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| **Course title: Aquatic Entomology** | **Code:** | **Credits: 3** |
| Type (lecture/seminar/practice/consultation) and number of contact hours:  |
| Evaluation method (end-term exam mark/ term mark / other):  |
| Suggested semester: 3 |
| Frequency of availability: odd semesters |
| Language: English |
| Prerequisites *(if any)*: - |
| **Description** |
| **Aims:** Arthropods are forming the main and most diverse component of freshwater life. The aims of the course are: (1) to familiarize the students with the groups of aquatic arthropods, their taxonomy, distribution and ecology; (2) to give an overview on the composition of the aquatic fauna of the different realms, habitats and seasons; (3) to develop knowledge on the trophic relations, life cycles and bio indicator values of aquatic arthropods.**Competences to develop:** Completing this course the students will be able to recognize the main groups of aquatic arthropods, understand the mechanisms influencing their distribution and composition of the communities. This knowledge helps to start the study of their taxonomy and ecology, as well applied aspects like biomonitoring and nature protection.**Course content and schedule:** The freshwater as habitat of arthropods: peculiarities in physiology, habitat use and community composition. General life cycles, feeding strategies and distribution types of aquatic arthropods. The main aquatic habitats: characteristics of physics, chemistry and main biological components of the habitats.*Taxonomy and systematics*: Enumeration of the aquatic arthropod taxa, their morphology, general system and basics of their biology. Crustacean groups: Branchiopoda, Ostracoda, Copepoda, Amphipoda, Isopoda, Decapoda. Cheliceratan groups: Acari, Araneae. Hexapodan groups: amphibiotic insects (Ephemeroptera, Odonata, Plecoptera, Trichoptera, Megaloptera), aquatic and semiaquatic groups of other hexapods (Collembola, Orthoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Diptera).*Distribution and zoogeography*: Composition of the fauna of the realms, and the main drivers of the origin of regional patterns. Palaearctis: Europe, Mediterranean, Central Asia, Siberia, Himalayan ranges, East Asia and Pacific coast. Oriental: Indian subcontinent, Indochina, Wallacea. Nearctis: Appalachian, Canadian, Pacific and Southwestern ranges. Neotropics: Central America and Caribbean, Amazonia, Andes, Atlantic forest and Southern South America. Aethiopian: West Africa, East Africa, South Africa. Australasian: New Guinea, Australia, New Zealand.*Habitat and ecology*: Composition of ecosystem in different freshwater habitats, their structure and function. Lotic habitats: crenal, rhitral and potamal. Lentic habitats: lakes, ponds and wetlands. Subterranean and seasonal habitats.**Education management:****Asessment:*** **method of assessment:** Oral presentation of a chosen topic at the end of the course.
* **mid-term requirement: -**
* **oral exam topics (if any): -**
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| **Compulsory reading:** McCafferty, W.P.: Aquatic Entomology: The fishermen’s and ecologists’ illustrated guide to insects and their relatives. Jones and Bartlett Publishers, 1983 or later**Optional reading:** Lancaster, J., Downes, B.J. Aquatic Entomology. Oxford University Press. 2013Banarescu, P.: Zoogeography of Freshwaters. Vol. 1. General distribution and dispersal of freshwater animals. Aula-Verlag. 1990**Supporting (compulsory/optional) digital materials:** |
| **Person in charge of program:** Marianna Marschall PhD (college professor, head of institution) |
| **Person in charge of the course:** Dávid Murányi PhD (associate professor) |
| **Instructor:** Dávid Murányi PhD |
| **Instructor’s office hours:** Monday 12-13 |
| **Preferred contact details:** ***muranyi.david@uni-eszterhazy.hu*** |
| **Online communication method:** e-mail |

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| **Course title: Human and Urban Ecology** | **Code:** | **Credits: 3** |
| Type (lecture/seminar/practice/consultation) and number of contact hours:  |
