Department of Biological Sciences

Postgraduate Programmes

Since Spring semester 2017/2018, all academic courses in our Postgraduate Programs of study are taught in English.

Master in Molecular Biology and Biomedicine

The course BIO 768 Genes, Microbes and Environment in Intestinal Health (10 ECTS) has been added to the list of Restricted Elective courses (Table B, Postgraduate Prospectus 2017-2019).

Master in Biomedical Sciences

The course BIO 768 Genes, Microbes and Environment in Intestinal Health (10 ECTS) has been added to the list of Restricted Elective courses (Table C, Postgraduate Prospectus 2017-2019).

Master in Biodiversity and Ecology

The course BIO 871 Molecular Ecology (10 ECTS) has been added to the list of Elective Courses (Table E, Postgraduate Prospectus 2017-2019) and the BIO 768 Genes, Microbes and Environment in Intestinal Health (10 ECTS) has been added to the list of Restricted Elective courses (Table F, Postgraduate Prospectus 2017-2019). In addition, the course CEE 581 environmental Threat Assessment (10 ECTS) has been removed from the aforementioned list of Restricted Elective courses.

Ph.D. in Biomedical Sciences

The course BIO 768 Genes, Microbes and Environment in Intestinal Health (10 ECTS) has been added to the list of Restricted Elective courses (Table I, Postgraduate Prospectus 2017-2019).

Ph.D. in Biodiversity and Ecology

The courses below have been added to the list of Restricted Elective courses ((Table J, Postgraduate Prospectus 2017-2019):

BIO 768 Genes, Microbes and Environment in Intestinal Health (10 ECTS)

BIO 871 Molecular Ecology (10 ECTS) have been added to the list of Restricted Elective courses.

- BIO 660 Developmental Genetics: Embryos, Cells and Genes (10 ECTS)

- BIO 740 Cellular Communication (10 ECTS)
- BIO 760 Topics in Genomics and Proteomics
- BIO 768 Genes, Microbes and Environment in Intestinal Health (10 ECTS)
- BIO 871 Molecular Ecology (10 ECTS)
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In addition, the course CEE 581 environmental Threat Assessment (10 ECTS) has been removed from the aforementioned list.

Course Descriptions

BIO 660 Developmental Genetics: Embryos, Cells and Genes

This course discusses fundamental aspects of the cellular and genetic basis of the fascinating, but still incompletely understood process of embryonic development: the transformation of the fertilized egg into the newborn individual. The course discusses the general concepts of embryonic development that are shared between all vertebrate animals, including humans, at the cellular and genetic levels. Specific topics of fundamental processes of vertebrate development and capabilities related to developmental mechanisms (e.g. cloning of organisms and tissue regeneration) are discussed using model organisms.

BIO 768 Genes, Microbes and Environment in Intestinal Health

The goal of this course is to illustrate the importance of synergisms among gene alleles, microbes and the intestinal environment that predispose for intestinal inflammation and cancer. Through lectures, student presentations and free group discussions of the literature we aim to understand critical aspects of intestinal human homeostasis and disease, including inflammatory bowel disease and intestinal tumor formation and metastasis. We will highlight the importance of Drosophila genetics, histopathology and quantitative population genetics analysis to identify the host genes, microbes and dietary factors that mediate inflammation and predispose for cancer. The usefulness of modeling human diseases primarily in flies, subsequently in mice and the necessity to follow up with human studies will be described based on the high degree of conservation between Drosophila and mammalian signaling pathways controlling intestinal regeneration.

BIO 871 Molecular Ecology

This course will provide an overview of the application of molecular genetic tools to ecological questions and will introduce the genetic markers, techniques and analyses commonly used in this field. The focus will be on how recent advances in molecular techniques can be used at population-, species- and community-levels to explore the dynamics of biodiversity in a changing world, including applications of population genetics,

phylogeography, phylogenetics, DNA-based species delimitation and taxonomic assignment, genomics and metagenomics. The course will consist of a series of lectures, group discussions on research papers, hands-on exercises and student presentations on selected topics.

Research Interests of the Academic Staff

- **Anna Papadopoulou, Assistant Professor**

Molecular Ecology and Evolution Laboratory

The Molecular Ecology and Evolution Lab applies molecular genetics and genomic tools to address ecological questions, with a special focus on the study of island communities. Specifically, we use molecular markers and genomic data to study the phylogeny, phylogeography and population genetics of island taxa, as well as to analyse island biodiversity patterns, with the aim to understand the ecological and evolutionary processes that generate and maintain biodiversity in island systems.

Islands harbour unique and vulnerable faunas and floras, which are increasingly threatened by intense pressure from invasive alien species, habitat destruction and climate change. Research and conservation efforts tend to focus on certain prominent groups (e.g., mammals or birds), largely overlooking the hidden biodiversity of the "small majority" (i.e., the highly diverse but neglected small-bodied taxa), which is though critical for the functioning of island ecosystems. Recent advances in molecular genetics and genomics hold great promise for accelerating inventories of previously neglected island communities (e.g. belowground biodiversity) as well as helping us to understand how this biodiversity is generated and maintained across space and time.

Research topics in the Molecular Ecology and Evolution Lab include:

1. Comparative phylogeography and population genomics to understand the role of ecological traits in the dispersal propensity and diversification of island taxa.

2. Studying the effects of Quaternary climatic change and sea-level oscillations on the demographic history and diversification of island taxa.

3. Developing and applying DNA-based methodologies for species delimitation, large-scale biodiversity assessment and diet inference of poorly known taxonomic groups.

For these purposes, we combine fieldwork, with labwork and bioinformatic analysis of molecular and genomic data. This research is being developed in close collaboration with other research groups in the UK, the USA, Spain, Greece and Cyprus.