BIOPSYCHOLOGY, UNDERGRADUATE STUDY PROGRAMME,

FIRST BOLOGNA CYCLE

COURSE DESCRIPTIONS

COMPULSORY COURSES

COMPULSORY COURSES FOR THE 1ST YEAR OF STUDY

Course name: **FOUNDATIONS OF PSYCHOLOGY**
Number of ECTS credits: **6**

Content:
Course offers an introduction to important achiecvements 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 gastalt psychology to behaviorism, from psychoanalysis to cognitivism, etc. Course emphasize themes connected with functionalism and behavioral sciances, especially with analysis of tests which represent an important face of these branches of psychology.

Course name: **DIFFERENTIAL PSYCHOLOGY**
Number of ECTS credits: **3**

Content:
1. definition and significance of differential psychology
2. importance of research differences between individuals and groups
3. differential psychology research areas such as interpersonal differences in:
- memory
- intelligence
- personality
- motivation
- sex
- age
- physical characteristics
- values
- identity, self-esteem, self-efficacy, and the like

4. application of knowledge of differential psychology in educational psychology, organizational psychology, sports psychology, developmental psychology and in other areas
5. research methods in differential psychology

Course name: **BASICS OF BIOPSYCHOLOGY**
Number of ECTS credits: **6**

Content:
Biological Basis of Psychology and Behavior, including Biological basis of Behavioral Disorders
Stress and Behavior
The Research Methods of Biopsychology
Evolution of the Brain and Behavior
Life-Span Development of the Brain

Brain Neuroplasticity

General Principles of Sensory Processing, Touch, Pain, and Attention
Hearing, Vestibular Perception, Taste, and Smell
Vision: From Eye to Brain
Motor Control and Plasticity

Homeostasis, Hormones, and the Brain
Neural Basis of Thermoregulation
Biological Rhythms, Sleep, and Dreaming
Drug Addiction and the Brain's Reward Circuits

Learning, Memory and Amnesia
Attention and Higher Cognition
Language and Hemispheric Asymmetry
Disorders of Cognition

Course name: **PSYCHOLOGY OF RATIONAL THINKING AND LOGIC**
Number of ECTS credits: **6**

Content:
Psychology and Logic. Psychology of Proof: deductive reasoning and logic. Main psyhological models of deductive reasoning. Epistemology of deductive reasoning. Fundamentals of mathematical logic, logical system, truth tables. Sets, relations, mappings. Graphs, networks, social networks. Mathematical logic and modeling of cognitive processes.

Course name: **DEVELOPMENTAL PSYCHOLOGY I**
Number of ECTS credits: **6**

Content:
- Definition of developmental psychology, methods and techniques in developmental psychology. Principles of development. Genetic and environmental factors of development.
- Understanding the development from the perspective of different developmental theories: psychodynamic, behavioural, humanistic, cognitive, ethological, contextualist and behavioural-genetics theory. Contribution and critique of the developmental theories.
- Characteristics of developmental stages from conception to late childhood. Specificities in development and sensitive periods of development. Individual differences in development. Family environment and other social groups (peers, friends, etc.) and development. The importance of the broader social environment for development. Intercultural differences in development.
- Prenatal development: characteristics of the period and protective and risk factors of development. Birth and newborn period. Characteristics of temperament. The development the attachment and separation anxiety.
- Baby and toddler: motor development and developmental milestones; perceptual and cognitive development including the contemporary empirical findings (based on research on habituation, classical and instrumental conditionality; theory of mind); language, social and emotional development; development of big five personality dimensions. Screening and developmental tests to determine the characteristics of early development.
- Cognitive, language, moral, personal and emotional development in early, middle and late childhood and the development of intelligence. The development of children's play and drawings. Social cognition and the development of understanding of emotions.
- Children in kindergarten and school. Academic achievement through the development. Prosocial and antisocial behavior in childhood.