| Evaluation method (end-term exam mark/ term mark / other):  |
| Suggested semester: 3 |
| Frequency of availability: odd semesters |
| Language: English |
| Prerequisites *(if any)*: - |
| **Description** |
| **Aims:** Introduction to human ecology, general characteristics of ecosystems, associated sciences, history of human ecology, definitions; ecosystems: and biosphere, ecosystem types; ecosystem relationships, ecological division of the earth; ecological catastrophes, ecocrises; dynamics and stability of ecosystems; productivity of ecosystems**Competences to develop:** Completing this course the students will be able to recognize the characteristics of ecosystems, understand the mechanisms influencing ecological division of the Earth, ecological catastrophes. This knowledge helps to start the study of the natural and human environment, and the environmental risks and resources, the global energy balance problems.**Course content and schedule:** Introduction to human ecology, general characteristics of ecosystems, associated sciences, history of human ecology, definitions; ecosystems: and biosphere, ecosystem types; ecosystem relationships, ecological division of the earth; ecological catastrophes, ecocrises; dynamics and stability of ecosystems; productivity of ecosystemsPopulation ecology, dynamics of human populations, characteristics of populations: population density, birth rate, death rate, population structure, sexual rate, life expectancy, spatial structureThe ecological and cultural adaptation, relationships of man and its environment: human adaptation to environment, modelling responses. The effect of Plant blindness and Nature lack in urban areas Biotic factors: interspecies interactions, interspecies interactions; human biorhythm, biological daily rhythm, yearly rhythms; cultural adaptation: evils of civilization, consequences of urbanizationThe natural and urban environment and the environmental risks and resources of them. Abiotic factors: light, temperature, air, water, soil, human adaptability (to artic zones, high altitudes, arid lands, grasslands, humid tropics). Urban areas in the world. Human influence on the biosphere: environmental modification by exploiting the environmental factors, environmental modification by burdening the environment, changes in ecosystems: changes in the microenvironment, in the soil, in the water balance, in the atmosphere Agents of human attendance: pesticides, waste and rubbish, radioactive radiation, magnetic influences, bioindication, environment and conservationConventional ways of food acquisition, human ecological aspects of human nutrition, plant production, animal biological production, new/alternative resources for nutrition, supplementary nutrition, biosynthesisHuman nutrition: energy needs, basal metabolic rate, essential nutrients, prenatal and postnatal development, physical activity, social aspects of nutrition: life style, social factors, diversity in human populations’ dietEcology of disease and illness: the environment and its influences and hazards to health; populational diversity in the infectious and non-infectious diseases’ incidence; biological responses (congenital and acquired) to the infectious and non-infectious diseasesParasitism: epidemiology, infections, invasions, diseases spreaded by parasites, parasites and parasitismPoisoning and human diseases (schistosomiasis, filariasis, malaria, amoebiasis, cholera, diarrhoeal diseases, tuberculosis and leprosy, diphteria, veneral diseases, measles, smallpox, yellow feaver, bronchitis, influenza, industrial lung disease, illness associated with drug abuse, cardiovascular disease, mental disorders, malignant neoplasms, deficiency diseases), preventionThe global energy balance problems: energy and substrate balance of the biosphere, information flow, human energy consumption and alternative resources, advantages and disadvantages of the resources, environmental conservationNew technologies and environment: human ecological aspect of new technologies: risks and possibilities.**Education management:****Asessment:*** **method of assessment:** Oral presentation of a chosen topic at the end of the course.
