BIOPSYCHOLOGY, MASTER STUDY PROGRAMME, SECOND BOLOGNA CYCLE

COURSE DESCRIPTIONS

COMPULSORY COURSES

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

Content:
- Definition of clinical psychology.
- Historical development of clinical psychology.
- Theoretical models in clinical psychology (psychoanalytic, cognitive-behavioral, humanistic-existential, systemic, integrative).
- Clinical psychodiagnostics.
- Phases of diagnostical process.
- Anamnesis.
- Psychological tests in clinical psychology.
- Projective techniques and self-descriptive
- techniques.
- Psychological report.
- Diagnostical classifications and psychopathology.
- Clinical assessment of cognitive abilities.
- Clinical assessment of personality, interpersonal
- relationships and emotions.
- Research in clinical psychology.
- Clinical-psychological counselling and
- psychotherapy.
- Specifics of working with children and
- adolescents.
- Specifics of working with people with special
- needs.
- Ethics in clinical psychology.

Course name: **ADVANCED RESEARCH AND STATISTICAL METHODS IN PSYCHOLOGY**
Number of ECTS credits: **6**

Content:
- Quantitative and qualitative research in social sciences, behavioral sciences, and psychology
- Scientific method and positivist foundations of quantitative research; philosophical, theoretical, and disciplinary foundations of qualitative research
- A review of causal and correlational research designs for data collection (experiment, survey); meta-analysis
- A review of qualitative research designs, methods and techniques of data collection and analysis
- Research ethics in psychology
- Review of univariate and bivariate descriptive and inferential statistics

- Introduction to multivariate statistics
- Preparation of data for analysis
- Review of statistical techniques of multivariate analysis
- Use of selected techniques (MR, ancova, manova, PCA, FA, CA, DA, LR, SEM …)
- Running a computer program for statistical analysis

Course name: **ADVANCED MODELING IN PSYCHOLOGY**
Number of ECTS credits: **6**

Content:
- Introduction to Modeling
- Graph Theory, Network Flows and Algorithms
- Stochastic Processes
- Monte Carlo Methods
- Markov Chains and Related Models
- Linear Programming
- Integer Programming
- Evolutionary Trees

Course name: **PSYCHOTERAPEUTIC APPROACHES AND PSYCHOTERAPY**
Number of ECTS credits: **6**

Content:
- In-depth overview of the theoretical framework and basic concepts of different psychotherapeutic approaches.
- Overview of the historical background of different psychotherapeutic approaches and psychotherapy.
- Definition and learning of various psychotherapeutic methods and technics.
- Learning characteristics of therapeutic relationship, communication and the context of therapeutic treatment.
- Overview of ethical questions in the field of psychological counselling and psychotherapy.

Course name: **BEHAVIOURAL GENETICS**
Number of ECTS credits: **6**

Content:
- History and introduction; proximate and ultimate causes of behaviour.
- Behavioural biology: interplay between proximate factors (genes, nervous system and hormones), behaviour and environment; nature-nurture.
- Laws of heredity: pedigree, homozygous, heterozygous, law of segregation, principle of independent assortment, Mendelian diseases, autosomal, dominant, and recessive.
- Methods in behavioural genetics: twins, families and adoption studies, selection lines; gene knockout models; genome sequencing in model organisms.
- Single gene effects, pleiotropy and polygeny.
- Genes affect behaviour via nervous and endocrine system.
- Proximal causes of aggressive and social behaviour.
- Proximal causes of mating behaviour and parenting.
- Genes and physiological basis of personality.
- Proximal causes of gender differences in behaviour.
- Genes, abilities and disabilities: cognitive, learning, development of cognitive abilities, IQ; reading disorders, Alzheimer disease.

- Genes, nervous system and ability to control impulses: impulsive behaviour, ADHD, antisocial behaviour, criminal…
- Genes, nervous system, mental and emotional disorders: schizophrenia, manic depression, anxiety, mania…
- Evolutionary psychology
- Laboratory work: measuring behaviour, measuring stress.

