

## DOCTORAL SCHOOL OF BIOLOGICAL SCIENCES<sup>5</sup>

Faculty of Science

**Name of discipline:** biological sciences

**Form of training:** doctoral (Ph.D.) training

**Program objectives:** to acquire the academic degree training, acquisition of practice in higher education

**Training time:** 4 + 4 semesters

**Training type:** regular school

**Financing:** state-supported, or tuition fee based

**Entrance requirements:** master's degree and a successful entrance exam

**Language requirements:** State-recognized type „C” secondary (or equivalent) in English language and basic knowledge of a second language

**Training ends:** First 2 years (I): 122 credits and complex examination; Second 2 years (II): 118 credits, final (pre-degree) certificate

**The number of credits required:** 240

**Ways of Getting Credit / modules:** study credits (I: 48-60, II: 0), research credits (I: 60, II: 120), educational credits (I: 0-12)

**Responsible for the trainig:** Prof. Anna Erdei – head of the graduate school

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<sup>5</sup> Beiktatta a CCIX/2016. (IX.26.) Szen. sz. határozat.

## DOCTORAL EDUCATION PROGRAMS

### I. ECOLOGY, CONSERVATION BIOLOGY AND SYSTEMATICS

Program leader: Dr. János Podani

**Students must complete 32 credits from the following courses:**

**BIO/1/2 Grassland ecology**

4 credits, lecture, optional, can be taken only once

**BIO/1/4 Theory and practice of ecological sampling**

4 credits, lecture, optional, can be taken only once

**BIO/1/5 Introduction to the analysis of multivariate biological data**

4 credits, practical, optional, can be taken only once

**BIO/1/6 Conservation biology**

4 credits, lecture, optional, can be taken any number of times

**BIO/1/7 Fundamentals of seed bank ecology**

4 credits, lecture, optional, can be taken only once

**BIO/1/14 Population dynamics and evolution of clonal plants**

4 credits, lecture, compulsory, can be taken any number of times

**BIO/1/17 Conservation of biodiversity in forests**

4 credits, lecture, optional, can be taken only once

**BIO/1/18 Bryophyte ecology**

6 credits, practical, optional, can be taken only once

**BIO/1/19 General ecology**

4 credits, practical, optional, can be taken only once

**BIO/1/20 Spatial ecology**

4 credits, lecture, optional, can be taken only once

**BIO/1/20GY Spatial ecology**

4 credits, practical, optional, can be taken only once

**BIO/1/21 Vegetation dynamics**

2 credits, lecture, optional, can be taken only once

**BIO/1/22 Phylogenetics in conservation biology**

2 credits, lecture, optional, can be taken only once

**BIO/1/23 Forest ecology**

2 credits, lecture, optional, can be taken only once

**BIO/1/24 Application of spatial informatics to ecology**

2 credits, lecture, optional, can be taken only once

**BIO/1/25 Holocene vegetation dynamics and phylogeography**

2 credits, lecture, optional, can be taken only once

**BIO/RK-KV Credits transferred from other programs (max: 16)**

**Research** (for a total of 208 credits):

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times

## II. ETHOLOGY

Program leader: Dr. Ádám Miklósi

**Students must complete 32 credits from the following courses:**

**BIO/2/1 Behaviour genetics**

4 credits, lecture, compulsory, can be taken only once

**BIO/2/2 Cognitive ethology**

4 credits, lecture, optional, can be taken only once

**BIO/2/3 Human ethology**

4 credits, lecture, compulsory, can be taken only once

**BIO/2/4 Ethology**

4 credits, lecture, compulsory, can be taken only once

**BIO/2/5 Research management**

4 credits, lecture, compulsory, can be taken only once

**BIO/2/6 Integrated research methods in ethology**

6 credits, lecture, optional, can be taken only once

**BIO/2/7 Behaviour ecology**

4 credits, lecture, optional, can be taken only once

**BIO/2/8 Ethology of dogs**

4 credits, lecture, specialization compulsory optional, can be taken only once

**BIO/2/9 PhD students' reports**

4 credits, lecture, optional, can be taken any number of times

**BIO/2/10 Animal welfare**

4 credits, lecture, optional, can be taken only once

**BIO/2/11 Synthetic ethology**

4 credits, lecture, optional, can be taken only once

**BIO/2/12 Animal personality**

4 credits, lecture, optional, can be taken only once

**Research** (for a total of 208 credits):

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times

### III. IMMUNOLOGY

Program leader: Dr. Anna Erdei