* **mid-term requirement: -**
* **oral exam topics (if any): -**
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| **Compulsory & optional reading:**Daniel G. Bates, Judith Tucker: Human Ecology: Contemporary Research and Practice, Springer Science & Business Media, 2010, ISBN 9781441957016Endlicher, Wilfried & Langner, Marcel & Hesse, M. & Mieg, H.A. & Kowarik, Ingo & Hostert, Patrick & Kulke, Elmar & Nützmann, G. & Schulz, M. & van der Meer, Elke & Wessolek, Gerd & Wiegand, Claudia. (2007). Urban Ecology - Definitions and Concepts.**Supporting (compulsory/optional) digital materials:**http://habitat3.org/wp-content/uploads/Habitat%20III%20Policy%20Paper%208.pdf |
| **Person in charge of program:** Marianna Marschall PhD (college professor, head of institution) |
| **Person in charge of the course:** Erika Pénzes-Kónya PhD (associate professor) |
| **Instructor:** Erika Pénzes-Kónya PhD |
| **Instructor’s office hours:** Monday 12-13 |
| **Preferred contact details:** ***konya.erika@uni-eszterhazy.hu*** |
| **Online communication method:** e-mail, Neptun |

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| **Course title:****Plant Anatomy (Plant Cytology and Hystology)** | **Code: NBT\_BI188G4** | **Credits: 4** |
| Type (lecture/seminar/**practical**/consultation) and number of contact hours: **45** |
| Evaluation method (end-term exam mark**/** **term mark** / other): **term mark** |
| Suggested semester: **1** |
| Frequency of availability: **odd semesters** |
| Language: **English** |
| Prerequisites *(if any)*: **-** |
| **Description** |
| **Aims:** The aim of the course is to acquire the basic knowledge of botany in practice, to give knowledge of plant morphology, cellular, organ and histological topics, to provide functional knowledge of plant anatomy, to prepare for plant taxonomy, plant physiology, functional plant biology and other botanical subjects.**Competences to develop:** **-**Upon completion of the course, the student will acquire a basic knowledge of botany with regard to plant cytology, organology, histology and morphology. They learn basic botanical preparation techniques. It lays the foundation for the acquisition of plant species knowledge and plant taxonomy. It prepares for plant physiology studies by providing functional plant anatomical knowledge. After completing the subject, the student will have a high level of knowledge and systematize, apply and synthesize the plant organisms as living systems at the ifraindividual and supra-individual levels. With the help of this course as a foundation subject, they will find links between the knowledge acquired in each subject in other subject-based areas of plant biology, and will understand the importance of an interdisciplinary approach. They will be able to improve their knowledge of plant biology and continue their studies at a higher level. They will strive to get to know the relationship between nature and man, the physique and functioning of man and other living organisms, gain new professional knowledge, and be able to actively influence the professional thinking of their environment. They will be able to recognize and integrate the knowledge and knowledge of the various scientific disciplines.- High school biology studies are sufficient to enroll the course.**Course content and schedule:****Plant Cytology and histology**1. Introduction to light microscopy.The structure and the operation of the light microscope. The parts of the light microscope: optical and mechanical parts. The magnification of the light miscroscope.
2. Basic plant biological preparation techniques.
3. The parts of the plant cell.
4. The types of the plant tissues.
5. Meristems. The phases of mitosis.
6. The epidermis and its appendices.
7. Secondary and tertiary dermal skin of the plants.
8. The vascular tissue and its parts.
9. Ontogeny of the monocots and the dicots
10. The organ and the histological structure of the root, stem and the leaf. Comparison of the organ and the histological structure of the dicots and the monocots.
11. Secondary growth of the stem. The structure of the year rings. The meaning of the homoxylous and the heteroxylous xylem.
12. The detailed structure of the leaf. Dorsiventral, isolateral leaves. The pine leaf.

**Education management:****Venue and date:** EKU, Almagyar campus, Eger, Building D, D-409 laboratoryon Tuesdays: 8.00-10.45**Also available online if needed****Asessment::*** **method of assessment:** test questions in writing
* **mid-term requirement: -**
* **oral exam topics (if any): -**

**Questions:**1. List the parts of the light microscope.
2. How do we determine the magnification of the light microscope?
3. List the parts of the plant cell, and also draw it.
4. What are the types of the plant tissues?
5. List the phases of mitosis.
6. Give description of the epidermis.
7. Describe the structure of the periderm.
8. Specify the parts of the vascular tissue.
9. Describe the phases from plant embrio to mature plant, and also characterize the ontogeny of the dicots and the monocots.
10. Describe the organ and the histological structure of the root, stem and the leaf. Compare the organ and the histological structure of the dicots and the monocots.
11. Secondary growth of the stem. The structure of the year rings. The meaning of the homoxylous and the heteroxylous xylem.
