

BIOPSYCHOLOGY, UNDERGRADUATE STUDY PROGRAMME, FIRST BOLOGNA CYCLE

COURSE DESCRIPTIONS

COMPULSORY COURSES

Course name: **BIOCHEMISTRY**

Number of ECTS credits: **6**

Content:

Students in the course acquainted with the basics of organic chemistry. They gain knowledge of the structure, property and the role of specific organic compounds and their reactivity. Students deepen their knowledge of various types of organic compounds, their structure, reactivity and the possibility of transformation of one organic compounds in the other with focusing on the functionalization of organic compounds. Gain a basic knowledge in the field of organic chemistry, which will serve as the basis for the acquisition of new science knowledge especially in biochemistry. Students learn about the structure, function, biosynthesis and degradation of the major life biomolecules, especially proteins and enzymes. Are able to identify, isolate and quantified biomolecules. Proficient in many techniques, methods and apparatus which are necessary for this. At the same time get insight into the dynamic process of metabolism, the key metabolites in individual metabolic cycles and their interconnection in regulatory mechanisms that maintain cells in a steady state. If the balance in the cell breaks down for various reasons, it may be a variety of metabolic diseases.

Course name: **EVOLUTIONARY BIOLOGY**

Number of ECTS credits: **6**

Content:

Students will be acquainted with the fundamentals of evolutionary biology as a universal concept on which is based the biological science. Throughout the history of the development of evolutionary thought come to the Darwinian evolution, which was later accompanied by the development of modern neo - Darwinists. During the tense confrontations between evolutionism - creationism students can understand the importance of evolution for the modern biology, due to the role it plays in the formulation of hypotheses and their testing. The course is aimed at understanding the foundations of Darwinian evolution (spontaneous variation - selection), participants are introduced to the basic hypothesis of the creation of life. The course introduces the basic concept of connectivity of modern biology, in the light of evolutionary biology. This course will allow the students the understanding of fundamental mechanisms of change and adaptation of the living world. The relatively high proportion of independent work is aimed at promoting and developing critical diverse biological interpretations of the facts in the light of evolution biology, which can be achieved by self-studying and presenting and defending the conclusions in the form of seminars.

Course name: **EVOLUTIONARY PSYCHOLOGY**

Number of ECTS credits: **6**

Content:

- The concept of evolutionary psychology.
- The evolution of development thinking apparatus - cortex
- Evolution and adaptation to environmental change
- Development of motivation

- Evolutionary importance of behavior and structure of integrated behavior
- Genetic innate need
- Choice of conduct
- Power and powerlessness
- Evolutionary psychology and ecology
- Evolutionary psychology and understanding of the importance of establishing quality relationships
- Development and change - managing the future
- The importance of the unconscious in evolutionary psychology
- The importance of the collective unconscious in evolutionary psychology
- Evolutionary psychology and gender differences
- Evolutionary psychology and natural selection
- Values and ethics from the perspective of evolutionary psychology
- Morality and evolutionary psychology
- Sense and nonsense from the perspective of evolutionary psychology

Course name: **NEUROLOGICAL BASES OF HIGHER NERVOUS FUNCTIONS I**

Number of ECTS credits: **6**

Content:

- Neuron and glia
- Action potential of a neuron
- Neurotransmitter systems
- Evolution of the nervous system
- Overview of the nervous system
- Motor system
- Somatosensory system
- Special sensory organs
- Motivation
- Attention
- Emotions
- Language and speech
- Memory

Basic neuron communication

- Neural transmission
- Synaptic structure and function
- Neurotransmission and neurotransmitters
- Neuronal nets

Structure of neural impulses

- Information
- Electrical nature of impulses
- Resting potential
- Action potential

Synapsis

- Structure
- Function
- Types of synapsis

Neurotransmitters

- In general
- Specific: Ach, GABA, Ser, NA etc

Computer simulation of neural nets and its learning

Course name: **FOUNDATIONS OF NATURAL SCIENCES**

Number of ECTS credits: **6**

Content:

- Foundation and authority of science: the relation between science and actuality (is the book of nature written in mathematical language?); logic and methodology of natural sciences; experiment and interpretation; what has been “scientifically proven”?
- Historical overview of mathematics as the basis of natural science.
- Formal systems: axioms, rules of inference, theorem, proof, undecidability.
- Limitations of formal systems, contradictions, fullness, Gödel.
- History and analysis of key scientific paradigms: Aristotelian science, Ptolemy, physics and metaphysics (theory of relativity and quantum mechanics); modern science (Copernicus, Galileo, Newton, Leibniz and Darwin); mechanicism; 20th century (relativity, quantum theory, cosmology and chaos theory). Structure of the micro-world: from atoms to quarks and leptons; LHC. Structure of the macro-world: cosmology; standard model; complex systems: chaos theory, determinism.
- Relation between natural and social sciences: hierarchy in science (hard and soft sciences); arrogance and mutual critique (Sokal hoax); the role of philosophy of science. Common traits in natural and social sciences: information theory, cybernetics, system theory, theory of complexity; the role of ethics in relation between social and natural sciences.
- The positioning of mathematics in society; mathematics in social sciences, economy, art and everyday life.
- The role of science in society, culture and art: social role of science and the position of science in society and culture in 21st century.

Course name: **FOUNDATIONS OF PSYCHOLOGY**

Number of ECTS credits: **6**

Content:

- Course offers an introduction to important achievements in the history of psychology from the onset of thinking about human psyche until now.
- Course emphasize the “tradition of empiricism”, which opened the door for the new scientific discipline: from structuralism to functionalism, from gestalt psychology to behaviorism, from psychoanalysis to cognitivism, etc.
- Course emphasize themes connected with functionalism and behavioral sciences, especially with analysis of tests which represent an important face of these branches of psychology.

Course name: **PSYCHOLOGY OF HUMAN DEVELOPMENT**

Number of ECTS credits: **6**

Content:

Study provides an overview of the basic issues of developmental psychology, research methods in the study of development, perceptual and motor development, cognitive development, speech development and communication, development of emotions and affections, and moral and social development.

Course name: **PERSONALITY PSYCHOLOGY**

Number of ECTS credits: **6**

Content:

Course offers an insight into different areas of temperament and personality, theories of personality: dimensions as extroversion (E), neuroticism (N), psychoticism (P) by H.J. Eysenck, J. Gray's model, J. Strelau's model; Costa and McRae's big-five model; sensation seeking and five alternative factors by Zuckerman and colleaguse, psychobiological and psychophysiological studies of temperament and personality, neuropsychology and psychopharmacy; trino brains by MacLean, monoamnioenergetic

systems, stress and behavior, personality and health, psychophysiology of emotion, anxiousness, schizophrenia and depression, use of concepts about temperament.

Course name: PSYCHOLOGICAL PRACTICE

Number of ECTS credits: 6

Content:

- Biological background of the human mind
- Fundamentals of Neurology
- Personality
- Motivation
- Stimuli and perception
- Thinking
- Attention
- Memory
- Behavior
- Cognitive impairment
- Emotion
- Mental disorders between individuals and society
- Psychology of specific population groups
- Animal Psychology
- Research methods in psychology
- Psychology in everyday life
- Human behavior in crisis situations
- Psychological reports: How do you write and how not to write
- Presentation of scientific research results.

Course name: STATISTICS

Number of ECTS credits: 6

Content:

- Graphical methods (empirical distribution function, basics of probability, charts)
- Models for categorical data (contingency table, chi-square test, logit and probit models)
- Time series analysis (time series, stationarity, ARIMA models, estimation of parameters, testing the suitability of a model and time series forecasting).

Course name: MENTAL HEALTH, MENTAL DISORDERS

Number of ECTS credits: 6

Content:

- The concept of »one and only health« (WHO) as an interlace between physical and mental functioning,
- The definition of mental health in the human treatment as a bio-psycho-sociological being,
- The definition and classification of mental disorders.
- The history of mental disorders across time and space
- The review of individual mental health.
- From recognition to the treatment of mental disorder
- The accurate recognition of most frequent mental disorders.
- Depression and other mood disorders.
- Anxiety and panic disorder.
- Eating disorders.
- Obsessive compulsive disorder
- Substance related disorders.

