

ISTINYE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF STEM CELL AND TISSUE ENGINEERING (THESIS)
COURSE DESCRIPTIONS

1st SEMESTER

Adult Stem Cell Biology | 5 ECTS

In this course, the characteristics of mesenchymal stem cells, hematopoietic stem cells and even differentiated unipotent stem cells in adult individuals will be explained. In addition, isolation, characterization, culture and differentiation processes of these cells will be explained.

Basic Cell Culture And Aseptic Techniques | 5 ECTS

All contents of cell culture from following rules when entering a laboratory, content and usage of devices, aseptic conditions to different cell culture techniques will be covered predominantly by application by following 'do first, then correct' method.

Advanced Cell Biology | 5 ECTS

All intracellular structures from the cell nucleus to the membrane will be discussed in detail. At the same time, important signal mechanisms that function from DNA to intercellular space will be processed at the graduate level.

Scaffolds In Tissue Engineering | 5 ECTS

All scaffold types, which is required for cell adhesion, their features and in which cases they are used in tissue engineering will be explained. In addition, methods to be used in tissue engineering, which are compatible with stem cells, will be discussed.

Master Of Science Thesis Advisory-1 | 1 ECTS

Considering the interest of the student, interviews are conducted with supervisors. According to thesis subject, literature studies are performed and the final thesis subjects are planned.

Master of Science Specialized Field Course-1 | 4 ECTS

Following the transfer of basic informations about the thesis, students are trained in terms of having all knowledge of the thesis, following the thesis financially, performing experiments, interpreting and reporting results, writitng thesis and having role in publication. Materials for experiments are provided.

ELECTIVE COURSES

Clinical Stem Cell Applications I | 5 ECTS

How stem cells are used in which clinical field are examined by considering both advantages and disadvantages. Good and bad examples in the world are discussed with ethical aspects. The first part of the course is planned for the fields of Orthopedics, Dermatology and Plastic Surgery.

Molecular Biological Techniques I | 5 ECTS

Molecular biological methods which are DNA or RNA based methods such as PCR, electrophoresis, RT-PCR and sequencing will be studied. The course covers both theoretical and practical stages.

Biodegradable and Biocompatible Polymers | 5 ECTS

In this course, the polymeric biomaterials which are used in tissue engineering are examined. Biocompatible and biodegradable scaffolds, for example, poly(α -hydroxy esters) such as poly(lactic acid) and poly(glycolic acid), and the degree of porosity, degradation chemistries and fabrication of these polymers will be discussed in this course. Polymeric criteria required for 3-dimensional tissue regeneration, injectable polymers, collagen-like nanofibrous polymer skeletons, polymers that trigger bone formation, polymers that trigger cartilage formation, polymer/inorganic phase nanocomposites used in bone structure engineering, polymeric vascular structures, polymeric biomass used in myocardial tissue engineering, polymers used in kidney tissue engineering, polymers used in other organ engineering are included in this course content.

Basic Hematology, Immunology And Bone Marrow Transplantation | 5 ECTS

In the course, the issues related to cellular and humoral immunity will be discussed starting from the immunogenetic properties of cells. Then, basic hematology information will be given and hematopoietic stem cells, hematopoietic stem cell-related diseases, and bone marrow transplantation will be discussed.

Three-Dimensional Tissue Engineering I | 5 ECTS

Starting from three-dimensional cell culture methods, information about tissue engineering studies by plating cells on scaffolds is given. Then, 3D printers and their tissue engineering applications are emphasized. Applications are performed in 3D laboratory with theoretical training.

Advanced Microscopy Techniques | 5 ECTS

Microscopic examination which is the most important method in stem cell analysis is taught. Different types of microscopes are introduced and used. Then, the course covers the application of techniques related to stem cell microscopy. At the end of the course, students should be able to know all common types of microscopes and able to use multiple types.

Basic Polymer Chemistry | 5 ECTS

In this course, the general structure of polymers, polymerization processes and polymeric materials which are used in tissue engineering will be studied with the basics, especially health-based individuals will be informed about polymer chemistry, biochemical processes and usage areas of polymers.