12. The detailed structure of the leaf. Dorsiventral, isolateral leaves. The pine leaf.
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| **Compulsory reading:**Raven P, Evert R, Eichorn S: Biology of Plants. WH. Freeman and Company / Worth Publishers 1999 **Optional reading: -****Supporting (compulsory/optional) digital materials:** https://drive.google.com/drive/folders/0B1gLzWoJ8ltxOXlEVFZHa2llQVk |
| **Person in charge of program:** Marianna Marschall PhD (college professor) |
| **Person in charge of the course:** Marianna Marschall PhD (college professor) |
| **Instructor:** Marianna Marschall PhD (college professor) |
| **Instructor’s office hours:** Wednesdays, 13.00-14.00 |
| **Preferred contact details:** marschall.mariann@uni-eszterhazy.hu |
| **Online communication method: e-mail,** Neptun network |

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| **Course title: Biogeography** | **Code:** **NBT\_BI184K3** | **Credits: 3** |
| Type (lecture/seminar/practice/consultation) and number of contact hours:  |
| Evaluation method (end-term exam mark/ term mark / other):  |
| Suggested semester: Autumn |
| Frequency of availability: odd semesters |
| Language: English |
| Prerequisites *(if any)*: - |
| **Description** |
| **Aims:** Distribution of the life on Earth is not random but follows several consistent patterns. The aims of the course are first, to familiarize the students with the most common distribution patterns and second, to interpret the underlying factors resulting in global distribution systems.**Competences to develop:** Completing this course the students will be able to understand the mechanisms how a particular distribution pattern is formed. This knowledge helps to understand and interpret the most recent global problems in environmental biology like the troubles with the invasive species or biodiversity loss.**Course content and schedule:** The area and its dynamism: definition of the area, main types and groupings (quantitative and qualitative), area regressions and expansions. How to map an organism’s area. Chorology (species characterized by geographical distributions); the main global chorotypes. Area disjunctions and the underlying causes, time and space scale correlation in area disjunctions. *Secular scale* (ecological biogeography): Ecological factors affecting distributions; extrinsic (environmental and biotic interactions) and intrinsic factors (dispersion; dynamisms and dispersion methods). Introduced species and their interactions with the local flora/fauna. *Millennial scale* (post-Pleistocene biogeography): Ice ages and its consequences. Quaternary area fluctuations, area-analytical methods for recognizing Pleistocene refugia in Eurasia and South America. Phylogeography as a tool in reconstruction post Pleistocene area expansions. The origin of North-South and East-West area disjunction in Eurasia.*Phylogenetic scale* (paleobiogeography): Plate tectonics and biogeography (origin of transatlantic transpacific disjunction, moving species vs. moving continents). Main analytical methods in paleobiogeography (area-cladograms, reduced area-cladograms, component analysis, brooks parsimony analysis).Global biogeographical systems: flora/fauna versus vegetation/faunation. Zoogeographical and Phytogeographical regions (geographical regions characterized by their species composition). Climatic zones and Biomes.**Education management:****Asessment:*** **method of assessment:** Oral presentation of a chosen topic at the end of the course.
* **mid-term requirement: -**
* **oral exam topics (if any):**
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| **Compulsory reading:** Lomolino, M., Riddle, B., Brown J. Biogeography. Sinauer Assoc. Press. 1998 or later.**Optional reading: Cox, B.C. & Moore, P.D.** Biogeography: An Ecological and Evolutionary Approach. Wiley-Blackwell, 1993 or later**Supporting (compulsory/optional) digital materials:** |
| **Person in charge of program:** Marianna Marschall PhD (college professor) |
| **Person in charge of the course:** Csaba Csuzdi |
| **Instructor:** Csaba Csuzdi |
| **Instructor’s office hours:** Wednesday 9-10 |
| **Preferred contact details: *csuzdi.csaba@uni-eszterhazy.hu*** |
| **Online communication method:** e-mail |

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| **Course title: Soil Science** | **Code: NMT\_GG201G2** | **Credits: 2** |
| Type (lecture/seminar/**practice**/consultation) and number of contact hours: 2 hours/week |
| Evaluation method (end-term exam mark**/** **term mark** / other)  |
| Suggested semester: Autumn |
| Frequency of availability: **odd semesters** |
| Language: **English** |
| Prerequisites *(if any)*: **-** |
| **Description** |