- Specific phobias.
- Posttraumatic stress disorder.
- Dementia and other disorders due to a general medical condition.
- Child psychiatry.
- Self destructive behaviour and suicide.
- The basics of mental disorders therapies.
- The actual social situation regarding mental health.
- (one and only) care for (one and only) health.

Course name: **GENETICS**

Number of ECTS credits: **6**

Content:

- Fundamentals of transmission genetics: laws of inheritance, pedigree analysis of inheritance of dominant and recessive genes, molecular basics of dominant and recessive mutations.
- Autosomal and sex linked inheritance.
- Cytoplasmic inheritance.
- Human genome organization.
- Genome mapping, techniques of mapping, genetic and physical approaches, PCR technique, Southern, Northern detection, DNA markers (RFLP, VNTR, SSR, SNP, EST, AFLP...), fluorescent in situ hybridization (FISH), mapping STS,
- Restriction enzymes, separation of DNA fragments, cloning DNA vectors
- DNA recombinant techniques
- methods for sequencing DNA, understanding and importance of genomic projects
- analysis of genes, reverse genetics, methods for analysis of expressed sequences
- morphology and structure elements of Eukaryote chromosome: telomere, centromere, role, replication model of telomere, organization of DNA on the chromosome, construction of chromatin, heterochromatin
- organization of Eukaryote genome
- genes and organization of genes
- Organel genomes, evolution and properties
- The path from DNA to protein
- Expression of genes: initiation of transcription, the role of chromatin, the role of RNA polymerases, regulation of transcription in prokaryotes and eukaryotes, positive and negative regulation of expression of genes.
- Synthesis and processing of different RNA molecules
- Modification of genetic material, mutations on the chromosome, gene, genome. The causes of mutations, the impact on the organism and the importance in the evolution
- repair mechanisms
- recombinations
- mobile genetic elements and their role
- evolution of genomes
- population genetics: genetic variability and changes in populations, genetic distances, methods for estimation of genetic variability and distances, molecular markers for population genetic studies
- application of genomics in forensic studies

Course name: **COGNITIVE PSYCHOLOGY**

Number of ECTS credits: **6**

Content:

In cognitive psychology research has been expanding especially in the areas of language, information transfer, exploring brain functioning, physiological theories, philosophical studies.

Cognitive psychology methods:

- Experiment
- Biophysiological methods
- Self-reporting
- Case studies
- Natural observation
- Computer simulation and artificial intelligence

Course name: **NEUROLOGICAL BASES OF HIGHER NERVOUS FUNCTIONS II**

Number of ECTS credits: **6**

Content:

Description of the content: study offers an overview of the methodological aspects of development and aging of the central nervous system as the basis for disorders of higher nervous activity. Along with a basic knowledge of psychopharmacology offers the possibility of composition models of the nervous system.

- Neurotransmitters and the basics of psychopharmacology
- Possible flow information: synaptic circuits
- Neural Networks
- Psychopathology, mental illness

Course name: **NETWORKS, LOGIC AND RATIONAL THINKING**

Number of ECTS credits: **6**

Content:

- Numbering Systems.
- Sequences. Limits and accumulation points.
- Series and convergence criteria.
- Fundamentals of mathematical logic, logical system, truth tables.
- Sets, relations, mappings.
- Graphs, networks, social networks.
- Mathematical logic and modeling of cognitive processes.

Course name: **DATA MINING**

Number of ECTS credits: **6**

Content:

- Introduction:

Data mining through history, sub-areas of data mining, data mining as a process.

- Data mining – the CRISP methodology:

Data mining as a cyclical process consisting of phases: problem understanding, data understanding, data preprocessing, modeling, evaluation and deployment

- Problem understanding:

Types of problems suitable to use data mining on. Problem transformation – making the problem suitable to be solved with adequate machine learning algorithms.