Biostatistics | 2 ECTS

Statistics, which is the main component of scientific research, and biostatistics applications used in health field are taught. Procedures such as planning of the study, determining the number of samples are also included in the course. Microsoft Excel and SPSS programs, which are the most commonly used programs for statistical calculations, will be explained.

2nd SEMESTER

Pluripotent Stem Cells | 5 ECTS

The features of stem cell types such as embryonic stem cells which are only found in embryos, stimulated pluripotent stem cells which are obtained by following different methods are described. Their effective intracellular pathways and differentiation processes are covered. In addition, the methods of obtaining or forming these cells, characterization, culture and differentiation steps are discussed.

Seminars | 2 ECTS

The course consists of compilation and presentation of literature studies on the subject of the thesis. The student makes his/her presentation at the end of the semester. In addition, students prepare a seminar booklet and submit it to the Institute.

Tissue Engineering And Its Applications | 5 ECTS

In this course, materials, cell types and methods of present tissue engineering examples are examined. In addition, students can perform tissue engineering applications in the laboratory in line with their own ideas.

Scientific Research Techniques And Publication Ethics | 3 ECTS

Within the scope of the course, the necessary processes for a proper scientific research are given step by step, the correct and incorrect scientific research samples are examined, and the problems and solutions encountered in the stages before, during and after the experiments are discussed. Finally, the ethical rules to be followed in the publication of scientific researches and examples of their violations are emphasized.

Master Of Science Thesis Advisory-2 | 1 ECTS

Considering the interest of the student, interviews are conducted with supervisors. According to thesis subject, literature studies are performed and the final thesis subjects are planned.

Master Of Science Specialized Field Course-2 | 4 ECTS

Following the transfer of basic informations about the thesis, students are trained in terms of having all knowledge of the thesis, following the thesis financially, performing experiments, interpreting and reporting results, writing thesis and having role in publication. Materials for experiments are provided.

ELECTIVE COURSES

Biomedical Materials | 5 ECTS

Biomedical materials are examined with their chemical, physical and biological aspects, from construction materials used in tissue engineering, to the devices where they are produced and tested. Also, the devices used associated with stem cells and their use are covered in this course.

Three-Dimensional Tissue Engineering II | 5 ECTS

The course focuses on 3D bioprinters, their working principles, bioinks, design, modelling and printing of 3D tissues theoretically in addition to 3D bioprinter applications.

Clinical Stem Cell Applications II | 5 ECTS

How stem cells are used in which clinical field are examined by considering both advantages and disadvantages. Good and bad examples in the world are discussed with ethical aspects. The second part of the course is planned for the fields of Cardiology, General Surgery and Neuromuscular Degenerative Diseases.

Molecular Biological Techniques II | 5 ECTS

Molecular biological techniques which are protein/antigen-based methods such as immunohistochemistry, immunofluorescence staining, ELISA and Western blot are studied. The course covers both theoretical and practical stages.

Research Planning And Application | 5 ECTS

Students who take this course learn the scope of research topics in the field of stem cells and have the opportunity to perform preliminary researches on the subjects they are interested in from article analysis to practical applications. In this course, it is aimed that the students develop the thesis subjects before the end of the semester.

3rd SEMESTER

Master Of Science Thesis Advisory-3 | 4 ECTS

In this course, information required for thesis studies is given students by their supervisors.

Master Of Science Specialized Field Course-3 | 6 ECTS

The processes related to master thesis are carried out and the required scientific and practical topics are studied.

Thesis Project I | 20 ECTS

While the students continue to literature studies, they can perform experiments for their thesis studies under supervisors' supervision.

4th SEMESTER

Master Of Science Thesis Advisory-4 | 4 ECTS

In this course, information required for thesis studies is given students by their supervisors.

Master Of Science Specialized Field Course-4 | 6 ECTS

The processes related to conducting and completing the thesis are carried out and the required scientific and practical topics are studied.

Thesis Project II | 20 ECTS

While the students continue to literature studies, they can perform experiments for their thesis studies under supervisors' supervision.