| **Aims:** The aim of the Soils course is to give the student the basic knowledge and skills needed to complete the course and program requirements successfully. The student will gain knowledge in the various areas of soil science and develop analytical skills in evaluating soils and soil conditions, and prescribing remedies.**Competences to develop:** Develop a working knowledge of soils for preparation as a landscape professional. Identify the properties and factors of soils. Analyze soil properties, structures and textures. Apply knowledge of soils to practical use through lab practice and research. Analyze experimental data using lab results. Apply soil management solutions to workplace problems. **Course content and schedule:**1. Week: Desciption of course requirements2. Week: Soil site description, Soil profiles and horizons, Color and structure, Soil horizon nomenclature Soil forming factors: Pedon and soil forming processes, Climate and biotic factors, Topography and anthropogenic factors, Parent materials (in case urban soil)3. Week: Soil texture and mechanical analysis I. 4. Week: Soil texture and mechanical analysis II.5. Week: Carbonate content and pH-analysis I.6. Week Carbonate content and pH-analysis II.7. Week: Earthworm count measurement in Almagyar-hills, biomass analysis8. Week: (Autumn holiday)9. Week: Soil site description, Soil profiles and horizons, Color and structure, Soil horizon nomenclature Soil forming factors: Pedon and soil forming processes, Climate and biotic factors, Topography factors, Parent materials (in case forest soil)10. Week: Soil texture and mechanical analysis I. 11. Week: Soil texture and mechanical analysis II.12. Week: Carbonate content and pH-analysis I.13. Week Carbonate content and pH-analysis II.14. Week: replacement of lab measurements. Evauation of term marks**Education management:** laboratory analysis(D. 409. room) and field trips (Eger, Almagyar-domb, Felsőtárkány).**Asessment:*** **method of assessment:** reports marks
* **mid-term requirement:** reports
* **oral exam topics (if any): -**
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| **Compulsory reading:**Henry D. Foth (1990): Fundamentals of Soil Science. John Wiley & Sons, New York, 360 p.**Optional reading:**M Pansu & J. Gautheyrou (2006): Handbook of Soil Analysis (Mineralogical, Organic and Inorganic Methods). Springer, Berlin, 991 p.**Supporting (compulsory/optional) digital materials:**biology.krc.karelia.ru:8080/biology/.../Fundamentals%20of%20Soil%20Science%20www.niordc.ir/uploads%5C86\_106\_Binder1.pdf |
| **Person in charge of program:** Marianna Marschall PhD (college professor) |
| **Person in charge of the course:** Peter Szűcs PhD (associate professor) |
| **Instructor:** Peter Szűcs PhD. (associate professor) |
| **Instructor’s office hours:** Thursdays, 10.00-11.30 |
| **Preferred contact details:** szucs.peter@uni-eszterhazy.hu |
| **Online communication method: e-mail,** Neptun network |

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| **Course title: Environmental Technology** | **Code: NBT\_KR804K2** | **Credits: 2** |
| Type (**lecture**/seminar/practice/consultation) and number of contact hours:  |
| Evaluation method (**end-term exam mark/** term mark / other):  |
| Suggested semester: Spring |
| Frequency of availability: **even semesters** |
| Language: **English** |
| Prerequisites *(if any)*: **-** |
| **Description** |
| **Aims:** The main aims of the course are to describe for students with the most frequent and modern environmental technologies and to show the Hungarian peculiarities.**Competences to develop:** Terminating this course the students will be able to understand the important technologies and methods of environmental technologies. The knowledge helps to understand and interpret the most recent environmental problems and the possible environmental technology solutions.**Course content and schedule:**1. Week: Desciption of course requirements2. Week: Definition of environmental technology, further basic concepts.Grouping polluting streams, The main groups of environmental problems, Technological flow charts3. Week: Basic concepts related to wastewater treatment (KOI, BOI, BOI5, TOC, LE, stb.) Grouping of sewage; based on origin. Process of activated sludge wastewater treatment 4. Week: Devices and treatment of sewage sludge5. Week: Devices and process of biogas production6. Week: Process of composting, main stages and types7. Week: Autumn holiday8. Week: The main details of new hungarian waste management statuateClean technologies9. Week: Energy production and consumption, national situations10. Week: Flue gas desulphurization technology of coal-fired power plant in Mátra Erőmű Zrt. (Visonta)11. Week: Environmental review of the railway track between Csorna and Győr town (a cause study)12. Week: Pollutants of transport, environmental technology solutions I.– Road traffic13: Week. Pollutants of transport, environmental technology solutions II.– railway, air and water transports14. Week: Oral presentation of a chosen topic at the end of the course.**Education management:****Asessment::*** **method of assessment:** Oral presentation of a chosen topic at the end of the course.