**Students must complete 32 credits from the following courses:**

**BIO/3/1 Journal klub**

4 credits, practical course, compulsory, can be taken any number of times

**BIO/3/2 Report of Doctoral Students**

4 credits, individual research, compulsory, can be taken any number of times

**BIO/3/3 PhD Day**

4 credits, lecture, compulsory, can be taken any number of times

**BIO/3/4B HSI Conference**

4 credits, lecture, optional, can be taken only once

**BIO/3/4E Impulse Conference**

4 credits, lecture, optional, can be taken only once

**BIO/3/5 Fluorescence flow cytometry and imaging**

4 credits, lecture, optional, can be taken only once

**BIO/3/6 Immunology of Infections**

4 credits, lecture, optional, can be taken only once

**BIO/3/7 Immunopathology**

4 credits, lecture, optional, can be taken only once

**BIO/3/9 Signaling mechanisms in immune cells**

4 credits, lecture, optional, can be taken only once

**BIO/3/10 Cellular communication in the immune system**

4 credits, lecture, optional, can be taken only once

**BIO/3/11 B cell ontogenesis**

4 credits, lecture, optional, can be taken only once

**BIO/3/12 T cell ontogenesis**

4 credits, lecture, optional, can be taken only once

**BIO/3/14 Innate immunity, evolution of the immune system**

4 credits, lecture, optional, can be taken only once

**BIO/3/17 Immunological application of microfluidity**

4 credits, lecture, optional, can be taken only once

**BIO/3/18 A systems biology view of the immunology of pregnancy**

4 credits, lecture, optional, can be taken only once

**BIO/RK-KV Credits transferred from other programs (max: 16)**

**Research (for a total of 208 credits):**

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times

## IV. EXPERIMENTAL PLANT BIOLOGY PROGRAM

Program leader: Dr. Zoltán Szigeti

**Students must complete 32 credits from the following courses:**

**BIO/4/1 Plant biotechnology**

4 credits, lecture, optional, can be taken only once

**BIO/4/3 Electronmicroscopical techniques I.**

8 credits, practice, optional, can be taken only once

**BIO/4/4 Pharmacobotanics**

4 credits, lecture, optional, can be taken any number of times

**BIO/4/5 Writing scientific papers in English**

4 credits, lecture, optional, can be taken only once

**BIO/4/6 Plant molecular biology**

4 credits, lecture, optional, can be taken any number of times

**BIO/4/7 Plant biochemistry**

4 credits, lecture, optional, can be taken any number of times

**BIO/4/8 Separation techniques in plant biochemistry**

8 credits, practice, optional, can be taken only once

**BIO/4/9 Absorption and fluorescence spectroscopy for studying plant substances and metabolism**

8 credits, practice, optional, can be taken only once

**BIO/4/11 Mechanism of ion uptake and mineral nutrition of plants**

4 credits, lecture, optional, can be taken only once

**BIO/4/12 Biogenesis and evolution of the photosynthetic apparatus**

4 credits, lecture, optional, can be taken only once

**BIO/4/13 Plant – bacterium interactions**

4 credits, lecture, optional, can be taken only once

**BIO/4/14 Plant – fungus interactions**

4 credits, lecture, optional, can be taken only once

**BIO/4/15 Secondary metabolism in plants**

4 credits, lecture, optional, can be taken only once

**BIO/4/16 Plant stress physiology**

4 credits, lecture, optional, can be taken only once

**BIO/4/18 Biology of plant reproduction**

4 credits, lecture, optional, can be taken only once

**BIO/4/19 Fluorescent techniques**

4 credits, practice, optional, can be taken only once

**BIO/4/20 Ultrastructural basis of plant cell functions**

4 credits, lecture, optional, can be taken only once

**BIO/4/21 Molecular plant virology**

4 credits, lecture, optional, can be taken only once

**BIO/4/22 Electronmicroscopical techniques II.**

8 credits, practice, optional, can be taken only once

**BIO/4/23 Plant transformation and transgenic plants**

4 credits, lecture, optional, can be taken only once

**BIO/4/24 PCR techniques in plant molecular biology I.**

4 credits, lecture, optional, can be taken only once

**BIO/4/24GY PCR techniques in plant molecular biology II. Pr**

4 credits, lecture, optional, can be taken only once

**BIO/4/25 Plant cell and tissue culture**

4 credits, lecture+practice, optional, can be taken only once

**BIO/RK-KV Credits transferred from other programs (max: 16)**

**Research (for a total of 208 credits):**

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times