Course name: **NEUROLOGICAL BASES OF HIGHER NERVOUS FUNCTIONS I**
Number of ECTS credits: **6**

Content:
- Neuron and glia
- Action potentioal of a neuron
- Neuratransmiter systems
- Evolution of the nervous system
- Overview of the nervous system
- Motor system
- Somatosensory system
- Special senzory 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 impuls
- Information
- Electrical nature of impuls
- 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: **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: **STATISTICS FOR PSYCHOLOGISTS**
Number of ECTS credits: **6**

Content:
Basics of probability. Basic statistical terms and concepts. Univariate analysis (Dichotomous variables - summarizing, point-wise and interval estimation, tests for proportion; Nominal variables - frequency distribution, point-wise estimation and goodness-of-fit test; Ordinal variables – rang, cumulative frequencies, quantiles, point-wise and interval estimation, testing hypotheses, sign test; Interval variables – measures of central tendency, measures of dispersion, standardization, determining the sizes of classes/bins, normal distribution, point-wise and interval estimation, testing hypotheses). Bivariate analysis (Association between two nominal variables – Cramer's coefficient, test for association; Correlation between two interval variables – covariance, Pearson's correlation coefficient, testing non-correlation; Correlation between interval and dichotomous variable – point-biserial correlation coefficient, standardized mean difference, testing the equality of two means; Association between interval and nominal variable – explained and unexplained variance, test for association; Correlation between two ordinal variables – Spearman's correlation coefficient, testing non-correlation; Association between ordinal and dichotomous variable; Association between ordinal and nominal variable – Kruskal - Wallis analysis of variance). Basics of regression.

Course name: **RESEARCH METHODOLOGY IN PSYCHOLOGY**
Number of ECTS credits: **3**

Content:
Basics of philosophy of science and epistemology. Research designs and methods. Basics of experimental design. Levels of evidence. Data visualisation. Scientific informatics and communication. Writing a research report. Overview of multivariate statistical methods. Basics of epidemiology and public health research. Qualitative research methodology. Ethical issues in psychological research.

Course name: **COGNITIVE PSYCHOLOGY**
Number of ECTS credits: **6**

Content:
Introduction to cognitive psychology, development of cognitive psychology, research methods in cognitive psychology.
Neurobiological basis of cognitive psychology, structures and functions of the brain.
Perception, Attention and Consciousness, functions of attention, automatic and controlled processes.
Memory, memory models; knowledge organization, declarative and procedural knowledge, organization of declarative knowledge.
Language and its understanding, language in a social context, bilingualism; reading in a context.
Problem solving and creativity, types of problems, critical thinking, theory of creativity.
Decision making and reasoning, model of decision making, deductive and inductive reasoning, models of reasoning.

Course name: **BIOCHEMISTRY AND GENETICS IN BIOPSYCHOLOGY**
Number of ECTS credits: **6**

Content:
1. Basics of Biochemistry
- Biological Information: from DNA to RNA and protein sythesis.
- Biomolecules of life: amino acids, peptides proteins.

2. Dynamic Function of Biomolecules
- Biological function of proteins and their structures.
- Enzymes and their functioning in molecular biology
- Other biological molecules and their function: carbohydrates, lipids.

3. Storage and Transfer of Biological Information
- Structure and function of DNA and RNA
- Biosynthesis of DNA and RNA

- Genetic code and metabolism

4. Metabolics and Energy
- Cellular metabolism and bioenergetics
- Carbohydrates and glucose
- Crucial biochemical cycles
- Energy and ATP
- Metabolism of biomolecules

5. Genomes, Transcriptomes and Proteomes
- DNA and genome
- Genome structures
- Genome expression and proteomes

6. Basic techniques for genome study
- Studying DNA
- Molecular techniques
- Genetic mapping and diseases

7. Genome functioning
- DNA and protein functioning
- Processing of DNA
- Proteine synthesis
- Genome activity and regulation

8. Gene replication and development
- Genome replication
- Mutation, repair and recombination
- Genome and biopsychology
- Genetic inheritance and mental disorders

COMPULSORY COURSES FOR THE 2ND YEAR OF STUDY

Course name: **SOCIAL PSYCHOLOGY I**
Number of ECTS credits: **6**

Content:
Students learn about the historical development and current status of the various factions within social psychology and methodological peculiarities of research in social psychology.

Special focus will be on the content, that enables us to better understand the dynamics of groups and societies and which is as follows: social influence and social power, social motivation, obedience and compliance, social attribution and social cognition, prosocial behavior and antisocial behavior, etc. Importance of understanding the field of social reality for understanding groups and the society. In-depth explanation of its structure (through the integration of individual social psychological phenomena such as soc. norms, soc. representations, attitude, prejudice, etc…) and dynamics (through integration of social psychological processes of conformity, social innovation, group polarization, etc.). Students will gain experience in the role of participants in social psychological experiments and with their own project work apply the learned knowledge and skills to the group and the society level of activity.

