



Uskudar University

Institute of Health Sciences

Course Contents of Medical Genetics Doctorate Program

Compulsory courses

TGN601 Molecular and Cytogenetic Basis of Genetic Diseases

The course Molecular and Cytogenetic Basis of Genetic Diseases aims to teach students the molecular structure, functions and control of genetic material DNA and RNA. This course also covers how genetic changes, gene expression and protein synthesis occur at the molecular level. It also aims to provide information about the basic principles of clinical cytogenetics, classification and frequency of numerical and structural chromosome abnormalities, autosomal trisomies, syndromes related to shape irregularities, single gene diseases with cytogenetic findings, gender development, sex chromosome anomaly syndromes. This information helps students understand modern genetic research and gain information about the technologies developed for the diagnosis and treatment of genetic diseases at the molecular and cytogenetic level.

TGN603 Diagnosis of Genetic Diseases

The aim of the Medical Genetics and Disease Diagnosis course is to teach the methods used in the diagnosis of genetically based diseases, laboratory tests and molecular analysis techniques, and to explain to students how genetic diseases are diagnosed and treated. This course also covers topics such as how to interpret genetic test results, genetic counseling and disease prediction. The aim is to provide students with a broad knowledge and understanding of the diagnosis and treatment of genetic diseases.

TGN604 Advanced Molecular and Cytogenetic Methods

The aim of the Advanced Molecular and Cytogenetic Methods course is to teach students the analysis methods and techniques used in molecular biology and to emphasize the use of these techniques in fields such as genetics, biotechnology, medicine and agriculture. This course will also provide students with basic information about the structures, functions and interactions of DNA, RNA and proteins. Students will also learn the latest technological developments used in molecular biology and their applications. In addition, the aim of the course is to learn the skills of advanced methods used in cytogenetics laboratories (FISH, Array technology / Array CGH), to create algorithms and to correlate them with clinical genetics applications, to interpret them, to discuss and to evaluate the results.

TGN607 Project Writing Techniques

The aim of the course is to provide students with information about the purpose of the project, the basic features of the project and the types of projects in preparation for academic life. This course aims to teach how to write the sections of the project and to examine national and international projects. In addition, it covers topics such as project planning, work packages, Gant charts, and reporting in terms of project management.

TGN609 New Genetic Methods in Individual Diagnosis and Treatment of Cancer

The general approach to cancer treatment is to add systemic chemotherapy to local treatments such as surgery and radiotherapy. In contrast, in recent years, the opportunity to offer patient and tumor-specific individualized treatment has begun to be seized. The aim of this course is to review new methods for the development of targeted treatments and the use of some biomarkers in the selection of those who will and will not benefit from these treatments, as well as individualization of cancer treatment.

TGN610 Analysis of Genetic Data and Artificial Intelligence

The purpose of the genetic data analysis and artificial intelligence course is to teach the methods and artificial intelligence techniques used in the analysis of genetic data and to provide students with the ability to work and research in these areas. This course provides students with basic information about the basic data processing methods used in the analysis of genetic data, statistical analysis techniques, and the application of artificial intelligence techniques such as machine learning and deep learning. This course also aims to provide students with programming skills to analyze and model biological data.

Elective Courses

TGN611 Epigenetics

The aim of the Epigenetics course is to understand how gene expression is regulated beyond heredity and how environmental factors affect it. Epigenetics involves gene expression regulation that is not dependent on changes in the DNA sequence. These regulations can be affected by environmental factors and therefore play an important role in many human diseases. This course aims to teach students the molecular mechanisms of epigenetic regulation, how epigenetic modifications are related to diseases, and how epigenetic technologies can be used for research and treatment.

TGN612 Molecular Basis of Neurological Diseases

The aim of the Molecular Basis of Neurological Diseases course is to provide students with an understanding of the molecular and cellular basis of neurological diseases, how these diseases occur and how they can be treated. This course teaches students the biochemical, genetic and molecular mechanisms of nervous system diseases and examines how these contribute to disease etiology and pathogenesis. In addition, this

It addresses how diseases are classified and treated in different categories such as neurodegenerative, neuroinflammatory, neuropsychiatric and neuro-oncological diseases.