- Data understanding:

Getting to know the terminology: attribute, instance, class, categorical, ordered, continuous. Getting to know the data. Using visualization techniques to gather insights into the data (histograms, 2D, 3D and diagrams in higher dimensions ...)

- Data preprocessing:

Transforming the data in a form suitable for certain programs. Discretizations, transformations, combinations, eliminations, sampling.

- Modeling:

The use of different machine learning algorithms: Naive Bayes, regression, support vector machines, neural nets, decision trees and rules, association rules, clustering ... Knowing the difference between classification and regression.

- Evaluation:

Assessing the quality of built models. Statistical significance testing, t-test, learning/testing sets, leave-one-out, cross validation.

Course name: **SOCIAL PSYCHOLOGY**

Number of ECTS credits: **6**

Content:

Students learn the development of social-psychological theories and the specificities of work and research in social psychology. Themes that are particularly exposed within the course: social interaction, attribution and perception, social influence, social representations, positions and prejudices etc. Through examples from social workings students get an insight into referential theories and authors, who analyze psychology of masses and its influence on human behavior. Students will take part in social-psychological experiments, and use their own project work to apply acquired knowledge.

Course name: **PSYCHOLOGICAL DIAGNOSTICS**

Number of ECTS credits: **6**

Content:

- This course provides an overview of the concept of measurement in psychology,
- Methodology overview for test evaluation and use
- Phases of test development and use
- Importance of measurement properties of tests
- Score interpretation
- How to evaluate and choose a test
- Presentation and application of different types of tests.

Course name: **RESEARCH METHODOLOGY**

Number of ECTS credits: **6**

Content:

- Philosophy, theory, measurement in research
- Insight, discovery and proof in science (philosophy and structure of research, induction, deduction)
- The logic of research design and statistical models
- Formulating hypothesis
- Measurement theory – quantitative methods in psychology
- Methods of quantitative research
- Methods of qualitative research
- Observation, interview, structured questionnaires
- Constructing questionnaires
- Research ethics
- Preparing a research report
- Presenting results of psychological research
- Software tools in psychological research (statistical software packages, Pajek etc.)
- The concept of statistical significance
- Overview of statistical models and tests

Course name: BIOINFORMATICS PRACTICE

Number of ECTS credits: 6

Content:

In introduction, molecular evolution of certain human genes will be presented. Molecular evolution will focus on the importance of polymorphism at the molecular level, the neutral theory and the theory of coalescence. The course will be based on the acquisition of fundamental knowledge in the field of evolutionary genetics that are needed to understand IT tools in biological science and in the evolution of genes responsible for a particular psychological behavior.

Main topics:

- The concept of molecular evolution
- DNA polymorphism
- Neutral theory
- Coalescence theory, orthology and paralogy
- Molecular markers (EST, SNP, SSR, AFLP, RAPD, mtDNA markers)
- Evolutionary changes in nucleotide sequences (models, genetic distances)
- The rate of nucleotide exchange
- Molecular clock
- Molecular phylogenetics of genes responsible for the psychological behavior
- Phylogenetic trees
- Homoplasy, apomorphy, plesiomorphy, homology
- The use of mtDNA and nuclear markers for constructing trees
- Aligning sequences
- Methods for construction of phylogenetic trees
- Algorithms for finding optimum trees
- Databases for nucleic and protein sequences
- Introduction to computer tools for sequences analysis of genes responsible for the psychological behavior.

Course name: ETHICS AND HUMANITY

Number of ECTS credits: 6

Content:

- The notion of ethics and its concepts.
- Analysis of the relationships between ethics and moral philosophy.
- Fundamental bioethical issues (abortion, euthanasia, genetic engineering, etc..).
- Understand the concepts of life, liberty, dignity and integrity of the individual (with an emphasis on mental integrity), sociality, social responsibility, human rights and freedoms.
- Understanding of humanity as ethical self-understanding of society and the individual, as well as a moral quality of life.
- Ethics and humanity in harmony with the psychology of an individual and society.
- The practical value and applicability of knowledge about ethics and humanity.