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

Content:
- Definition of health, illness and health psychology
- Definition and understanding of risk and protective factors for health and public-health strategies connected with them
- Understanding of the process of becoming ill and how we perceive, interpret and respond to symptoms of illness.
- Understanding of impact of illness on the individual and their families, including the concept of quality of life.

Course name: **CLINICAL AND PSYCHOLOGICAL INTERVIEW**
Number of ECTS credits: **6**

Content:
- Insight in the characteristics of clinical procedure environment.
- Overview of the characteristics of therapeutic relationship between the therapist and the client.
- In-depth overview of different types of interviews in psychology and clinical practise.
- In-depth overview of clinical interview characteristics and skills for a good interview.
- Practical experiences with case studies and role playing.

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

Content:
- Definitions of psychological counselling.
- Historical development of psychological counselling.
- Differentiation between psychological counselling and psychotherapy.
- Main models of psychological counselling.
- Developing counselling relationship and contract.
- Active listening.
- Basic methods and interventions in psychological counselling.
- Using positive resources in psychological counselling.
- Ending the counselling relationship.
- Common factors in psychological counselling.
- Coaching and psychological counselling.
- Foundations of supervision and mentorship.

Course name: **RESEARCH METHODS IN NEUROSCIENCE**
Number of ECTS credits: **6**

Content:

Theoretical basis, principles, indications, methods of application, interpretations of results of research methods in neuroscience:

- electrophysiological and related methods
- (EEG, EMG, EP, P300, DBS, TCMS),
- examination of autonomic nervous system
- cerebrospinal fluid examinations
- morphologic brain imaging (CT, MRI)
- functional brain imaging (fMRI)
- functional methods SPECT, PET

ELECTIVE COURSES

Course name: **ECOLOGY OF NEW MEDIA**
Number of ECTS credits: **6**

Content:

- basic theoretical principles of new media,
- psychology of visual balance,
- psychology of art and the power of communication, - psychology of Color in Art,
- implementation and analysis for the user's role using the new media from a psychological point of view,
- correlation and analysis of the artistic process through the new media in relation to the psychology of art,
- manufacture of interface systems for new media,
- analysis of interaction and new media polyhedrosis,
- perception of the digital space, their integration and purposeful use of new technologies,
- a concept and, consequently, digital art artifact.

Student reading:

- Selected chapters of theories of new media,
- New media as the interface of cultural practices
- Psychological analysis of new media usage
- Implementation of modern art artifact in the new media environment.

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

Content:

- Principal terms and definitions
- Sensorial ability and transmission in nervous system
- Physiology of behaviour (hormones and pheromones, stress)
- Biology of behaviour
- Genetic of behaviour through process of evolution, domestication and ontogenesis
- Anomalous behaviour
- Animal Welfare
- Ethogram of some species (horse, pig, hen, dog, cat and rabbit)

- Research methods in animal behaviour

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

Content:
- Overview of forensic psychology
- Distinction between forensic and therapeutic evaluation
- The role of forensic psychologist
- Forensic profiling
- Interview and questioning in the field od forensic psychology
- Expert testimony in civil and criminal procedures.

Course name: **SELECTED TOPICS IN NEUROSCIENCE**
Number of ECTS credits: **6**

Content:

Theoretical basis and principles of neuroscience and practical clinical proceedings of one of the following neuropsychological topics:
- Aphasic syndromes
- Developmental dyslexia
- Apraxia
- Neglect
- The frontal syndromes
- Amnestic disorders and dementia

Course name: **PUBLIC-HEALTH INTERVENTIONS: SELECTED TOPICS**
Number of ECTS credits: **6**

Content:
- Definition of the model intervention – prevention – research
- Teaching on the development, impementation and analysis of public-health interventions
- Case-studies of public-health interventions, specifically in the field of suicidology.

