



National and Kapodistrian University of Athens
THIRD TERM
PANGEA TRACK/PROFILE: 2 - APPLIED PALAEOLOGY

TITLE OF UNIT: Biosphere and Geoenvironmental applications

NUMBER of ECTS: 7

OPTIONAL or COMPULSORY (if applicable): **OPTIONAL**

PREREQUISITES (in term of either skills or knowledge or units to be validated before registration to this course):

MODE OF TEACHING (distance education, webinar, workshops, seminars, lectures, supervised projects, etc): **Lectures of the instructor, practical work and oral presentations of the students**

Number of hours dedicated to lectures, practices, field-excursions, etc: **52**

Personal workload (hours expected to be dedicated to, including supervised projects): **123**

Description of the course

General aims

The aim of this course is to understand how the biosphere is responded to global changes. We will examine the biological content of past and modern geoenvironments and emphasis will be given to its environmental applications.

Expected outcomes (knowledge)

- Acquisition of basic knowledge and understanding the role of biosphere in the relationship between the geosphere, atmosphere, and hydrosphere
- Analysing the biological content of past and modern geoenvironments, and its environmental applications

Expected outcomes (skills)

- Skills to analyse data on biological content and apply them as a tool for solving environmental issues
- Skills to use biosphere information to address questions of global climate change
- Improved abilities of scientific research, analytical and critical thinking

Content summary

- Biogeochemical indicators and microfossils



- Primary productivity and the global carbon cycle, stable isotopes and paleoceanographic applications
- Marine microfauna as bioindicators for environmental monitoring
- Floral archives and global environmental changes, mass extinctions
- Vegetation response to Quaternary climatic changes, permanent populations and refuges in the Mediterranean

Person in charge of the unit (first and last name, e-mail)

Margarita Dimiza, mdimiza@geol.uoa.gr

| EVALUATION MODE (final exam, oral defence, report...) | Ratio of the final grade |
|--|---------------------------------|
| Final exam | 30% |
| Oral defence | 30% |
| Report | 40% |

**TITLE OF UNIT: Environmental Stratigraphy and applications****NUMBER of ECTS: 7**OPTIONAL or COMPULSORY (if applicable): **COMPULSORY**

PREREQUISITES (in term of either skills or knowledge or units to be validated before registration to this course):

MODE OF TEACHING (distance education, webinar, workshops, seminars, lectures, supervised projects, etc): **Lectures of the instructor, practical work and oral presentations of the students**Number of hours dedicated to lectures, practices, field-excursions, etc: **52**Personal workload (hours expected to be dedicated to, including supervised projects): **123****Description of the course**

General aims:

The aim of this course is to familiarize with classical and novel stratigraphic tools in order to approach environmental issues.

Expected outcomes (knowledge)

- Acquisition of basic knowledge and understanding in the application of novel tools, such as high-resolution analysis when applying biostratigraphic, chemostratigraphic, magnetostratigraphic, ecostratigraphic, tectonostratigraphic disciplines
- analysing past and modern geoenvironments

Expected outcomes (skills)

- -skills to analyse data and apply stratigraphic information as a tool to approach environmental issues
- -skills to use stratigraphic information

Content summary

- Description and analysis of numerous microfossil, macrofossil, tracefossil indices combined with sedimentary and geochemical data in high resolution sedimentary records in order to detect and determine (paleo)environmental variability due to natural and/or anthropogenic stressors (e.g., pollution, eutrophication, climate change, tectonic deformation).
- Biostratigraphy, Chronostratigraphy, Geochronology
- Lithostratigraphy, Cyclostratigraphy
- Magnetostratigraphic applications
- Chemostratigraphic applications
- Ecostratigraphic applications
- Tectonostratigraphic applications

**Person in charge of the unit (first and last name, e-mail)**Maria Triantaphyllou, mtriant@geol.uoa.gr

| EVALUATION MODE (final exam, oral defense, report,...) | Ratio of the final grade |
|---|---------------------------------|
| Final exam | 40% |
| Oral defence | 20% |
| Report | 30% |
| Class participation | 10% |



TITLE OF UNIT: Marine Paleoecology

NUMBER of ECTS: 8

OPTIONAL or COMPULSORY (if applicable):

PREREQUISITES (in term of either skills or knowledge or units to be validated before registration to this course):

MODE OF TEACHING (distance education, webinar, workshops, seminars, lectures, supervised projects, etc): **Lectures of the instructor, practical work and oral presentations of the students**

Number of hours dedicated to lectures, practices, field-excursions, etc: **52**

Personal workload (hours expected to be dedicated to, including supervised projects): **123**

Description of the course

General aims

The aim of this course is to provide graduate students with a working knowledge of marine paleoecology: main concepts and issues and Methods of paleoecological analysis of the marine ecosystem.