Course name: SELECTED BIOPSYCHOLOGICAL TOPICS IN THE ENGLISH LANGUAGE

Number of ECTS credits: 6

Content:

- Social cognition
- Social attribution
- Social identity
- Self-categorization
- Social Scheme

- Social Scripts
- Biology of human Behavior
- Brain anatomy
- Neurons and Neurotransmitters
- Action potential and postsynaptic potentials
- Perception
- Emotions
- Behavior
- Cognition and cognitive disorders
- Plasticity of the Brain
- Neurological developmental Disorders
- Learning and Memory
- Lateralization of the Brain
- Language and Speech
- Actions of Psychoactive Drugs
- Topics by students choice

Course name: **PUBLIC MENTAL HEALTH**

Number of ECTS credits: **6**

Content:

- Definition of public health and public mental health
- Introduction to to indicators, determinants and threats to public mental health
- prevention of negative mental health (different stages of prevention) and promotion of positive mental health; most prevailing mental disorders (depression, suicidality etc.); the role of positive mental health, strategies for prevention, etc.
- Education and raising awareness in the field of public mental health; the meaning of stigma reduction
- Law and policy in the field of public health and public mental health
- Critical evaluation of law and policy in the field of public health and public mental health

Course name: **ADVANCED BIOPSYCHOLOGICAL DIAGNOSTICS**

Number of ECTS credits: **6**

Content:

Theoretical basis of methods used in the neuroscience:

- Computer axial tomography (CAT)
- Positron emission tomography (PET)
- Magnetic resonance imaging (MRI)
- Functional magnetic resonance imaging (fMRI)
- Neuromagnetography and magnetoencephalography (MEG)
- electrophysiologic and related methods (EEG, EMG, EP, P300, DBS, TCMS),
- electroencephalography : alfa, beta, theta, delta waves, waves and spikes etc

Course name: **PSYCHOPHARMACOLOGY**

Number of ECTS credits: **6**

Content:

- Content of study offers systematic approach to initial chapters of pharmacology, which are needed for independent and critical insight into discussed topic.
- Through overview of historical important natural psychoactive substances (caffeine, alcohol, nicotine, cocaine, reserpine, mescaline,...) student recognize fundamental concepts and effects,

which contributed to development of psychopharmacology as one of basic keystone of current pharmacology.

- Based on mentioned examples follow cognition of theoretical basis and contemporary insights as well as mechanisms, which are involved and are responsible for therapeutic effects; cognition of pharmacokinetics and pharmacodynamics as well as metabolism of active substances.
- Cognition of basic outlines of pathophysiology of psychiatric and neurological disorders represents theoretical basis for projection of basic principles of pharmacological treatment and contemporary categorization of pharmacotherapy.

Course name: GAME THEORY

Number of ECTS credits: 6

Content:

- Decision making in strategic situations.
- Basic concepts of game theory.
- Normal form games with key examples
- Stochastic decision making
- Dynamic games in extended form and repeated games, with key examples
- Experimental and behavioral game theory

ELECTIVE COURSES

Course name: ePSYCHOLOGY

Number of ECTS credits: 6

Content:

The course addresses contents and develops knowledge in the field of the utilisation and development of the key tools for electronic work of psychologists in the research and clinical settings. For psychology in the 21st century, the knowledge of these tools (for finding information on the web, for project work, develop a simple web-based solutions, such as web portals, questionnaires, for the efficient organization of work in the clinic, etc.) is a key for a successful career.

The course covers two areas: Web and other electronic tools for clinical and research work in psychology and tools for project management. These two areas are connected within the final product - the project work.

Course name: EVOLUTIONARY GENETICS

Number of ECTS credits: 6

Content:

In the introduction molecular evolution will be described. Emphasis will be placed on the importance of polymorphism at the molecular level, the neutral theory and coalescent theory. The goal is the acquisition of fundamental knowledge in the field of evolutionary genetics necessary for understanding the use of IT tools in the biological sciences.