Course name: **MOLECULAR METHOD OF PROCESSING BIOLOGICAL SAMPLES**
Number of ECTS credits: **6**

Content:

Theoretical content:
- Choice of representative sample at quantitative research
- Criteria of choice of appropriate method (quantitative research)
- Biological samples, correct abstraction, processing, transport and storing
- Methods of processing of biological samples
- microscopic techniques
- photometric techniques,
- immunochemical techniques,
- radioimmune techniques,
- flow cytometry,

- molecular methods (nucleic acid isolation and amplification with polymerase chain reaction (PCR), using forward and reverse primers, verification of effectiveness of amplification, Restriction Fragment Lenght Polymorphism (RFLP) analysis as well as different methods of product evaluation).
- Interpretation of data and results gained with molecular methods

Content of laboratorial exercises:
- Techniques of microscopy with light microscope,
- Determining of enzmyes with photometric methods
- Use of immunochemical methods
- Nucleic acid isolation and amplification with polymerase chain reaction (PCR), using forward and reverse primers, verification of effectiveness of amplification, Restriction Fragment Lenght Polymorphism (RFLP) analysis and product evaluation.

Course name: **MOLECULAR BASIS OF CENTRAL NERVOUS SYSTEM DISORDERS**
Number of ECTS credits: **6**

Content:

Explanation of the molecular basis of the most frequent and some rare central nervous system disorders and injuries like:
- encephalitis,
- meningitis,
- epilepsy,
- Parkinson's disease,
- Alzheimer's disease,
- Huntington's disease,
- Tourette's disease,
- cerebrovascular attack,
- multiple sclecrosis,
- Creutzfeldt-Jakob disease,
- migraine.

Various underlying causes of these neuropathologies like: infections, trauma, degeneration, structural defects, tumors, autoimmune disorders, stroke.

Specific attention will be given to:
- Genes and proteins: The importance of a well kept balance.
- Gene technology: impact on neuropathology.
- Biomarkers: Protein content diagnostics of the cerebrospinal fluid as a central tool in the diagnosis of various diseases.
- Scientific research: current research methods.

Course name: **MOLECULAR BASIS OF NEURODEGENERATION**
Number of ECTS credits: **6**

Content:

Focus on parallels between ageing and different neurodegenerative disorders, i.e., the progressive loss of structure or function of neurons.

Examples of Neurodegenerative disorders to be dealt with at the molecular level:
- Parkinson’s, Alzheimer’s, and Huntington’s disease,

- ageing,
- amyotrophic lateral disease.

Similarities that relate these diseases to one another on a sub-cellular levels of:
- genetics,
- intracellular mechanisms:
- protein degradation pathways, atypical protein assemblies, mitochondrial dysfunction, axonal transport,
- programmed cell death.

Current therapies and therapeutic advances that could ameliorate (many) neurodegenerative diseases simultaneously.

Course name: **NEUROBIOLOGY OF PHYSICAL/SPORTS ACTIVITY 2**
Number of ECTS credits: **6**

Content:

PSYCHOBIOLOGY OF HUMAN PERFORMANCE
1. A Cognitive Neuroscience Perspective on Sport Performance
- Regional Cortical Activity in Elite Performers
- Contrasts of Brain Activity During Psychomotor Performance
- Effects of Training on Cortical Activation
- Performance Variation and Cortical Arousal
- Networking Between Cortical Association and Motor Regions
- Directions for Future Investigation
2. The Psychophysiology of Biofeedback and Sport Performance
- Measuring the Physiological Index
- Feedback Methods
- Selecting the Index
3. The Psychophysiology of Imagery in Spors
- Theoretical Concerns
- Functional Equivalence
- Influencing Physiological Change
- Image Generation
- Imagery Modalities and Perspectives
- Neuroscientific Implications for Imagery Use by Sport Performers
- Indirect Evidence for the Mirror Neuron System
- Direct Evidence for the Mirror Neuron System

PHYSICAL FUNCTIONING AND MENTAL HEALTH IN OLDER ADULTS
- Physical Activity and Mortality
- Physical Activity, Functional Abilities, Independence and Well-Being Into Older Age
- Physical Activity, Cognitive Function and Mental Health in Older Adults
- Physical Activity Guidelines for Older Adults
- Aerobic Exercise-Training Interventions
- Strength-Training Interventions
- Exercise-Training Interventions and Cognitive Function
- Exercise Programmes for Older Adult