TGN613 Biotechnology and Genetic Engineering

The aim of the Biotechnology and Genetic Engineering course is to teach students the basic principles, technologies and applications of biotechnology and genetic engineering. This course explains to students how biotechnology enables the production of new products, services and technologies using biological systems. It also examines how genetic engineering techniques can be used to modify genetic materials and how they can be used in different areas such as health, agriculture, industry and the environment. This course also helps students follow developments in biotechnology and genetic engineering and understand their effects on society.

TGN614 Drug Metabolism and Pharmacogenetics

The aim of the Drug Metabolism and Pharmacogenetics course is to provide students with basic information on how drugs are metabolized in the body, their effects, side effects, interactions and their effects that vary from person to person. In addition, it focuses on pharmacogenetics, examining the fact that the effects of drugs on different individuals are due to genetic differences. This course aims to teach the skills needed to understand the genetic factors that should be considered in the clinical decision-making process during drug therapy and the effects of these factors on disease treatment.

TGN615 Animal Models and Human Diseases

The aim of the Animal Models and Human Diseases course is to teach the methods used in the study of human diseases through the use of different animal species and the advantages and limitations of these animal models. This course covers how the basic pathological mechanisms of human diseases are studied in animal models, how these models help in understanding the mechanisms of human diseases and identifying new therapeutic targets for their treatment. The course also covers the ethical aspects of animal models and the issue of animal rights.

TGN616 Molecular Basis of Cancer and Cellular Signaling Pathways

The aim of this course is to provide students with information about the molecular and cellular basis of cancer. It is also aimed for students to learn how cells communicate with each other, how signaling occurs within the cell, how the resulting response and signaling pathways affect cell functions such as transcription, translation, intracellular protein trafficking and cell proliferation, and how pathological conditions develop due to the disruption of signaling.

TGN617 Genetic Epidemiology

The aim of the genetic epidemiology course is to examine the effects of genetic factors on disease development and spread and to teach the tools to be used to identify and control the genetic causes of diseases by combining this knowledge with epidemiological methods. This course covers topics such as the examination of genetic diseases, the interactions of genetic factors with environmental factors, the identification of genetic variations and the determination of the distribution of these variations in populations. It also provides information about the design, data analysis and interpretation of genetic epidemiology studies.

TGN618 Genome Editing and Ethics

The aim of the Genome Editing and Ethics course is to teach students how genome editing technology can be used, the advantages and disadvantages of this technology, ethical issues and application areas. This course helps students understand the potential of gene editing technologies, how they can be used in areas such as human health, agriculture and biotechnology, and the ethical, legal and social issues that may arise. It also provides information about ethical frameworks and legal regulations for the correct and responsible use of this technology.

TGN619 Bioinformatics Analysis and Applications

The aim of the Bioinformatics Analysis and Applications course is to provide students with an introduction to learning and applying the basic methods and tools used in the field of bioinformatics. This course teaches computer-based methods used for the analysis and interpretation of biological data (genomics, proteomics, metabolomics, etc.). In addition, this course covers topics such as accessing bioinformatics databases, downloading data, data analysis, and reporting results. Through this course, students gain the skills to analyze biological data, contribute to the understanding of biological systems, and find solutions to biological problems using bioinformatics tools.

TGN620 Stem Cell Biology and Gene Therapy

The aim of the Stem Cell Biology and Gene Therapy course is to provide students with basic information about stem cell biology, differentiation and use of stem cells, and innovative treatment methods such as gene therapy. This course will provide students with information about how genetic diseases occur, how they are diagnosed and treated. In addition, ethical issues related to the use of stem cells will be discussed. The aim of this course is to provide students with the basic knowledge and skills to conduct research in these areas.

TGN621 Genetics and Neuropsychiatry

The aim of the Genetics and Neuropsychiatry course is to teach students the basic concepts and principles in the fields of genetics and neuropsychiatry, and to provide information about research and findings in these fields. to ensure that they understand and to explain how these are reflected in clinical practice.

The Genetics and Neuropsychiatry course teaches students the effects of genetic factors on mental disorders and neurological diseases, diagnosis and treatment methods of neuropsychiatric diseases, pharmacological treatments, social effects of neuropsychiatric diseases and disease management strategies.