Major topics:

- The concept of molecular evolution
- Polymorphism of DNA molecules
- Neutral theory
- Coalescent theory
- Molecular markers (mtDNA)

- Evolutionary changes in nucleotide sequences (models, genetic distance)
- Speed of nucleotide substitutions
- Molecular clock
- Molecular phylogenetics
- Phylogenetic trees
- Homoplasy, homology, apomorphic and plesiomorphic traits
- The use of mtDNA and nuclear markers for the construction of trees
- Aligning the nucleotide sequences
- Methods for determining phylogeographic trees
- Algorithms for finding optimum trees
- Databases of nucleic and protein sequences
- Introduction to computational tools for working with nucleotide sequences

Course name: **MATHEMATICS: METHOD AND ART**

Number of ECTS credits: **6**

Content:

- Generating mathematical truths. Mathematics: A method and art. The numbers 1, 2, 3, 5, 7 and basic principles of thinking. Real and virtual. Restriction, extensions, symmetry. Mathematization of science.
- Mathematics in science, social sciences, arts, politics. Concrete examples: Parliamentary elections and geometric configurations; Genome, Chinese I-Ching and hypercube; Symmetries of molecular graphs and fullerenes; Sports tournaments and graph matchings; Albrecht Durer - Melancholy, truncated cube and Pappus configuration; Durer and magic squares. Primes, factorization and secret codes.

Course name: **MODELLING OF COGNITIVE PROCESSES**

Number of ECTS credits: **6**

Content:

- The importance of models in cognitive psychology,
- The main theoretical principles of mathematical graph theory, neural networks and algorithms underpinning the modeling of cognitive processes
- Utilisation of models and practical aspects of specific cognitive processes
- Critical evaluation of modeling in biopsychology,
- Critical evaluation of selected scientific paper on the modeling of cognitive processes,
- Two-way flow of ideas between modeling and experimental research,
- Examples of modeling in the following cognitive processes: Memory, Reading and dyslexia, Face Recognition

Course name: **POPULATION GENETICS**

Number of ECTS credits: **6**

Content:

- Introduction to population genetics
- Genetic and phenotypic diversity (distribution, mean, variance, maintenance of genetic diversity, allele frequencies, genotype frequencies, heterozygosity)
- Molecular methods and sampling in population genetics: genome types (nuclear, chloroplast, mitochondrial), RFLP markers, SNP, AFLP, RAPD, SSR; random sampling, random sampling in layers, systematic sampling.
- Evolutionary factors and their effects on genetic structure of populations: natural selection, mating, fragmentation of populations, migration (random mating, inbreeding, inbreeding

depression, inbreeding coefficient, heterozygosity within populations, Wright's F statistic, models of migration)

- Parameters of genetic diversity
- Hardy-Weinberg equilibrium
- Linkage Disequilibrium analysis, causes of disequilibrium
- Random gene flow (genetic drift), Wright-Fisher model, inbreeding
- Irreversible and reversible mutation, influences on random gene flow, probability of fixation of new neutral mutations
- Genetic structure of populations (diversity, distribution of diversity between populations, genetic distances), population size, gene flow, reproduction, natural selection
- Molecular population genetics (sequence divergence, amino acid substitutions, nucleotide substitutions and their models, molecular clock), intraspecific polymorphism, polymorphism and divergence of non-coding regions, local recombination rates
- Use of population genetics in species conservation
- Use of statistical methods in population genetics

Course name: RULE OF LAW AND WELFARE STATE

Number of ECTS credits: 6

Content:

- Starting points and foundations of law: the philosophical origin, fundamental constitutional principles, human rights and freedoms.
- The theory of democracy.
- Constitutional democracy and the rule of law as the content and quality of the social system.
- Selected legal aspects of the economy.
- Economic analysis of law and democracy.
- Welfare State: selected issues and critical analysis of social practice.