IMPACT OF PHYSICAL ACTIVITY ON MENTAL HEALTH IN LONG-TERM CONDITIONS
- Long-Term Conditions and Mental Health Issues
- Long-Term Conditions and Quality of Life

- Long-Term Conditions and Physical Activity
- Chronic Obstructive Pulmonary Disease
- Diabetes
- Cancer

DEPRESSION AND ANXIETY
- Evidence Linking Depression and Exercise
- Exercise and Postnatal Depression
- Exercise and Antenatal Depression
- Exercise and Anxiety
- Exercise for Treating Depression and Anxiety
- Exercise Versus Conventional Treatment for Depression and Anxiety
- Promoting Exercise in the Treatment of Depression and Anxiety

DEMENTIA AND ALZHEIMER'S DISEASE
- Risk Factors and Pathophysiology for Dementia and Alzheimer's Disease
- Need for Interventions
- Physical Activity and the Prevention of Dementia and Alzheimer's Disease
- Exercise Conditions Effective at Delaying the Onset of Dementia
- Mechanisms by Which Physical Activity May Affect Dementia
- Physical Activity for Attenuating the Progression and Symptoms of Dementia and Alzheimer's Disease
- Physical Activity Interventions in Dementia and Alzheimer's Disease

Course name: **NEUROSCIENCE AND ART**
Number of ECTS credits: **6**

Content:

The 'influence' of neuroscience on art is manysided:
- With acumulating knowledge of brain function the expression in art has changed (vision – projection, hearing – (a)tonic music),
- Descriptions of different neuropsychologic disorders can be found in art (eg. Novels of T. Mann),
- Artistic expression can change due to neurologic or psychiatric disorders (eg. Ravel's Bolero, van Gogh's yellow period).

Key question: What is the neuroscience of creativity?

Course name: **PSYCHOPHARMACOLOGY OF MENTAL DISORDERS**
Number of ECTS credits: **6**

Content:
-overview of mental disorder classification:
-Clinical disorders and major mental disorders, learning disorders, substance use disorders: depression, anxiety disorders, bipolar disorder, ADHD, autism spectrum disorders, anorexia nervosa, bulimia nervosa, and schizophrenia.
- neurobiological basis of mental disorders, relevant for pharmacological treatment.
-Psychopharmacology of depression: Noradrenergic and serotonergic pathways in normal brain and in depression, desirable features of an antidepressant, drugs used in the treatment of depression, classification of antidepressants (TCA, MOI, SSRI, ...)
-psychopharmacology of anxiety disorders: monoaminergic (antidepressants, buspirone, antipsychotics) or amino acid (benzodiazepines, anticonvulsants) neurotransmitter systems
-antipsychotics, hypnotics, dementia, Parkinsonism

-basic pharmacokinetics, pharmacodynamics of psychopharmaca: absorption, distribution, metabolism, elimination and toxicology of psaychotropics (ADMET).
-drugs overview for neurodegenerative disorder (Alzheimer, ALS, Parkinson)
-drug and substance abuse, drugs for abuse treatment
-overview of basic mechanism of action of psychotropic drugs with addiction potential

Course name: **PSYCHOLOGY OF CONSUMER BEHAVIOR**
Number of ECTS credits: **6**

Content:

The course deals with the content that allow an understanding of consumer behavior in real life situations. Course deals the psychological, social and personal influences on consumer buying behavior in the everyday environment.

1. Introduction to Consumer behavior: development and definition of marketing, basic marketing concepts, consumer's definition, consumer behavioral processes, the basic theories and models, sciences who study consumer behavior, consumer research, research methods and techniques of consumer behavior.
2. Factors affecting Consumer behavior

- Psychological factors: motivation, perception, learning and memory, attitudes
- Sociological factors: groups, family, role and position of the individual
- Cultural factors: the reference group, social class
- Personal factors: age and level of family life cycle, lifestyle, personality

3. Purchase decision making process: the level of individual and group decision making process, the characteristics of the purchase situation.
4. Segmentation and positioning on consumer's market
5. Research of Consumer behavior

- qualitative and quantitative approach
- measuring customer satisfaction.