Course name: **PSYCHOLOGICAL DIAGNOSTICS**
Number of ECTS credits: **6**

Content:
- history of psychological measurement and testing
- measurement in psychology,
- methodological review and stages of test production and use,
- test characteristics,
- interpretation of points, how to evaluate and select a test,
- presentation of several types of tests.

Course name: **BIOPSYCHOLOGY OF MOTIVATION AND EMOTIONS**
Number of ECTS credits: **6**

Content:
Biopsychology of motivation - basics
- Definition, specifics and type of motivation
- Fundamental approaches and concepts in the (bio) psychology of motivation
- Models and theories of motivation: biological and physiological, neurological, behavioral, cognitive and humanistic theories
- Motivation in relation to other (bio) psychological processes
- Homeostasis: regulation of the internal environment
- Production of steroids in the brain
- Hormones made by the brain for the brain
- Brain's reward circuits and (drug) addiction

Biopsychology of emotion, stress, and health
- Theoretical models of emotions (socio-constructivist, neurobiological and cognitive models) and definitions of emotions
- Experience, expression and recognition of emotions. Individual and cross-cultural differences
- Development of emotions
- Emotional regulation strategies
- Impact of emotions on psychosocial health, learning and behavior
- Emotions, aggression, and stress
- The role of the autonomic system in emotional and social stress
- Emotional responses, amygdala, and the interaction of autonomic and adrenal hormones
- Interaction of the brain and the immune system
- Synaptic Changes during Fear Conditioning
- Emotions and mental health

Hunger, Eating, and Health
- Appetite regulation and weight-loss strategies
- Food addiction and dopamine-reward models of weight gain

Hormones and Sex: Evolutionary, Hormonal, and Neural Bases
- Neural bases of human sexual behavior
- Neurochemical aspects of sexual behavior, including drug effects
- Neural mechanism of sexual orientation
- Parenting behavior
- Love
- Role of sleep in learning and memory in humans
- Sleep within particular brain regions

Course name: **DEVELOPMENTAL PSYCHOLOGY II**
Number of ECTS credits: **6**

Content:
Characteristics of developmental stages from adolescence to late adulthood. Individual differences in development. The influence of genetic and broader (society) and specific social factors (e.g., family, peer groups, friends) on development from adolescence to late adulthood. Society and development - intercultural differences in development from adolescence to late adulthood. Cognitive, social, moral and emotional development in adolescence: traditional and contemporary conceptualizations of adolescence; intelligence development, formal logical thinking; emotions; development of big five personality dimensions; identity formation and occupational choices; romantic relationships, relationships with parents; pro-social and anti-social behaviour in adolescence; moral reasoning. Individual differences. Emerging adulthood: conceptualization and rationale of a new developmental period; characteristics of emerging adults; secondary individuation; reaching criteria of adulthood. The importance of social factors in order to achieve the criteria of adulthood. Cognitive, personality, social and occupational development in early, middle, and late adulthood: postformal thinking, practical intelligence, wisdom, quantitative changes in cognitive abilities; romantic and peer relationships,

parenthood; development of big five personality dimensions, normative crises models of personality development, model of timing of significant life events; prejudice to late adulthood and aging. Dealing with death and bereavement.

Course name: **PSYCHOMETRICS**
Number of ECTS credits: **6**

Content:
Part 1: Psychophysics
- Definition and basic concepts of psychophysics
- Sensory threshold estimation (classical psychophysics, signal detection theory, theory of three continua)
- Scaling methods (Fechner's method, Thurstone's methods, fractioning and multiplication method, Stevens' methods)

Part 2: Psychological testing
- Measurement theory in psychology
- Measurement of individual differences (a historical overview)
- Types of tests
- Test scores and their transformation
- Test reliability (aspects, models, estimation methods)
- Test validity (aspects, models, estimation methods)
- Procedures of test development (item analysis)

Introduction to item response theory (Rasch model and its extensions)

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 metal 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: **NEUROLOGICAL BASES OF HIGHER NERVOUS FUNCTIONS II**
Number of ECTS credits: **6**

Content:
Course 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: **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 psychophisiological studies of temperament and personality, nauropsychology and psychopharmacy; trino brains by MacLean, monoamnioenergetic systems, stress and behavior, personality and health, psychophysiology of emotion, anxiousness, schisophrenia and depression, use of concepts about temperament.

