COURSE CODES COURSE CONTENTS

MNB601 **Molecular Cell Biology**

Students will be taught the basics of cellular neurobiology by explaining the types of neurons and their cellular subdivisions, the basic functions of these subdivisions, the cell structure-function relationship, the synapse structure and other accessory cells in the nervous system.
A detailed foundation will be provided on the types and cell biology of neurons and glia, cell-cell communication, neural progenitor cells, cell cycle, apoptosis and necrosis.

MNB602 **The science of neurodegeneration: And Genetic**

The aim of this course is to provide students with a solid foundation in molecular neuroscience in terms of genes and cell metabolism. The main topics are; production and regulation of biomolecules in neurons, biomolecules responsible for the formation and development of neuron-specific structures, proteins responsible for the formation of neuron-specific functions, intracellular interaction pathways, production and functions of membrane proteins, and basic topics such as gene expression and regulation of gene expression will be given in detail. The course will also exemplify how this molecular system is affected in cases of neural disorders.

MNB603 **Systemic Neurophysiology**

In this course, students will learn the physiology of the central and peripheral nervous systems. The main subheadings are as follows: Central and peripheral motor control; supraspinal control; motor cortex and pyramidal tract; cerebellum; basal ganglia; reticular activating system and sleep; dopaminergic system; adrenergic system; serotonergic system; cholinergic system; limbic system; hypothalamus and regulation; control of emotions; cognitive functions; association areas of the cerebral cortex.

MNB604 **Cellular Neurophysiology**

The aim of this course is to learn the molecular mechanisms of neural function. For this purpose, a foundation will be established on the subfields of cellular neurophysiology such as action potential generation and transmission, ion channels and ion channel kinetics, receptors and receptor potential, postsynaptic and presynaptic potentials, synaptic transmission and quantal oscillation, membrane electrophysiology, passive and active transmission.

MNB605 **Neuroanatomy**

The aim of this course is to provide a foundation in central and peripheral nervous system anatomy. Based on human neuroanatomy, brain anatomy, spinal cord anatomy and peripheral nervous system anatomy will be emphasized and anatomical examination methods will be explained.

MNB606 **Neurogenetics**

The aim of the course is to provide a general overview of genetics, followed by an examination of genetic networks, neural expression regulation, and epigenetic factors specific to neural systems. In this field, genetic mechanisms underlying cognitive functions and disorders will be used as examples, and recent developments in the field will be presented.

MNB607 **Advanced Biostatistics**

Evaluation of scientific data, calculation of mean, standard error and deviation, parametric and non-parametric statistical tests, preparation of graphs and tables, meaning and display of statistics, use of statistics with sample studies in experimental neuroscience.

MNB608 **Advanced Bioinformatics**

In this course, after an introduction to general bioinformatics, bioinformatic analysis and methods will be taught, especially in molecular neuroscience. For this purpose, students will be brought to a basic level in programming languages such as Matlab and R and will be provided with the opportunity to learn modeling and analysis methods in the fields of transcriptomics, genomics, proteomics and phylogeny with applications.

MNB609 / 610 **Molecular Neuroscience II Current Developments I /**

The aim of the course is to enable students to follow and discuss current developments in molecular neuroscience, to encourage them to evaluate and interpret findings, and to generate scientific hypotheses. The aim of the course is to further deepen their understanding of the dialogue between different levels of biological organization and the importance of molecular neuroscience for health and disease.

MNB611 **Neurodevelopment**

In this course, the development of the human nervous system will be explained starting from the embryonic period and examining the effects of genetic and environmental factors. In this field, emphasis will be given to embryonic neurogenesis, axonogenesis, synaptogenesis, development of neural networks, neuroplasticity and adult neurogenesis. Current developments and methods in this subject will also be taught in parallel with the subjects.

MNB612 **Advanced Neuroscience in Method And Models**

The basic methods and principles used in neuroscience, such as in vivo, in vitro and in silico modeling logic for the study of nervous system function and diseases; basic laboratory apparatus and their use for neuroscience research; basic in vivo and ex vivo research techniques; basic in vitro research techniques; concepts of concentration and molarity, preparation of solutions and suspensions, laboratory discipline and record keeping; reporting and storage of data; individual responsibility in teamwork, basic principles and techniques of immunohistochemistry, living cell markers and basic techniques used in neuroscience will be examined.

MNB613 **Neuropharmacology**

To provide the mechanisms of action of drugs effective in degenerative and non-degenerative diseases caused by molecular changes in the central and peripheral nervous system. The information obtained will form the basis for researching and developing the effectiveness of drugs.

MNB614 **Neuroimmunology**

This course aims to cover the in vitro, in situ and in vivo properties and dysfunctions of the neuroimmune system elements.

MNB615 **Neuroendocrinology**

It is aimed to teach the central and peripheral nervous system, the endocrine glands connected to these systems, brain diseases related to regulatory and supervisory systems and their mechanisms of action.

MNB616 **Seminar**

It is aimed for students to practice conveying thesis topics through oral and written presentations in the course, to gain critical approach and discussion practice in presentations of scientific findings and to learn scientific presentation techniques. In addition to these, various functions such as guiding the research of thesis writing plan and purpose; helping students write their graduation thesis in line with their areas of expertise; conducting literature review, reading and analysis; creating research hypothesis, establishing a model, formulating hypothesis, selecting data collection method, discussing data collection and analysis methods, article writing format; presentation plan; reporting of doctoral thesis plan will be provided.