Course name: **STATISTICAL MODELING IN SOCIAL AND BEHAVIORAL SCIENCES**
Number of ECTS credits: **6**

Content:

Introduction and basic concepts
Review of basic probability and statistical concepts

Statistical Inference
Hypothesis Test Terminology
standard statistical tests, ANOVA
power analysis

Statistical modeling
Simple Linear Regression
Multiple Linear Regression
Stepwise regression models
Non-linear regression models
Regression tree

Feature extraction
feature selection, feature generation, feature transformation, dimensionality reduction, PCA, LDA

Clustering
Sequential and Hierarchical Clustering,
Clustering based on Function Optimization:
K-means clustering

Factor Analysis

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

Content:
- Work field of school psychologists.
- Elements of educational interaction (class characteristics, types of lessons, work forms, styles of teaching).
- Adjustment of teaching for individual students, types of students with special needs, and methods of work with them (interventions), gifted students (recognizing, characteristics, working with them).
- Recognition of school problem situations and dealing with them, counselling, communication with parents, teachers and students
- Team work: characteristics, benefits and possible problems, encouraging team work in educational setting.
- Teaching social skills, conflict solcing, mediation.
- Classroom management: goals, techniques, prevention of behaviour problems.
- Learning how to learn: learning strategies and tactics, teaching learning strategies.Assessing and grading knowledge: types of assessment, traditional and alternative forms of assessments, effects of grading on students.

Course name: **COGNITIVE BEHAVIORAL THERAPY**
Number of ECTS credits: **6**

Content:
- In-depth overview of cognitive – behavioural theoretical concepts
- In-depth overview of cognitive – behavioural psychotherapy methods and technics
- Case studies of different therapeutic procedures according to different types of psychological problems and disorders.

MODULAR ELECTIVE COURSES – BLOCK A

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

Content:
Course includes basic chapters of personnel psychology, especially contents that describe the relationship between persons and the organisation, in particular the establishment of the relationship, its development, and termination.
I. Orientation:
- personnel psychology: research subjects and methods, professional field, roles and working methods.
I. Theories and development of the HRM function.

II. HRM function: mission, roles, activities, relations with organisational strategy, organisation of HRM department, influences on organisational effectiveness, cross-cultural dilemmas and approaches.
III. Areas of individual differences relevant to personnel psychology, techniques and methods of assessment and diagnosis.
IV. Personnel selection and employment: principles, models, techniques, selection process, national legislation.
V. Psychological contracts and employment.
VI. Careers: theories, career decisions, career diagnostic, career planning and career management from individual development and organisational perspective.
VII. Socialisation and deployment.
VIII. Education and training of employees: theories, practical considerations, need analysis on the level of individual, group and organisation, knowledge management.
IX. Competences and competence management.
X. Personnel appraisal and feedback.
XI. Motivating employees: theories, job characteristics, characteristics of the work context, employee commitment, person-organisation fit, instruments for assessing motivation, reward and pay system (analysis, development, evaluation of the system).
XII. Participative management
XIII. Job loss and the experience of unemployment: research and perspectives.

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

Content:
Course includes basic chapters of organisational psychology, especially contents that describe and explain individual and collective behaviour in relation to the shaping and functioning of the organisation as a sociotechnical system.
I. Orientation:
- organisational psychology: research subjects and methods, professional field, roles and working methods.
- history, development, and related scientific disciplines.
I. Organisations defined
II. Theories of organisation.
III. Organisational structure and processes: components, analysis, design, and redesign, interrelation with organisational strategy.
IV. Interorganisational networks and influences: business context, national legislation and institutions, national culture, cross-cultural networks and (co)operations.
V. Organizational effectiveness: criteria, determinants, optimization.
VI. Leadership and power in organisations: theories, models, cross-cultural leadership, analysis and interventions. Conflicts and conflict management.
VII. Teams and groups: definition, structure, processes, effectiveness, team building.
VIII. Communication within the organisation: process, elements, communication analysis, planning and implementing interventions.
IX. Decision-making in organisations: process, phases, context, rationality, leadership decision-making, decision-making tools.
X. Organisational climate and culture: definitions, schools of thought, theories, approaches to research and analysis, dimensions, questionnaires, planning in implementing intervention plans.
XI. Organisational justice: theories, models and applications.
XII. Organisational development and change: planned changes, determinants and influences (facilitators, inhibitors), planning and assessing organisational change.
XIII. The learning organisation.

