

Curriculum for Tissue Engineering Program (PhD)

Core courses: 24
 Elective Courses: 6
 Thesis: 20
 Total: 50

Table : A

Compensatory courses

Code	Courses	Credits			Hours			Prerequisite
		Theoretical	Practical	Total	Theoretical	Practical	Total	
01	Medical Information systems	0.5	0.5	1	9	17	26	-
02	General Anatomy and Embryology	1	0.5	1.5	17	17	34	-
03	Histology	1	0.5	1.5	17	17	34	-
04	Cell Physiology	2	-	2	34	-	34	-
05	General Pathology	2	-	2	34	-	34	-
06	General Pharmacology	2	-	2	34	-	34	-
07	Fundamentals of Immunology	2	-	2	34	-	34	-
08	Cellular and Molecular Biology	2	-	2	34	-	34	-
09	Statistics and Research Methods	2	-	2	34	-	34	-
10	Genetics	1	-	1	17	-	17	-
11	Biomechanics	2	-	2	34	-	34	-

12	Fundamentals of Materials Sciences	2	-	2	34	-	34	-
13	Fundamentals of Biochemistry	2	-	2	34	-	34	-
14	Fundamentals of Biophysics	2	-	2	34	-	34	-
	Total	25						

According to the department schedule and by the approval of post-graduate education council, Ph.D. students are due to take a maximum of 16 credits from the aforementioned courses (Table A).

Table : B

Core courses

	Courses	Credits			Hours			Prerequisite
		Theoretical	Practical	Total	Theoretical	Practical	Total	
15	Principals of Tissue Engineering	2	0.5	2.5	34	17	51	02, 03, 04, 05, 06, 07
16	Care and Use of Laboratory Animals	1	1	2	17	34	51	-
17	Cell Culture	2	1	3	34	34	68	03
18	Histological Study Methods	1	1	2	17	34	51	-
19	Bioinformatics, Research Methods,	1.5	2	3.5	26	68	94	08, 09

	Clinical Trials							
20	Mechanisms of Tissues and Organs Repair	2	0.5	2.5	34	17	51	15
21	Bio-scaffolds	2	1	3	34	34	68	-
22	Graft Biology and Immunology	1.5	0.5	2	26	17	43	07
23	Molecular Techniques and Advanced Cellular Signaling	2.5	1	3.5	43	34	77	08
24	Thesis	20						
	Total	44						

Table : C

Elective courses

Code	Courses	Credits			Hours			Prerequisite
		Theoretical	Practical	Total	Theoretical	Practical	Total	
25	Cellular Bank	1.5	0.5	2	26	17	43	15, 20
26	Angiogenesis	1.5	0.5	2	26	17	43	04, 05, 06
27	Effective strategies for communicating with Policymakers and Investors	1.5	0.5	2	26	17	43	-

28	Ethics in Medical Education	2	-	2	34	-	34	-
29	Molecular Genetics	1.5	0.5	2	26	17	43	08, 10
30	Nanobiotechnology	2	-	2	34	-	34	-
31	Three Dimensional Cell Culture	1	1	2	17	34	51	17
	TOTAL	14						

After supervising professor's consent and approval of post-graduate education council, students are due to take 6 credits of the aforementioned courses that are relevant to the theme of their Ph.D. thesis (Table C).

Course & Lesson plan for the first semester

Course Plan

- 1. General Anatomy and Embryology**
- 2. Histological Study Methods**
- 3. Cell Culture**
- 4. Fundamentals of Immunology**
- 5. Fundamentals of Materials Sciences**

Course & Lesson plan for the second semester

Course Plan

- 1. Principals of Tissue Engineering**
- 2. Graft Biology and Immunology**
- 3. Molecular Techniques and Advanced Cellular Signaling**
- 4. Bio-scaffolds**
- 5. Three Dimensional Cell Culture**

Course & Lesson plan for the third semester

Course Plan

- 1. Mechanisms of Tissues and Organs Repair**
- 2. Nanobiotechnology**
- 3. Cellular Bank**
- 4. Bioinformatics, Research Methods, Clinical Trials**
- 5. Care and Use of Laboratory Animals**

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First semester

No	Course name	The number of unites			Type	Description
		theo	prac	total		
1	Histological methods	1	1	2	Core	Introduction to cellular phenotype using immunochemistry and cell sorting
2	Cell Culture	2	1	3	Core	Introduction to cell culture, cell and tissue imaging and application of stem cells in tissue regeneration
3	Fundamentals of Immunology	2	-	2	Compensatory	Introduction to the immune system and its function
4	Fundamentals of Materials	2	-	2	Compensatory	Introduction to materials, their properties and biomedical applications
5	General Anatomy and Embryology	1	0.5	1.5	Compensatory	Introduction to the general human anatomy and the early stages of embryo development
Total				10.5		

Second semester

No	Course name	The number of unites			Type	Description
		theo	prac	total		
1	Principles of Tissue Engineering	2	0.5	2.5	Core	Advanced strategies in tissue engineering

2	Molecular techniques and advanced cell signaling	3	1	4	Core	Detailed knowledge of the regulatory mechanisms of cell and molecular techniques commonly used in medical research and gene therapy
3	Three Dimensional Cell Culture	1	1	2	Elective	principles of three dimensional cell culture
4	Scaffolds in Tissue engineering	2	1	3	Core	Introduction to material selection and methods of scaffold fabrication and characterization
5	Biology and immunology of transplantation	2	-	2	Core	Introduction to the patient's immune reactions after transplantation of tissue engineered construct.
	Total			13.5		

Third semester

No	Course name	The number of unites			Type	Description
		theo	prac	total		
1	Mechanisms of organs repair	3	-	3	Core	Understanding the mechanisms of regeneration in organs and tissue engineered constructs
2	Bioinformatics, research methods, clinical trial methods	1.5	2	3.5	Core	The use of online molecular databases, introduction to research methodology and application of statistical softwares
3	Animal Models	1	1	2	Core	Handling animal models used in biomedical researches
4	Cell and tissue banks	1.5	0.5	2	Elective	Overview of cell-lines and maintenance procedures of cells and tissues
5	Nanobiotechnology	2	-	2	Elective	Introduction to nanobiotechnology concepts and techniques
	Total			12.5		