* **mid-term requirement: -**
* **oral exam topics (if any): -**
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| **Compulsory reading:**Boyce, A. (1996): Introduction to Environmental Technology. John Wiley & Sons, Inc.**Optional reading:**Christensen T H, Kjeldsen P (1989): Technology and Environmental impact. Academic Press, London.**Supporting (compulsory/optional) digital materials:** |
| **Person in charge of program:** Marianna Marschall PhD (college professor) |
| **Person in charge of the course:** Peter Szűcs PhD (associate professor) |
| **Instructor:** Peter Szűcs PhD (associate professor) |
| **Instructor’s office hours:** Thursdays, 10.00-11.30 |
| **Preferred contact details:** szucs.peter@uni-eszterhazy.hu |
| **Online communication method: e-mail,** Neptun network |

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| **Course title: Functional Biochemistry** | **Code: NBT\_BI187K4** | **Credits: 4** |
| Type (lecture/seminar/**practice**/consultation) and number of contact hours: 2 hours/week |
| Evaluation method (end-term exam mark**/** **term mark** / other)  |
| Suggested semester: Spring |
| Frequency of availability: **even semesters** |
| Language: **English** |
| Prerequisites *(if any)*: **-** |
| **Description** |
| **Aims:** The aim of the functional biochemistry course is to give the student a detailed insight into different biochemical processes and bioactive molecular families. An advanced knowledge will be gained of the mechanisms of biochemical reactions and the relationships will be explained to physiological processes.**Competences to develop:** Develop a deep knowledge of advanced biochemical processes using detailed mechanistic background: energy consumption and production, energy storage, detailed analysis and description of different functional biochemical molecules and metabolic processes. Biochemical background of health and different diseases.**Course content and schedule:**1. Week: Description of course requirements2. Week: The structural and biochemical hierarchy of the human cell. Energy: energy requirements of the body, tissues and biochemical processes.3. Week: Enzymes, activities, properties, regulation and physiology.4. Week: Transport processes, digestive system, digestion and absorption. Transport processes in the cells, molecules and ions.5. Week: Essential metabolism processes, carbohydrates, fats, proteins and amino acids.6. Week Nutritional oxidation, formation of ATP, the physiological significance.7. Week: The nucleic acid and ammonia metabolism. Fatty acid synthesis, triglycerides, phospholipids, fatty acids, polyunsaturated fatty acids.8. Week: Hormones and their role in the cell and the human system. Biochemistry of life processes, physical activity, athletes, healthy and sick individuals.9. Week: Biochemistry of mental health and mental problems. The nutritional biochemistry, physiology and pathology.10. Week: Biochemistry of starvation, changes in the metabolic processes, survival and death. Defense against pathogens, the immune system.11. Week: Avoiding trauma, changes in metabolism, immune response.12. Week: Biochemistry of reproduction.13. Week Biochemistry of cell growth and cell death.14. Week: Biochemistry of diseases, cancer, atherosclerosis, hypertension, heart attack.**Education management:** **Asessment::*** **method of assessment:** final exam
* **mid-term requirement:** -
* **oral exam topics (if any): -**
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| **Compulsory reading:**Jeremy M. Berg and John L. Tymoczko, Biochemistry, 8th Edition, ISBN-13: 9781464126109, ISBN-10: 1464126100**Optional reading:**David L. Nelson and Michael M. Cox, Lehninger Principles of Biochemistry 6th Edition, ISBN-13: 978-1429234146, ISBN-10: 1429234148**Supporting (compulsory/optional) digital materials:**- |
| **Person in charge of program:** Marianna Marschall PhD (college professor) |
| **Person in charge of the course:** Beáta Bóka PhD |
| **Instructor:** Beáta Bóka PhD |
| **Instructor’s office hours:** by appointment |
| **Preferred contact details:** boka.beata@uni-eszterhazy.hu |
| **Online communication method: e-mail,** Neptun network |