Course name: **BIOINFORMATICS TOOLS IN PSYCHOLOGY**
Number of ECTS credits: **6**

Content:
In this course we will learn bioinformatic approaches and tools in the field of functional genomics and their application in the field of psychology. In the introductory part, we will learn the basics of molecular biology with an emphasis on genes, transcripts and proteins, and their functions and interactions. Modern molecular biology techniques enable us to carry out measurements of a large number of genes and/or proteins simultaneously. For this purpose we will learn machine learning and data mining approaches to handle such large amounts of data. We will present approaches that are adapted for the analysis of high-density omic data focusing on the level of gene expression. We will wrap up the subject with a seminar by applying the presented methods on real-world data from studies of molecular basis of various psychological disorders and diseases, such as autism, bipolar disorder, Alzheimer's and Parkinson's disease, schizophrenia and susceptibility to abuse of intoxicating substances.
Introduction – motivation from the fields of molecular biology and biopsychology
- DNA, RNA, protein, biological process.
- Biological pathways: metabolic networks (KEGG), signaling pathways, interaction networks.
- Biological markers and molecular basis of diseases and psychological disorders.

Data mining
- 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 and 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. Discretization, transformation, combination, elimination, sampling.
- Statistical data modeling (t-test, ANOVA, permutation methods, multiple comparisons corrections).
- Supervised and unsupervised machine learning methods. The use of different machine learning algorithms. 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.

Analysis of high-throughput omic data
- The technology of high-throughput omic measurements (DNA microarrays, next-generation sequencing) and specificity of derived data.
- Design of experiments using the technology of high-throughput omic measurements.

- Pre-processing and quality control of omic data.
- Statistical modeling of omic data and variance-stabilization approaches.

Machine learning approaches on omic data.

COMPULSORY COURSES FOR THE 3RD YEAR OF STUDY

Course name: **PUBLIC MENTAL HEALTH**
Number of ECTS credits: **6**

Content:
- Definitions of mental health as a continuum form health to illness and related basic psychological concepts
- Definitions of public mental health and related concepts (indicators, determinants, characteristics) and its impact on society
- Definitions and examples of interventions in the field of mental health: promotion, prevention, psychological treatment; including first psychological aid and approches based on CBT and MBCT
- Definitions of concepts of prevention in regards to specific target groups
- Definition of the most important public health and public mental health problems in Slovenia and worldwide and related issues (suicide, depression, alcohol, bereavement) within the risk groups and their characteristics
- Research methods in mental health
- Education and raising awarenes in the field of public mental health; the meaning of stigma reduction
- Ethics and the role of professionals

Course name: **FUNDAMENTALS OF WORK AND ORGANISATIONAL PSYCHOLOGY**
Number of ECTS credits: **6**

Content:
Introduction to work and organisational psychology (W&O psychology) with an emphasis on work psychology.

I. Orientation:
- areas of W&O psychology,
- theoretical approaches, its connections with other fields of psychology and scientific disciplines,
- development of the discipline and its history in Europe and the rest of the world,
- W&O psychology as an applied discipline; roles, tasks and work methods of scientists and practitioners,

II. Job creation and job description:
- the changing nature of work: past, present, future;
- work in different work contexts: work process, working conditions, tasks, tools, time arrangements, team-work,
- job analysis and job description: definition, aims and goals, methods and information sources, work profiling,
- work design: work process design, job design, tools design, sociotechnical system design,
- planning and performing interventions for the optimization of the work and the work environment.

III. Competencies at Work:
- understanding the competence concept,
- necessary, useful and harmful competencies,
- competence profiles.

IV. Motivation and attitudes
- theories of work motivation,
- attitudes toward work.

V. Work performance

- theories, determinants, errors, assessment, optimizing the outcomes and the criteria involved,
- organisational citizenship behaviour,
- contraproductive behaviours: withdrawal, absence, lateness, turnover, absenteeism.