Expected outcomes (knowledge)

- Fully understand the fundamental concepts of paleoecology
- Practical knowledge of how to carry out paleoecological studies in the marine ecosystem and to identify the strengths and weaknesses of the paleoecological data
- Solve problems related to palaeoecological research in marine environments
- Understand the relationship between micro- and macro-fossils and paleoenvironmental parameters
- Understand the use of other proxies (Milankovitch variables, trace element analysis, sediment analysis, etc.) in relation to the faunal pattern and the re-construction of the history of past marine environments

Expected outcomes (skills)

- Theoretical thinking and ability to convert theory into practice
- Ability to apply knowledge to solve problems
- Search, analysis and synthesis of data and information, using the necessary technologies
- Decision making
- Autonomous work
- Teamwork
- Working in an interdisciplinary environment
- Respect for the natural environment
- Promote free, creative and inductive thinking



Content summary

- Basic concepts and principles of paleoecology - the marine ecosystem - use of microfossils in the interpretation of paleoenvironments
- Qualitative and quantitative analysis of fossil assemblages
- Microfossils as indicators of physico-chemical parameters and paleodepth of paleo environments
- Invertebrate paleoecology: quantitative and qualitative methods
- Deep Sea Environments
- Shelf environments
- Marginal environments

Person in charge of the unit (first and last name, e-mail)

Hara Drinia, cntrinia@geol.uoa.gr

| EVALUATION MODE (final exam, oral defence, report...) | Ratio of the final grade |
|---|--------------------------|
| Final exam | 30% |
| Oral defence | 30% |
| Report | 40% |



TITLE OF UNIT: Methods of applied research in Geosciences - Methods for the analysis of environmental data

NUMBER of ECTS: 7

OPTIONAL or COMPULSORY (if applicable):

PREREQUISITES (in term of either skills or knowledge or units to be validated before registration to this course): **There are no prerequisites, but basic knowledge on geo-environmental issues is required.**

MODE OF TEACHING (distance education, webinar, workshops, seminars, lectures, supervised projects, etc):

- Face-to-face lectures
- Practical exercises using PC
- Field exercises

Number of hours dedicated to lectures, practices, field-excursions, etc: **48**

Personal workload (hours expected to be dedicated to, including supervised projects): **127**

Description of the course

General aims

- Search, analysis and synthesis of data and information, using the necessary technologies
- Decision making
- Autonomous work
- Teamwork
- Working in an interdisciplinary environment
- Respect for the natural environment
- Promotion of free, creative and inductive thinking

Expected outcomes (knowledge)

- Statistical analysis, remote sensing, geographic information systems and sampling of geo-environmental data.
- Knowledge of how laboratory instruments function.

Expected outcomes (skills)

- Application of specialized software for the analysis of geo-environmental data (geographic information systems, software packages for photogrammetry, R-project programming language, statistical software, 2D and 3D graphs).
- Skills in the use of appropriate laboratory techniques for treatment and preparation of samples.

**Content summary**

- Simple linear model, general linear model, multivariate analysis, time series analysis (homogeneity test, time series gaps filling, trends, normalization, periodicity), spatial and temporal analysis of atmospheric data.
- The contribution of state of the art remote sensing techniques in environmental research, global position systems, high-resolution relief representation techniques, applications of geographic information systems in physical and environmental geography.
- Functions and applications of laboratory instruments. Laboratory techniques for treatment and preparation of samples, optical and Scanning Electron Microscope techniques.

Person in charge of the unit (first and last name, e-mail):

Assistant Prof. Kostas Eleftheratos, kelef@geol.uoa.gr

| EVALUATION MODE (final exam, oral defence, report...) | Ratio of the final grade |
|--|---------------------------------|
| Written work | 70% |
| Multiple choice test | 10% |
| Short answer questions | 10% |
| Oral exam | 10% |