## V. PROGRAM GENETICS

Program leader: Dr. Tibor Vellai

**Students must complete 32 credits from the following courses:**

**BIO/5/1 Genetic analysis (progressive level)**

4 credits, compulsory, can be taken only once

**BIO/5/2 Developmental genetics**

4 credits, lecture, optional, can be taken only once

**BIO/5/3 Gene technology, recombination**

4 credits, lecture, optional, can be taken only once

**BIO/5/4 Clinical human genetics**

4 credits, lecture, optional, can be taken only once

**BIO/5/5 Genetic aspects of bone metabolism**

4 credits, lecture, optional, can be taken only once

**BIO/5/6 Molecular taxonomy, evolution**

4 credits, lecture, optional, can be taken only once

**BIO/5/7 Exon shuffling, molecular evolution, genomics**

4 credits, lecture, optional, can be taken only once

**BIO/5/8 Applications of transgenic plants**

4 credits, lecture, optional, can be taken only once

**BIO/5/9 Gene silencing, RNA interference**

4 credits, lecture, optional, can be taken only once

**BIO/5/11 Sequence-specific DNA-protein interactions (prokaryote, eukaryote)**

4 credits, lecture, optional, can be taken only once

**BIO/5/12 Seminars in bioinformatics**

4 credits, lecture, optional, can be taken only once

**BIO/5/13 Transgenic animals: developmental applications**

4 credits, practice, optional, can be taken only once

**BIO/5/15 From transcription to translation: proteins, genes, diseases**

4 credits, lecture, optional, can be taken only once

**BIO/5/16 Bacterial and (new) phage genetics**

4 credits, lecture, optional, can be taken only once

**BIO/5/17 Molecular tumor genetics**

4 credits, lecture, optional, can be taken only once

**BIO/5/18 The function and biogenesis of plant regulatory small RNAs**

4 credits, lecture, optional, can be taken only once

**BIO/5/19 Functional genomics**

4 credits, lecture, optional, can be taken only once

**BIO/5/20 Forensic genetics and pedigree (lineage) determination**

4 credits, lecture, optional, can be taken only once

**BIO/5/21 Plant-microbe symbiosis, mycorrhiza relation and the genetic analysis of symbiotic nitrogen fixation**

4 credits, lecture, optional, can be taken only once

**BIO/5/22 Recombination models, gene conversion, enzymes, gene map**

4 credits, lecture, compulsory, can be taken only once

**BIO/5/23 Genetics in forensic sciences**

4 credits, lecture, optional, can be taken only once

**BIO/RK-KV Credits transferred from other programs (max: 16)**

**Research** (for a total of 208 credits):

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times

## VI. MOLECULAR CELL AND NEUROBIOLOGY PROGRAM

Program leader: Dr. Gábor Juhász

**Students must complete 32 credits from the following courses:**

**BIO/6/1 Introduction to molecular neurobiology**

4 credits, lecture, optional, can be taken only once

**BIO/6/2 Cell biology of neurodegeneration diseases**

4 credits, lecture, optional, can be taken only once

**BIO/6/3 Developmental biology**

4 credits, lecture, optional, can be taken only once

**BIO/6/4 Light and electron microscopical immunocytochemistry**

6 credits, practice, optional, can be taken only once

**BIO/6/6 Membranology**

4 credits, lecture, optional, can be taken only once

**BIO/6/7 Neuroanatomy I.**

4 credits, practice, optional, can be taken only once

**BIO/6/8 Neuroanatomy II.**

4 credits, practice, optional, can be taken only once

**BIO/6/9 Neurobiology analysis methods**

4 credits, lecture, optional, can be taken only once



**BIO/6/10 Stem cell biology**

4 credits, lecture, optional, can be taken only once

**BIO/6/11 Receptors, signaling, cell-cell communication**

4 credits, lecture, optional, can be taken only once

**BIO/6/13 Cell adhesion: cell-cell, cell-matrix interactions**

4 credits, lecture, optional, can be taken only once

**BIO/6/16 Cytoskeleton, movement, cytomatrix**

4 credits, lecture, optional, can be taken only once

**BIO/6/20 Transgenic techniques: GFP, gene knockout and more**

4 credits, lecture, optional, can be taken only once

**BIO/6/21 The ubiquitin-proteasome system and its roles**

4 credits, lecture, optional, can be taken only once

**BIO/6/22 The biology of cancer**

4 credits, lecture, optional, can be taken only once

**BIO/6/23 The molecular cell biology of autophagy and cell death**

8 credits, lecture, optional, can be taken only once

**BIO/RK-KV Credits transferred from other programs (max: 16)**

**Research** (for a total of 208 credits):

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times