VI. Teams and groups: definition, structure, processes, effectiveness, team building.

Course name: **INTRODUCTION TO CLINICAL PSYCHOLOGY AND PSYCHOTHERAPY**
Number of ECTS credits: **6**

Content:
- Basic definition of clinical psychology, psychotherapy and psychological counselling
- Basics of main paradigms in clinical psychology and psychotherapy:
    - Psychoanalytic
    - Cognitive-behavioural
    - Humanistic-existential
    - Systemic
    - Integrative
- Presentation of the basics of clinical developmental theories:
    - Classical psychoanalytic theory
    - Theory of object relations
    - Ego psychology
    - Self psychology
    - Relational psychoanalysis
    - Attachment theory
    - Interpersonal neurobiology
- Introduction to clinical psychological diagnostics.
- Introduction to psychotherapy and counselling.
- Psychotherapy research and common factors in psychotherapy.
- Therapeutic relationship and working alliance.
- Clinical psychological interview.
- Use of psychological tests and clinical assessment.
- Main interventions.
- Ethics in clinical psychology.

Course name: **GAME THEORY IN BIOPSYCHOLOGY**
Number of ECTS credits: **6**

Content:
- The decision problems in strategic situations.
- Basic concepts of game theory: players, moves, income, matrix game with two players.
- Games in normal form: dominating moves, the best answer, Nash balance.
- Important examples of games in normal form: prisoners' dilemma, game of coordination, partnership struggle, Coin game.
- Random decisions: mixed moves, the existence of Nash balance.
- Dynamic games, games in the branched form: strategies, Nash balance, reversible induction, undergames, perfect balance of undergames.
- Important examples of games in a branched form: centipede game, ultimatum game, the game of negotiations, repeated prisoners' dilemma.
- Comparison of decision theory and human decision making: experiments.
- Behavioral game theory

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 inside to 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: **QUALITATIVE RESEARCH**
Number of ECTS credits: **6**

Content:
Basic notion of qualitative research and underlying epistemology. Strategic principles of qualitative research. Basic methodological principles of qualitative research. The notion of Grounded theory. Qualitative research design. Techniques of qualitative data gathering:
- Interview (semi-structured, life-story or narrative, explicitation)
- Observation
- Sources (with emphasis to ethnographical data)

Qualitative text analysis and Grounded theory. Clustering and timeline analysis. Basic principles of case study. Triangulation. Selecting participants in qualitative research. Example of ethnography. Ethical considerations. Qualitative research in mind studies: finding out about the structure of human experience.

Course name: **BASICS OF EDUCATIONAL PSYCHOLOGY**
Number of ECTS credits: **6**

Content:
- Definition of educational psychology, methods, and techniques in educational psychology.
- Different views of learning, learning types.
- Knowledge construction, personal knowledge construction.
- Academic problem solving.
- Social and cultural factors of motivation for learning, teachers' strategies for supporting motivation, students' self-regulatory strategies.
- Self-regulatory of learning, self-regulatory of motivation, topics in strategies of self-regulatory.
- Learning environment, types of learning environment.
- Classroom leadership and instructional environment, instructions and feedback.
- Developing strategies for understanding and use of knowledge.

Course name: **SEMINAR – FINAL PROJECT PAPER**
Number of ECTS credits: **6**
(Seminar content: only for students enroled in the 3rd year of study from the 2018/19 academic year.)

The subject is divided into three areas:
- Final seminar (2 ECTS)

Presentation of the rules and instructions for preparation of the final project paper, presentation of deadlines for the study completion, more detailed treatment of APA standards.
- Skill workshop (2 ECTS)

Use of research databases, search for resources, scientific and professional writing, structured training of skills for final project writing, structured training of skills for final presentation.
- Final project assignment (2 ECTS)

Supervised independent work (under mentorship), which in particular in the form of theoretical tasks investigates the topic, final presentation (performed as an exam in front of the mentor).

ELECTIVE COURSES

(Read the short descriptions of all elective courses of the study programme. In the table Elective courses you will find the list of the elective courses which were offered in the last two years.)

ELECTIVE PSYCHOLOGICAL COURSES

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
- Pain in the context of mental health
- Disorders in childhood and mental health
- Psychooncology
- Psychocardiology
- Hospital care of physical illness and mental health
- Out-patient care of physical illness and mental health
- Communication between health care givers and patients
- Palliative Care: Quality of life vs. the number of days

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. Elements of the relational problem solving. Techniques of production solutions:
- Mental maps
- Brainstorming
- Lateral thinking
- Resolution of problems
- Evaluation of alternatives and decision-making

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: **THE PSYCHOLOGY OF COMMUNICATION**
Number of ECTS credits: **6**

Content:
Definitions and key models of the communication process. Differentiation and overview of the fields of verbal and nonverbal communication, focusing on the emotional and relational, and conscious and unconscious communication. Deepening the understanding of communication as an active process, with emphasis on understanding of the creation of social reality by language. Developing communication skills.