Course name: PSYCHOPHARMACOTHERAPY

Number of ECTS credits: 6

Content:

Study content offers systematic upgrade of basic pharmacology, that is tying up structure of molecule and its pharmacological effects. Based on this, student realises targets of active ingredients that are achieving their effects in a body and possibility of mutual activity of medicines and possibility of interactions with commonly used medicines or some frequent pathophysiological conditions (diabetes, raised blood pressure, chronic pain,...) The latter is additionally supported with cognition of basic characteristics of frequent pathophysiological conditions and their pharmacotherapies. Based on learned knowledge is to student enabled comprehensive insight in practice and confrontation with concrete and daily pharmacotherapeutic cases.

Course name: PSYCHOLOGY OF PROBLEM-SOLVING

Number of ECTS credits: 6

Content:

- definition of problem solving,
- problem-solving strategies: from frustration to the problem,
- levels of problem-solving
- definition of the problem
- organization of problems
- individuation of goals
- techniques of production solutions: Mental maps, Brainstorming, Lateral thinking, Resolution of problems, Evaluation of alternatives and decision-making

- elements of the relational problem solving

Course name: **DEVELOPMENTAL BIOLOGY**

Number of ECTS credits: **6**

Content:

The introduction will comprise the basics of classical embryology, summarizing the development and growth of multi-cellular organisms in the period from fertilization until birth or hatching or a transformation (metamorphosis). This will be followed by a review of early and late embryonic development in different organisms, with special emphasis on some organ systems (eg nervous system). At the same time the impact of gene expression and intercellular communication, which regulates proper development will be presented. The applied views will present developmental biology in the light of evolutionary changes, with a special emphasis on the cases of medical practice.

Main issues:

- Fundamentals of developmental biology
- Classic anatomical basis
- Evolution of developmental patterns
- Fundamentals of experimental embryology
- The genetic basis of development
- Differential expression of genes
- intercellular communication as a basis for the proper development

Early embryonic development

- fertilization - the beginning of a new organism
- Early development and methods of teaching in selected model organisms
- Establishment of body axes

Further embryonic development

- ectoderm and central nervous system development and epiderm
- neural crest cells
- Axial and intermediate mezoderm
- Mezoderm of the lateral plate and endoderm
- Development and evolution of selected organ systems
- aging and regeneration
- Origin and fate of germ cells (germ line)

Selected topics

- Examples of developmental biology in medical practice (cancer, endocrine disorders and the development of human therapeutic application of stem cells)
- development control and environmental impact
- Developmental mechanisms of evolutionary change

Course name: **SOMATIC DISEASE, MENTAL HEALTH**

Number of ECTS credits: **6**

Content:

- The incidence of physical illness in modern societies (prevalence, incidence, mortality)
- Position sick people in modern societies
- Stigma of physical illness
- Sociology of chronic diseases
- Risk factors for mental health at the physical sickness
- The most common mental disorders in physical diseases
- Suicide in the case of physical illness
- Quality of life
- Self-image and attitude towards oneself in the event of physical illness
- Empowering the sick: what it is and how to achieve it

- Health between the individual and society
- Corporate social Responsibility for health
- Cardiovascular diseases and mental health
- Multiple sclerosis and mental health
- Epilepsy and Mental Health
- Cancer and Mental Health

Course name: FUNDAMENTALS OF WORK AND ORGANISATIONAL PSYCHOLOGY

Number of ECTS credits: **6**

During the course the students acquire knowledge, skills, technical and research skills in the field of work and organisational psychology, especially in the following areas: work analysis in work design, the relationship between individual and work context, job performance, health and well-being at work. Main topics:

- individual characteristics in the work (the basics of differential psychology in relation to work),
- work as individual and collective activity (changing the nature of the work: past, present and future),
- work motivation and attitudes towards work,
- work performance – its determinants and measurement criteria,
- teams and groups at work,
- occupational health psychology.

Course name: GRAPH THEORY AND SOCIAL NETWORKS

Number of ECTS credits: **6**

Content:

- Graph, examples of graphs.
- Trees. Basic properties, counting trees. Cheapest tree.
- Operations on graphs. Product of graphs. Covering graphs and voltage graphs.
- Graph coloring. Vertex coloring. Edge coloring.
- Directed Graphs. Eulerian directed graphs. Tournaments.
- Social networking in the language of graph theory.