

### COURSE RECORD

Code	<b>BENG 527</b>
Name	<b>Advanced Stem Cell Therapy</b>
Hour per week	3 (3 Theory + 0 Practice)
Credit	3
ECTS	7.5
Level/Year	Graduate
Semester	Fall
Type	Elective
Prerequisites	-
Description	This course aims at the comprehensive view of the advanced stem cell therapy with both embryonic and adult stem cells including characteristics at cellular and molecular levels, signaling transduction, stem cell interactions with their microenvironment and their role in regenerative medicine. The purpose of this course is to give point to advanced approaches of stem cell therapy involving in stem cell transplantation as a standard treatment for vascular, cardiac and bone disorders. Also, this course emphasizes the potential uses and limitations of stem cells for the treatment of hematological diseases, and ethical issues of stem cell applications in the regenerative medicine.
Objectives	<ul style="list-style-type: none"> <li>- Defining the current knowledge potential use and development of stem cell therapy and regenerative medicine.</li> <li>- Describing different types of stem cells and their specific characteristics, and also methods of applications to replace damaged or destroyed cells including tissue engineering.</li> <li>- Explaining the advanced applications of stem cell therapy to human diseases.</li> <li>- Evaluating current theories, methods and techniques within the research field and their advanced application in the stem cell therapy and tissue engineering.</li> </ul>
Learning Outcomes	<p>LO1- Explain scientific principles which underlie stem cell therapy and stem cell transplantation and human diseases connected to stem cell biology.</p> <p>LO2- Define various types of stem cells in the human body and the potential uses of stem cells in clinical practices.</p> <p>LO3- Interpret about the clinical, ethical, regulatory aspects of the applications of stem cell therapy and the principles underlying the equipment, reagents, databases and methods commonly used for research in the advanced stem cell therapy.</p> <p>LO4- Use advance laboratory techniques in stem cell research, and also scientific questions in the advanced stem cell therapy.</p>

### CONTRIBUTION TO PROGRAMME OUTCOMES\*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
LO1	5	5	5	5	5	3	5	0	0	0	0	0
LO2	5	5	5	5	5	3	5	3	3	3	3	3
LO3	0	0	0	0	0	5	5	5	5	5	5	5
LO4	0	0	0	0	0	5	5	5	5	5	5	5

\* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

### COURSE CONTENT DETAILS

Topics	Outcomes
Introduction to advanced stem cell therapy and regenerative medicine, Embryonic stem cells (ESCs) and induced pluripotent stem cells (iPSCs) with their clinical applications, current status of human ESCs and iPSCs in regenerative medicine.	LO1, LO2
Mesenchymal Stem Cells (MSCs) and their therapeutic applications, The latest advances for MSCs therapy.	LO1, LO2
The interaction between Extracellular microenvironments (ECM) and Stem Cell Therapy, Biomaterials including natural, synthetic and composite	LO3, LO4

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components and their effects on the advanced Stem Cell Therapy, Tissue and organ fabrication via decellularization in 2D and 3D.

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Vascular, cardiac and bone tissue engineering with the advanced stem cell therapy (blood-contacting biomaterials and functional blood vessels), (approaches, cardiac patches and maturation of differentiating cardiomyocytes), (maturation of differentiating osteoblastic and osteoclastic cells). L03, L04

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Introduction to immunology, immunomodulation and anti-inflammation for stem cell therapy, Use of large animal models and nonhuman primate models for regenerative medicine research, and also ethical concerns on stem cell clinical trials. L03, L04

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### **DERS BİLGİLERİ**

Kodu	<b>BENG 527</b>
İsmi	<b>Gelişmiş Kök Hücre Tedavisi</b>
Haftalık Saati	3 (3 Teorik + 0 Pratik)
Kredi	3
AKTS	7,5
Seviye/Yıl	Lisansüstü
Dönem	Güz
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	-
İçerik	Bu ders, hücreSEL ve moleküler düzeydeki özellikler, sinyal iletimi, kök hücrelerin mikroçevresiyle etkileşimi ve rejeneratif tıptaki rolleri de dahil olmak üzere hem embriyonik hem de yetişkin kök hücrelerle ileri düzeyde kök hücre tedavisine kapsamlı bir bakış açısı sunmayı amaçlamaktadır. Bu dersin amacı, damar, kalp ve kemik hastalıklarının standart tedavisi olan kök hücre naklini içeren kök hücre tedavisine ilişkin ileri yaklaşımlara dikkat çekmektedir. Ayrıca bu ders, hematolojik hastalıkların tedavisinde kök hücrelerin potansiyel kullanımları ve sınırlamaları ile rejeneratif tıpta kök hücre uygulamalarının etik konularını vurgulamaktadır.

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