESS OF ENVIRONMENTAL CONDITIONS, ENVIRONMENTAL MANAGEMENT SYSTEM, ISO 14000; A NEW APPROACH, ISO 14001: WHAT IT IS AND WHAT IT IS NOT, ADVANTAGES OF APPLYING ISO 14000. REVIEW OF ISO 14000 STANDARDS AND THEIR CERTIFICATION (STATISTICS). PRESENTATION AND ANALYSIS OF ISO 14001 PARAGRAPHS [ERMS & DEFINITIONS, REQUIREMENTS OF EMS (ENVIRONMENTAL MANAGEMENT SYSTEM), ANNEX A (REQUIREMENTS, ENVIRONMENTAL SIMILARITI, PLANNING, INSTALLATION & FUNCTIONING, CONTROL & CORRECTIVE ACTIONS, MANAGEMENT REVIEW. COMPARISON OF ISO 14001 WITH OTHER SYSTEMS OF ENVIRONMENTAL MANAGEMENT (CERES, EMAS, BS7750). QUESTIONNAIRE FOR PRELIMINARY AUDITING OF ISO 14001 (GAS RELEASE, LIQUID WASTE, SOLID WASTE). LIFE CYCLE ASSESSMENT (ISO 14040), ECO-LABELLING, ECO-LABELLING OF ISO 14020, APPLICATION OF ISO 14000 TO THE WASTE OF THE

FOODS AND DRINKS INDUSTRY.

{/slides}