MNB617 **Scientific Project Methods And Broadcasting**

The aim is to provide information and practice on scientific publication types, articles, compilations, case reports, rapid publication, literature and international publication and citation index systems, scientific publication writing language, preparation of papers for scientific meetings, oral and poster presentation techniques, what is a scientific project, how to prepare it, national and international project financing sources, and technology transfer.

MNB618 **Science Ethics**

The aim of this course is to instill in students the awareness of ethics and responsibility in the application, interpretation and publication of scientific research and to inform them on these issues. The main topics to be covered are ethical problems and unethical behaviors in research, ethical rules in scientific literature, ethics in animal and human research, and legal regulations regarding scientific ethics.

MNB640 **Cognitive Neuroscience**

The aim of this course is to provide students with information about Cognitive Neuroscience within the field of neuroscience, which is a multidisciplinary field. In this context, neural networks, electroencephalography, "what" and "where" networks, memory, executive functions, social cognition and decision making will be discussed.

MNB641 **System Neuroscience**

The aim of the course is to convey how internal and external stimuli are converted into nerve signals, transmitted and perceived. In this context, sensory systems will be discussed, as well as cognitive systems in the central nervous system. Some of the topics are somatovisceral sensory system-mechanoreceptors, somatovisceral sensory system- ascending pathways, somatovisceral sensory system- sensory cortex, pain, eye and visual sense, ear and auditory sense, inner ear and position sense, chemical sensory systems, association function of the brain, formation of responses, especially movement, to internal and external stimuli, default mode network, multiple demand network, limbic networks, central systems such as memory networks.

MNB642 **Behavioral Neuroscience**

Neuro-biological factors controlling behavior, stress and social behavior, behavioral models of psychiatric and neurological diseases, experimental psychology and analysis methods, the role of neuropeptides in the formation of social behaviors, stress, anxiety, depression, emotional and motivational brain (limbic system), hypothalamic control of hunger, satiety and sexual behaviors will be discussed.

MNB643 **Theoretical And Computational Neuroscience**

Theoretical and Computational Neuroscience, understanding brain function and transferring it to technological applications, neuroscience-related technologies, brain-computer interfaces, neural network modeling, sensory, motor and cognitive modeling, molecular modeling, neuroinformatics, neuro-morphic engineering, artificial intelligence, components of human-computer interaction, use of interactive systems and information technology will be covered.

MNB644 **Comparative Nerve Anatomy The system**

The aim is to examine the similarities and differences of the nervous systems of non-human organisms used in experimental studies.

MNB645 **Neuropsychology**

Examining the relationship between psychological processes and brain structures and systems will help us understand and explain the output of brain activities in observable and measurable behaviors.

MNB646 **Experimental animal models in neuropsychiatric and neurodegenerative disease research**

Basic experimental animal models used in the research of neurodegenerative diseases such as Parkinson's, Alzheimer's, Huntington's and neuropsychiatric diseases such as autism, schizophrenia, depression, anxiety, obsessive-compulsive disorders, epilepsy, and nutritional disorders will be used in an experimental and practical manner in order to learn about current developments in these subjects.

MNB647 **Neurochemistry**

It is aimed to create fundamental knowledge about the biochemical content of the nervous system, its metabolism and the integration of the products associated with these metabolisms with functional processes, as well as the biochemical mechanism of diseases.

MNB648 **Sleep Physiology**

The aim of the course is to explain sleep physiology and molecular mechanisms. Basic topics are circadian rhythm, slow wave sleep, REM sleep, sleep stages, neural networks and neurochemical systems underlying sleep, and sleep disorders

MNB649 **Memory**

Based on the types of memory and neural networks in humans, it is aimed to provide a foundation with one of the most basic functions, memory and its neurobiology. The subjects to be examined are, respectively, the historical development of memory studies, study methods, molecular and cellular information coding mechanisms, short-term memory, working memory, episodic memory, semantic memory, skill memory, emotional memory, language and observational learning, and related neural systems in the brain.

MNB650 **Schizophrenia Disorders And Mood**

To understand the phenomenology and etiology of schizophrenia and mood disorders. To understand the basic features, possible etiological explanations and possible neurocognitive processes of symptoms of schizophrenia and mood disorders. To develop the ability to use the knowledge gained about the etiology of schizophrenia and mood disorders in investigating and explaining complex neural functions.

MNB651 **Molecular Genetics Methods Applied in the Clinic:**

This course covers the applications of molecular genetics, including isolation and quantitation of nucleic acids and proteins, PCR, RFLP, sequence analysis, array systems, electrophoresis systems, cytogenetic applications, Western, Northern and Southern blot techniques.

MNB652 **Epilepsy: And Animal Models**

To provide clinical information about epilepsy and seizures as well as an understanding of their neurophysiological basis, epileptogenesis mechanisms, animal models and applications will be explained.

MNB653 **Stereotaxy The laboratory**

After establishing the basis of stereotaxy, it is aimed to explain stereotaxic systems, learn intracerebral intervention methods, demonstrate the stereotaxic approach used in intracerebral interventions in experimental studies, and learn the use of stereotaxic cages on rats and practice.

MNB654 **Epigenetics**

It is aimed to inform students about the molecular mechanisms of epigenetics, the functions of epigenetics, epigenetic mechanisms in neuroscience and diseases.

MNB655 **Theoretical neurobiophysics**

In this course, neuron model types at the cellular level, analytical examination of action potential generation, neural code analysis and ion channel kinetics models will be examined mathematically and practically.

MNB656 **Clinical Neurogenetics**

This course will cover the genetic causes of diseases such as Parkinson's, Alzheimer's, schizophrenia, bipolar disorders and the genetic evaluation of possible treatments. It will also contribute to the formation of an infrastructure for genetic counseling that can be given especially to these kinds of diseases.