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

Content:
- Definition of educational psychology, research methods and techniques in educational psychology.
- Behaviourist, cognitive, social cognitive, and constructivist views of learning, different types of learning (psychomotor, verbal, learning principles and laws, learning as problem solving.
- Neurophysiological basis of learning.
- Cognitive factors of learning: definitions, measures and role of intelligence, creativity, attention, memory, transfer.
- Learning motivation: needs and goals, internal and external motivation, theory of attribution, supporting optimal learning motivation. Emotional and personality factors of learning and teaching: effects of different emotions of learning, emotional regulation; the role of learners' and teachers' personality dimensions; stress in students and teachers; self-concept.
- Criteria and factors of learning successfulness, successful / less successful / unsuccessful students.
- Special needs learners: categories of special needs students, specific learning problems, gifted students.

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

Content:
- Overview of the historical background and beginnings of positive psychology.
- In-depth overview of the theoretical framework and basic concepts of positive psychology.
- Overview of the research field and main surveys in positive psychology.
- Introduction to the applied positive psychology.

Course name: **DEVELOPMENTAL PSYCHOLOGY: FROM ADOLESCENCE TO DEATH**
Number of ECTS credits: **6**

Content:
- 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.
- Emerging adulthood: conceptualization and rationale of a new developmental period; personality, cognitive and emotional characteristics of emerging adults; secondary individuation; reaching 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: **SOCIAL PSYCHOLOGY**
Number of ECTS credits: **6**

Content:
- In-depth overview of the field of social influence from the perspective of social motivation.
- Overview of the fields of social reality and social constructionism.
- Extending the understanding of the position of social psychology within science and problematisation of it.
- Introduction to the applied social psychology.

MODULAR ELECTIVE COURSES – BLOCK B

Course name: **EVOLUTIONARY BIOLOGY**
Number of ECTS credits: **6**

Content:
History of development of evolutionary thought before and after Darwin-Wallace's theory; Definition of life; Spontaneous variability (mutation s- molecular variability and its importance for evolution); Natural selection; Evolution and biogeography; Evolution and speciation; Biological species concept; Evolution in time (with basics of paleontology); Origin and evolution of human; Origin of life; Creationism and evolutionism.

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

Content:
Fundamentals of transmission genetics: lows of inheritance , pedigree analysis of inheritance of dominant and recessive genes, molecular basics of dominant and recessive mutations.
-Avtosomal and sex linked inheritance.
-Human genome organization.
-Human repetitive DNA. Human tandem repeated DNA. Satellite DNA, minisatellite DNA and microsatellites. VNTR sequences and DNA fingerprinting.
-Structure and function of telomeric DNA
-Interspersed repetitive DNA (SINE and LINES). Role of SINE and LINE in human genome evolution. Human genome polymorphism. SNP polymorphism and its practical applications.
-Structure of human genes, expression of genes. Gene and gene families. Examples of gene families.
-Morphology of human chromosomes, sex chromosomes organization, classification of genes present on sex chromosomes.
-Mutations of human genome, classification of mutations. Chromosomal aberrations, abnormal chromosome number. Sex chromosomes and their abnormalities.
-Down syndrome.
-Classes of point mutations, molecular mechanism of point mutations. DNA damage and error of replication. Mutation rates. Somatic mutations. Trinucleotides repeat mutations.
-Structure and inheritance of mitochondrial DNA. Mitochondrial DNA as a tool to study human origin.
-Oncogenes in humans. Molecular basis of cancer. Diagnosis and treatment of cancer. Colon cancer and breast cancer.
-An overview of genomics, transcriptomics and proteomics: genetic and physical mapping, sequence strategies, global analysis of mRNA, analysis of proteins (methods and applications).
- DNA analysis in forensic science

- Genomics and the challenge of infectious diseases.
- Gene and cell therapieS.
- A basic understanding of ethical aspects associated with modern genomics (data protection, legal and ethical aspects of patenting).

