IMMUNOHISTOCHEMISTRY TECHNIQUES

1	Course Title:	IMMUNOHISTOCHEMISTRY TECHNIQUES	
2	Course Code:	THE6004	
3	Type of Course:	Compulsory	
4	Level of Course:	Third Cycle	
5	Year of Study:	1	
6	Semester:	2	
7	ECTS Credits Allocated:	3.00	
8	Theoretical (hour/week):	1.00	
9	Practice (hour/week):	2.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	NONE	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Prof. Dr. ZEHRA MİNBAY	
15	Course Lecturers:	Prof. Dr. Zehra MİNBAY Prof. Dr. Özhan EYİGÖR	
16	Contact information of the Course Coordinator:	zminbay@uludag.edu.tr (224) 295 40 64 Bursa Uludağ Üniversitesi Tıp Fakültesi Histoloji ve Embriyoloji AD 16059 Nilüfer Bursa	
17	Website:		
18	Objective of the Course:	To educate researchers; who comprehend the detailed knowledge of and immunohistochemical techniques, who acknowledge the area of usage and the differences of these techniques and who can employ these techniques.	
19	Contribution of the Course to Professional Development:	It contributes to make him or her a researcher who can conduct scientific research by providing knowledge and skills about laboratory techniques used in histology discipline.	
20	Learning Outcomes:		
		1	Comprehend the principles and protocols of immunohistochemical techniques
		2	Determine antibodies, blocking agents and AR methods to be used in multiple immunohistochemical techniques
		3	Choice the appropriate immunohistochemical protocol to be used in experimental studies
		4	Provide solutions to problems arising during labeling protocols
		5	Employ light and flourescence immunohistochemical techniques
		6	Perform light and flourescence microscopic analyses in immunohistochemistry
		7	Quantitavely analyse the preparations resulted after immunohistochemical staining
		8	Comprehend the electron microscopic immunohistochemistry techniques
		9	
		10	
21	Course Content:		

	Course Content:	
Week	Theoretical	Practice
1	Immunohistochemistry (IHC) and immunocytochemistry (ICC): Similarities and differences, Types and structures of immunoglobulins	Presentation of the immunohistochemistry laboratory and equipment
2	Preparing Tissues for IHC Staining - Fixation, fixatives, tissue tracking, antigen retrieval	Perfusion fixation
3	Primary and secondary antibodies: Types, characteristics	Antigen Retrieval
4	Selection and optimization of primary antibody	Cutting Tissue Sections - cryostat
5	Washing buffers, blocking buffers, antibody diluents, covering materials, permeabilization agents for IHC	Preparing various solutions for IHC
6	Detection and visualization of the antigen-antibody complex - Enzyme conjugates and chromogenic substrates	Cutting tissue sections - vibrotom
7	Detection and visualization of the antigen-antibody complex - Fluorescent probes	Cutting tissue sections - microtome
8	Staining Protocols - Fluorescence Protocols	Indirect immunofluorescence technique on the free-floating sections
9	Staining Protocols - Chromogenic Protocols	Indirect immunoperoxidase staining for paraffin-embedded sections
10	Multiple Immunochemical Staining Techniques	Dual indirect immunofluorescence technique for free-floating sections
11	Immunohistochemistry at the ultrastructural level	Preembedding immunohistochemistry for electron microscopy and analysis
12	Troubleshooting immunochemical staining procedures – background staining	Light microscopical analysis of the preparations
13	Troubleshooting immunochemical staining procedures – weak signal and autofluorescent IHC Controls	Light and fluorescence microscopical analysis of the preparations
14	Microscopical examination, quantitative analysis, collection of digital Imagesand their presentation	Quantitative analysis of immunohistochemical stainings
22	Textbooks, References and/or Other Materials:	1. Kalyuzhny AE. Immunohistochemistry Switzerland: Springer International Publishing; 2016. 2. Renshaw S.Immunohistochemistry and Immunocytochemistry_ Essential Methods. 2nd edition. West Sussex:Wiley-Blackwell; 2017. 3. Lin F, Prichard J. Handbook of Practical Immunohistochemistry_ Frequently Asked Questions. 2nd edition. New York: Springer-Verlag; 2015. 4. Buchwalow IB, Böcker W. Immunohistochemistry_ Basics and Methods. Berlin Heidelberg: Springer-Verlag; 2010. 5. Burns R. Immunohistochemical Protocols. 3rd edition. Totowa: Humana Press; 2005. 6. Kumar GL. Education Guide – Immunohistochemical (IHC) Staining Methods. 5th edition. California: DAKO, 2009.
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	0	0.00

Quiz	0	0.00
Home work-project	0	0.00
Final Exam	1	100.00
Total	1	100.00
Contribution of Term (Year) Learning Activities to Success Grade		0.00
Contribution of Final Exam to Success Grade		100.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		Measurement and evaluation are performed according to the Rules & Regulations of Bursa Uludağ University on Undergraduate Education.

24 ECTS / WORK LOAD TABLE

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	1.00	14.00
Practicals/Labs	14	2.00	28.00
Self study and preperation	14	1.00	14.00
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	0	0.00	0.00
Others	7	3.00	21.00
Final Exams	1	15.00	15.00
Total Work Load			92.00
Total work load/ 30 hr			3.07
ECTS Credit of the Course			3.00

25 CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS

	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	5	5	5	4	4	0	5	0	3	0	0	2	0	0	0	0
ÖK2	5	5	5	4	4	0	5	0	3	0	0	2	0	0	0	0
ÖK3	5	5	5	4	4	0	5	0	3	0	0	4	0	0	0	0
ÖK4	5	5	5	4	4	0	5	0	3	0	0	5	0	0	0	0
ÖK5	5	5	5	4	4	0	5	0	3	0	2	2	0	0	0	0
ÖK6	5	5	5	4	4	0	5	0	3	4	2	2	0	0	0	0
ÖK7	5	5	5	4	4	0	5	0	3	4	2	0	0	0	0	0
ÖK8	5	5	5	4	4	4	5	0	3	0	0	2	0	0	0	0

LO: Learning Objectives PQ: Program Qualifications

Contribution Level:	1 very low	2 low	3 Medium	4 High	5 Very High