Course name: **PSYCHOLOGY PRACTICUM**
Number of ECTS credits: **6**

Content:
- Research ethics, ethics committee proposal
- Research methods in psychology, research plan, research implementation
- Scientific reports
- Presentation of scientific research results

Possible topics that will be covered during research work: Personality, Motivation, Stimuli and perception, Thinking, Attention, Memory, Behaviour, Cognitive impairment, Emotions, Mental disorders between individuals and society, Psychology of specific population groups, Psychology in everyday life, Human behaviour in crisis situations.

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 student's choice.

Course name: **ETHICS IN PSYCHOLOGY AND BIOPSYCHOLOGY**
Number of ECTS credits: **6**

Content:
- Introduction to ethics (ethics as normative science, the aim of moral reflection, moral relativism).
- Basic moral paradigms and theories (consequentialism (utilitarianism), rule ethics (contractualism, deontology and Kantian ethics, religion and ethics), virtue ethics (Aristotle's ethics, ethics of care and models of professional interpersonal relationships).
- Basics of environmental and animal ethics.
- Moral motivation (moral internalism and externalism, willful ignorance and cognitive dissonance)
- Research ethics: risk-benefit ratio, social value of research, subject selection, informed consent, anonymity, confidentiality, data protection, deception in research, results communication…), ethics in reporting research, examples of ethical violations in research, introduction and importance of ethics committee.
- Neurobiology of morality: philogenetic and ontogenetic development, innate vs acquired ability, the role of neuroplasticity and epigenetics.
- Biological imprint of emotions, thoughts and stress on moral judgement and decision-making.
- Empathy: biopsychological perspective.
- Existential views; what people are (broader perspective: creature and person). Work with people

- Various dilemmas (abortion, euthanasia, death penalty, violence, access to weapons, etc.).
- Science, power, authority.
- Ethical principles of psychologists and code of conduct: principles of respect for human rights, principles of professional competence, principles of responsibility of psychologists and principles of occupational integrity.
- Teaching and learning ethics.
- Ethics in education, supervision, work environment.
- Ways and procedures for solving ethical offence (mediation, settlement, sanctioning).

ELECTIVE NON-PSYCHOLOGICAL COURSES

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: **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.

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: **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.

Examples of applications of mathematical tools in various scientific areas, interdisciplinarity: The method of least squares (matrices, vectors, norm, matrix operations, applications); The chromatic number of a graph (scheduling problems); Probability (outcomes, events, probability measure, conditional probability, partition theorem, independent events, discrete and continuous random variables, expectation, variance, independent random variables, central limit theorem); Riemann integral (relation with the area under the graph of a positive function; application to continuous random variables; calculation with software such as Maxima); Eulerian cycles and paths, Hamiltonian cycles and paths (traveling salesman problem and related problems, applications); Eigenvalues and eigenvectors (application in principal component analysis, calculation of eigenvalues and eigenvectors with software such as Maxima); Derivative (applications in Pearson's goodness-of-fit test; calculation with software such as Maxima); Mathematics behind computerized tomography-CT (basics of Hounsfield's and Cormack's method).

Course name: **NEUROBIOLOGY OF PHYSICAL / SPORTS ACTIVITY 1**
Number of ECTS credits: **6**

Content:

Motor inactivity is becoming the leading factor in overall mortality and is an important factor in many diseases. In other words, regular and healthy physical activity and sports are the most effective, have no side effects, and are the cheapest non-pharmacological approach to the prevention (and treatment) of many diseases. In any case, every human health therapist needs to know the grips of sports activities on our health and needs to be able to advise us on quality and sustainable health. In the only such subject in the study programme, you will experience and learn about the biological and neurological response of our body to various training regimes, so you will be able to anticipate the results of the exercise and plan it as a safe exercise as well. You will realize that physical activity are intertwined in many spheres (growth, work, efficiency, autonomy, health, learning, quality of life) and as such it is also respected and appreciated.

Course name: **EVOLUTIONARY AND POPULATION GENETICS**
Number of ECTS credits: **6**

The content of this course is available in the presentation of the study programme Bioinformatics (Course structure).