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

Content:

Basic knowledge of neural substrates, physiology, neurochemistry, neuropsychological applications of:

- memory
- learning
- language
- emotion
- spatial behaviour
- attention
- consciousness
- developmental disorders
- neuropsychology of neurological disorders
- neuropsychology of psychiatric disorders.

Tutorials on neurotransmission, varieties of neurotransmitters and receptors, neurotransmitter system and behavior, and neurochemical pathways:

- cholinergic
- adrenergic
- dopaminergic
- serotonergic.

Course name: **NETWORKS, LOGIC AND RATIONAL THINKING**
Number of ECTS credits: **6**

Content:

- Number Systems
- Sequences. Limits and Accumulation Points of Sequences.
- Series and Convergence Tests.
- Basics of Mathematical Logic, Statement Calculus, Truth Tables.
- Sets, Relations, Mappings.
- Graphs, Grids, Social Networks.
- Mathematical Logic and Modelling of Cognitive Processes.

Course name: **DATA MINING**
Number of ECTS credits: **6**

Content:

- Introduction
  History of data mining. Areas of data mining. Data mining as a process.
- Data mining following the CRISP methodology. Understanding data mining as a cyclical process involving the phases: problem understanding, data understanding, data preprocessing, modeling, evaluation, deployment → better understanding of the problem.

- Problem understanding.
  Problem types suitable for data mining. Choosing the appropriate data representation for the machine learning algorithm at hand.
- Data understanding.
  Understanding basic notions such as: attribute, instance, class, categorical, ordered, continuous and related insight into the data. Use of visualization techniques for data understanding (histograms, 2D diagrams, 3D visualizations, 4+D techniques …)
- Data preprocessing.
  Processing the data in ways to make it suitable for the machine learning algorithm at hand – discretization, transformations, combinations, eliminations, sampling.
- Modeling.
  Use of different machine learning algorithms (naïve Bayes, regression, support vector machines, neural networks, decision rules and decision trees, association rules, clustering …). Knowing the difference between classification and regression.
- Evaluation.
- Assessing the quality of the models generated by machine learning algorithms – statistical significance testing, t-test, lerning/test set, leave-one-out method, cross-validation.

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

Content:
-overview of mental disorder and classifications
-neurobiology and psychopharmacology (structural and functional changes in brain; drugs used in the treatment: desirable features of drugs, classification, mechanism of action and side effects):
  -depression
  -schizophrenia
  -anxiety disorders
-overview of drugs used to treat neurodegenerative dementia (Alzheimer disease, Parkinson disease,...)
-overview of basic mechanism of action of psychotropic drugs with addiction potential
-drug and substance abuse
-drugs for abuse treatment
-basic pharmacokinetics, pharmacodynamics of psychopharmaca: absorption, distribution, metabolism, elimination and toxicology of psychotropics (ADMET).

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

Content:
- The problems of decision making in strategic situations.
- Basic concepts of game theory: players, actions, payoffs, two player matrix games.
- Games in normal form: dominated moves, best response, Nash equilibrium, mixed strategies, the existence of equilibrium, main examples.
- Games in normal form in practice: modeling human decision making.
- Dynamic games, games in extended form: strategies, Nash equilibrium, backwards induction, subgames, subgame perfect equilibrium, main examples.
- Repeated games: infinite repetition, finite repetition, the folk theorem.
- Dynamic games in practice: differences between theory and evidence about human decision-making.
- Decision-making without common knowledge: dynamic games with incomplete information, sequential equilibrium.
- Evolutionary game theory.