TGN622 Technological Developments in Molecular Genetics

The aim of the Technological Developments in Molecular Genetics course is to introduce students to the technological methods and tools used and newly developed in the field of molecular genetics, to teach the use of these technologies and to provide knowledge and skills on how they can be applied to molecular genetics research. This course is designed to help students understand and use the latest technological developments in molecular genetics.

TGN623 Prenatal Diagnosis and Applications

The aim of the Prenatal Diagnosis and Applications course is to learn the concept and philosophy of prenatal diagnosis of genetic diseases, to examine the indications for prenatal diagnosis in detail, to evaluate prenatal diagnosis techniques according to period and indication, to discuss the issues to be considered in informing the family before and after prenatal diagnosis, and to examine the latest developments in prenatal diagnosis.

TGN624 Monogenic Diseases

The aim of the Monogenic Diseases course is to provide information about the etiology, pathogenesis, clinic, laboratory tests (biochemical and molecular), diagnosis and treatment methods of monogenic diseases that are common in different societies.

TGN625 Diseases That Do Not Follow Mendelian Inheritance

The aim of the course on Diseases That Do Not Follow Mendelian Inheritance is to have knowledge about the types and characteristics of multigenic inheritance. To have knowledge about diseases that are inherited multifactorially and the effect of the environment on diseases. To have knowledge about the role of mitochondrial inheritance, gonosomal mosaicism, uniparental disomy and genomic imprinting in the formation of diseases, and the clinical diagnosis and treatment methods of such diseases. To have knowledge about the clinical diagnosis and treatment methods of diseases that do not follow Mendelian inheritance.

TGN626 Developmental Genetics and Teratology

The aim of the Developmental Genetics and Teratology course is to have knowledge about cellular differentiation, specialization, gene regulation mechanisms. To have knowledge about the development of systems and organs, mosaic and regulatory development, factors affecting normal embryonal development. To have knowledge about genes that activate hormones, various mechanisms in morphogenesis. To have knowledge about genotype and phenotype relationships in chromosomal anomalies. To have knowledge about gender development; Y chromosome, differences between mutagenesis and teratogenesis, formation mechanisms of various malformations.

TGN627 Dysmorphology

The aim of the dysmorphology course is to have information about the factors affecting morphogenesis, mutagenesis, teratogenesis, mutagenicity and teratogenicity tests, and examination methods in teratology. To have information about the frequency and etiology of malformations, types of malformations, and malformation formation mechanisms. To have information about the effects of drugs on the fetus, the effects of infections on the fetus, the effects of physical factors on the fetus, and maternal factors affecting the fetus. To have information about the approach to the child with malformation.

TGN628 Genetic Counseling

The purpose of the genetic counseling course is to teach the principles of genetic counseling and to provide the ability to provide genetic counseling to families at risk for genetic diseases.

TGN629 New Methods for Cancer Prevention “Cancer Vaccines”

In recent years, 'vaccine' has also come to the fore in cancer treatment. Immunotherapy, which is used after surgery, chemotherapy and radiotherapy, can stop or slow the development of cancer cells, prevent metastasis or strengthen the immune system to kill cancer cells. The aim of this course is to define immunotherapy and provide information about monoclonal antibodies, non-specific immunotherapies, oncolytic virus treatments, T-cell treatments and cancer vaccines.

TGN630 Scientific Research Methods and Scientific Ethics

Science and basic concepts (fact, knowledge, absolute, true, false, universal knowledge, etc.), basic information on the history of science, the structure of scientific research, scientific methods and different views on these methods, problem, research model, universe and sample, collection of data and data collection methods (quantitative and qualitative data collection techniques), recording, analysis, interpretation and reporting of data.

TGN650 Seminar

It includes topics such as research planning, literature review and topic selection, research method, selection of analysis methods and ethical problems, evaluation of research data and discussion of results, issues to be considered when writing an article, and principles to be followed in thesis writing.

TGN606 Thesis Proposal Preparation

Within the scope of this course, preparation for the proficiency exam and the submission of the thesis proposal form to the institute after passing the exam are carried out.