## VII. NEUROSCIENCE AND HUMANBIOLOGY

Program leader: Dr. László Détári

**Students must complete 32 credits from the following courses:**

**BIO/7/1 Molecular biology of learning and memory**

4 credits, theory, optional, can be taken only once

**BIO/7/2 Neuronal celldifferentiation I.**

4 credits, lecture, optional, can be taken only once

**BIO/7/3 Psychopharmacology**

4 credits, lecture, optional, can be taken only once

**BIO/7/4 Neurochemistry**

4 credits, lecture, optional, can be taken only once

**BIO/7/6 Behavioral physiology I.**

4 credits, lecture, optional, can be taken only once

**BIO/7/7 Daily rhythm, sleep and wakefulness**

4 credits, lecture, optional, can be taken only once

**BIO/7/8 Neurobiology and pharmacology of behavior**

4 credits, lecture, optional, can be taken only once

**BIO/7/9 Cognitive psychophysiology**

4 credits, lecture, optional, can be taken only once

**BIO/7/10 Anthropogenetics**

4 credits, lecture, optional, can be taken only once

**BIO/7/12 Evolution of primates**

4 credits, lecture, optional, can be taken only once

**BIO/7/14 History and sources of paleodemography**

4 credits, lecture, optional, can be taken only once

**BIO/7/15 Anatomical variations and developmental abnormalities**

4 credits, lecture, optional, can be taken only once

**BIO/7/16 Modeling in neurobiology**

4 credits, theory, optional, can be taken only once

**BIO/7/17 Imaging of brain structure and function**

4 credits, theory, optional, can be taken only once

**BIO/7/18 Electrophysiology**

4 credits, theory, optional, can be taken only once

**BIO/7/19 In vitro cell-technology**

4 credits, theory, optional, can be taken only once

**BIO/7/20 Experimental surgery and animal handling**

4 credits, theory, optional, can be taken only once

**BIO/7/21 Molecular basis of learning and memory**

4 credits, theory, optional, can be taken only once

**BIO/7/22 Emergence and spreading of anatomically modern Homo sapiens**

4 credits, lecture, optional, can be taken only once

**BIO/7/23 Critical stages of hominid evolution**

4 credits, lecture, optional, can be taken only once

**BIO/7/24 Critical stages of hominid evolution**

4 credits, lecture, optional, can be taken only once

**BIO/7/27 Data management and modeling in human biology**

4 credits, lecture, optional, can be taken only once

**BIO/7/28 Applied anthropometry**

4 credits, lecture, optional, can be taken only once

**BIO/7/29 Auxology**

4 credits, lecture, optional, can be taken only once

**BIO/7/30 Human ecology: Man and its environment I**

4 credits, lecture, optional, can be taken only once

**BIO/7/31 Human ecology: Man and its environment II**

4 credits, lecture, optional, can be taken only once

**BIO/7/32 Methodology of writing dissertations**

4 credits, lecture, optional, can be taken only once

**BIO/7/33 Genetics of human growth**

4 credits, lecture, optional, can be taken only once

**BIO/7/34 Paleopathology**

4 credits, lecture, optional, can be taken only once

**BIO/7/35 Natural and social scientific aspects of the race concept**

4 credits, lecture, optional, can be taken only once

**BIO/7/36 Neuronal celldifferentiation II.**

4 credits, theory, optional, can be taken only once

**BIO/7/37 Behavioral physiology II.**

4 credits, theory, optional, can be taken only once

**BIO/7/39 Neuroinformatics: basis and neurobiological applications**

4 credits, theory, optional, can be taken only once

**BIO/7/40 Presentation in science (paper, talk, poster, essay)**

2 credits, practical, optional, can be taken only once

**BIO/7/41 Discussion of scientific papers**

4 credits, theory, optional, can be taken any number of times

**BIO/7/42 Neurotoxicology**

2 credits, theory, optional, can be taken only once

**BIO/7/43 Light and fluorescent microscopy in neuroscience**

4 credits, theory, optional, can be taken only once

**BIO/7/44 Neuropeptides**

4 credits, theory, optional, can be taken only once

**BIO/7/45 Theoretical stemcell biology: development of organs and cell replacement**

4 credits, theory, optional, can be taken only once

**BIO/RK-KV Credits transferred from other programs (max: 16)**

**Research (for a total of 208 credits):**

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times

## VIII. STRUCTURAL BIOCHEMISTRY PROGRAM

Program leader: Dr. Mihály Kovács

Students must complete 32 credits from the following courses:

**BIO/8/1 Directed evolution approaches in protein science**

4 credits, lecture, optional, can be taken only once

**BIO/8/2 Introduction to a protein bioinformatics**

4 credits, lecture, optional, can be taken only once

**BIO/8/3 Eukaryotic gene expression systems**

4 credits, lecture, optional, can be taken only once

**BIO/8/4 DNA repair mechanisms: cellular aspects**

4 credits, lecture, optional, can be taken only once

**BIO/8/5 Structural biology of DNA repair**

4 credits, lecture, optional, can be taken only once

**BIO/8/6 Structure and function of intrinsically disordered proteins**

4 credits, lecture, optional, can be taken only once

**BIO/8/7 Journal Club**

4 credits, lecture, optional, can be taken any number of times

**BIO/8/8 Transient enzyme kinetics**

4 credits, practical course, optional, can be taken only once

**BIO/8/9 Fluorescence spectroscopy**

4 credits, practical course, optional, can be taken only once

**BIO/8/10 Transient enzyme kinetics**

4 credits, lecture, optional, can be taken only once

**BIO/8/11 Fluorescence spectroscopy**

4 credits, lecture, optional, can be taken only once

**BIO/8/12 Protein folding: mechanisms of formation of correctly folded and misfolded structures**

4 credits, lecture, optional, can be taken only once

**BIO/8/13 Methods for studying protein structure and interactions**

4 credits, lecture, optional, can be taken only once

**BIO/8/15 Physical biochemistry**

4 credits, lecture, optional, can be taken only once

**BIO/8/16 Eukaryotic signal transduction: protein networks**

4 credits, lecture, optional, can be taken only once

**BIO/8/17 Research progress reports**

4 credits, lecture, compulsory, can be taken any number of times

**BIO/8/19 Statistical analysis of biological measurements**

2 credits, lecture course, optional, can be taken only once

**BIO/8/20 Methods of protein crystallography**

4 credits, lecture, optional, can be taken only once

**BIO/8/21 Protein structure, flexibility and stability**

4 credits, lecture, optional, can be taken only once

**BIO/8/22 Intrinsically disordered proteins: a short course**

2 credits, lecture, optional, can be taken only once

**BIO/8/23 Albert Szent-Györgyi lecture series**

4 credits, lecture, optional, can be taken only once

**BIO/8/24 From basic research to targeted tumor therapy**

4 credits, lecture, optional, can be taken only once

**BIO/8/26 Calculation of molecular interactions in biology**

4 credits, lecture, optional, can be taken only once

**BIO/8/27 Structural bioinformatics of drug design**

4 credits, lecture, optional, can be taken only once

**BIO/8/28 Introduction to biomolecular modeling**

4 credits, lecture, optional, can be taken only once

**BIO/8/29 Practical applications of protein bioinformatics tools**

4 credits, lecture, optional, can be taken only once

**BIO/8/30 Investigation of protein and peptide structure by NMR spectroscopy**

4 credits, lecture, optional, can be taken only once

**BIO/8/31 Research progress reports**

0 credit, lecture, compulsory, can be taken any number of times

**BIO/RK-KV Credits transferred from other programs (max: 16)**

**Research** (for a total of 208 credits):

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times

## IX. ZOOTAXONOMY, ANIMAL ECOLOGY, HYDROBIOLOGY

Program leader: Dr. János Török

**Students must complete 32 credits from the following courses:**

**BIO/9/1 New trends in systematic zoology**

2 credits, lecture, compulsory, can be taken only once

**BIO/9/2 New trends and perspectives in animal ecology**

4 credits, lecture, compulsory, can be taken only once

**BIO/9/3 New trends and perspectives in animal ecology**

4 credits, lecture, can be taken only once

**BIO/9/5 Maintenance of wetland ecosystems**

4 credits, lecture, can be taken only once

**BIO/9/6 Lake sediments: accumulation, physical and chemical characterisation and role in nutrient cycling**

4 credits, lecture, can be taken only once

**BIO/9/7 Current issues in conservation biology**

4 credits, lecture, can be taken only once

**BIO/9/8 Biogeography**

4 credits, lecture, can be taken only once

**BIO/9/9 Ecological informatics**

4 credits, practice, can be taken only once

**BIO/9/10 Chemical ecology of insects**

4 credits, lecture, can be taken only once

**BIO/9/13 Advances in enchytraeid taxonomy and ecology**

4 credits, lecture, can be taken only once

**BIO/9/14 Methods in molecular taxonomy of animals**

4 credits, lecture, can be taken only once

**BIO/9/14 Methods in molecular taxonomy of animals**

8 credits, practice, can be taken only once

**BIO/9/15 Animal-microbe interactions**

4 credits, lecture, can be taken only once

**BIO/9/18 Ecology and evolution of parasites**

4 credits, lecture, can be taken only once

**BIO/9/19 Evolutionary ecology of birds**

4 credits, lecture, can be taken only once

**BIO/9/20 Reproductive and foraging strategies**

4 credits, lecture, can be taken only once

**BIO/9/21 Reproductive physiology of birds**

4 credits, lecture, can be taken only once

**BIO/9/23 Insect pheromones and biological control**

4 credits, lecture, can be taken only once

**BIO/9/24 Predator-prey systems in biological control**

4 credits, lecture, can be taken only once

**BIO/9/25 Advances in protistology**

4 credits, lecture, can be taken only once

**BIO/9/26 Student's report (semester 3)**

4 credits, lecture, compulsory, can be taken only once

**BIO/9/27 Student's report (semester 5)**

4 credits, lecture, compulsory, can be taken only once

**BIO/9/28 Recent advances in ecological statistics**

4 credits, lecture, can be taken only once

**BIO/9/29 Evolutionary ecology**

4 credits, lecture, can be taken only once

**BIO/RK-KV Credits transferred from other programs (max: 16)**

Research (for a total of 208 credits):

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times

## X. ZOOTAXONOMY, ANIMAL ECOLOGY, HYDROBIOLOGY

Program leader: Dr. Eörs Szathmáry

Students must complete 32 credits from the following courses:

**BIO/10/1 Basic Statistics (theory)**

4 credits, lecture, optional, can be taken only once

**BIO/10/2 Basic Statistics (practice)**

4 credits, practical course, optional, can be taken only once

**BIO/10/3 Advanced Statistics**

4 credits, practical course, optional, can be taken only once

**BIO/10/4 Biological Applications of General Linear Models**

4 credits, lecture, optional, can be taken only once

**BIO/10/5 Computer Programming for Biologists**

4 credits, practical course, optional, can be taken only once

**BIO/10/6 Numerical Methods and Computer Simulations in Ecology**

4 credits, practical course, optional, can be taken only once

**BIO/10/7 Theoretical Evolutionary Biology**

4 credits, lecture, optional, can be taken only once

**BIO/10/8 Theoretical Ecology**

4 credits, lecture, optional, can be taken only once

**BIO/10/9 Seminars in Evolutionary Biology and Ecology**

2 credits, seminar, optional, can be taken any number of times

**BIO/10/12 Research Planning**

2 credits, lecture, optional, can be taken only once

**BIO/10/13 Seminars in Population Biology**

4 credits, seminar, optional, can be taken any number of times

**BIO/10/14 Space-time Models in Ecology and Evolution**

4 credits, lecture, optional, can be taken only once

**BIO/10/19 The Structure of Trophic Networks**

4 credits, lecture, optional, can be taken only once

**BIO/10/20 Evolutionary Game Theory**

4 credits, lecture, optional, can be taken only once

**BIO/10/21 Nonlinear Phenomena in Ecology**

4 credits, lecture, optional, can be taken only once

**BIO/10/25 Biological Networks Journal Club**

4 credits, practical course, optional, can be taken any number of times

**BIO/10/26 Current Problems in Theoretical Biology**

4 credits, lecture, optional, can be taken only once

**BIO/10/29 Mathematical Approaches in HIV Research**

4 credits, lecture, optional, can be taken only once

**BIO/10/30 Models of Prebiotic Evolution**

2 credits, practical course, optional, can be taken only once

**BIO/10/31 Mathematical Models in Biology**

2 credits, lecture, optional, can be taken only once

**BIO/10/32 Computer Modelling in Biology**

4 credits, practical course, optional, can be taken only once

**BIO/10/33 Evolutionary Background of Human Cooperation**

2 credits, seminar, optional, can be taken only once

**BIO/RK-KV Credits transferred from other programs (max: 16)**

**Research (for a total of 208 credits):**

**BIO/KUT Supervised research**

1 credit/30 study hours, doctoral research, compulsory, can be taken any number of times



## THE LIST OF COMPLEX EXAMINATION COURSES

Selectable major- and minor-courses:

- Anatomy
- Animal systematics
- Biochemistry
- Bioinformatics
- Cytology
- Ecology
- Ethology
- Evolutionary biology
- Genetics
- Humanbiology
- Hydrobiology
- Immunology
- Microbiology
- Molecular biology
- Neurobiology
- Ontogeny
- Physiology
- Plant anatomy
- Plant physiology
- Plant systematics

Selectable only as minor-courses:

- Behavioural ecology
- Behavioural physiology
- Biogeography
- Biological plant protection
- Biophysics
- Biostatistics
- Cognitive ethology
- Conservation biology
- Evolutionary genetics
- Gene technology
- Human ethology
- Human genetics
- Immune pathology
- Immune regulation

- Immunological methods
- Immunology of infections
- Major transitions in evolution
- Methodology of teaching biology
- Methods of multivariate data processing
- Microbial biotechnology
- Modeling in biology
- Molecular developmental genetics
- Molecular tumor cell biology
- Mycology
- Neurochemistry
- Neuronal cell- and developmental biology
- Paleopathology
- Plant biotechnology
- Plant molecular biology
- Plant stress
- Protein science
- Psychopharmacology
- Psychophysiology
- Virology

## THE ASSESSMENT OF KNOWLEDGE

Fulfillment of requirements of a given course is rated by the lecturer in a five-grade scale system (5- excellent, 4-good, 3-fair, 2-passing, 1-fail). Research activities are evaluated and recorded in the transcript by the supervisor on a three-point scale (excellent – acceptable - failed). Credits are recorded in the Neptun system.