

Dentistry (English)			
Bachelor	TR-NQF-HE: Level 6	QF-EHEA: First Cycle	EQF-LLL: Level 6

Course Introduction and Application Information

Course Code:	DENT104		
Course Name:	Biophysics		
Semester:	Fall		
Course Credits:	ECTS 2		
Language of instruction:	English		
Course Condition:			
Does the Course Require Work Experience?:	No		
Type of course:	Compulsory Courses		
Course Level:	Bachelor TR-NQF-HE:6. Master`s Degree</div> <div>QF-EHEA:First Cycle</div> <div>EQF-LLL:6. Master`s Degree		
Mode of Delivery:	Face to face		
Course Coordinator:	Dr. Öğr. Üy. DENİZHAN KARIŞ		
Course Lecturer(s):	Dr. Denizhan Kariş		
Course Assistants:			

Course Objective and Content

Course Objectives:	The aim of the course is to investigate the biological systems with the biophysical perspective. In other words, in this course the biological functions which have physical basis are going to be discussed.
Course Content:	This course will focus on the definition of the biophysical research, its applications and tools, molecular interactions, bonds and biophysical features of water and its role in organism,

bioenergetics, energy flow in organisms, transport mechanisms through membranes, electrical properties of cells, structure and function of the ion channels, bioelectric potentials, action potentials, neuronal transmission in myelin sheathed nerve fibers, compound action potentials, biophysics of sensation, biophysics of blood circulation, biophysics of respiration, biophysics of vision, biophysics of hearing, basic principles in ultrasound, radiation biophysics, clinical applications of biophysical principles.

Learning Outcomes

The students who have succeeded in this course;

- 1) Acquires concepts, principles and methodology of biophysics.
- 2) Learns the importance of the laws of physics in understanding biological phenomena.
- 3) Learns the function of ion channels, the contribution of the ion fluxes on the membrane potential, components and physiological importance of the action potential, the approaches that used for measuring the function of excitable tissues and reading the electrographs.
- 4) Discusses the principles of circulatory system, respiratory system and sense of sight and hearing.
- 5) Discusses the basic principles of neuronal transmission.
- 6) Understand the biomechanical properties of the biological tissues.
- 7) Has knowledge about the mechanisms of molecular and physical interactions in the formation of diseases.
- 8) Incorporates interdisciplinary work into skills.

Course Flow Plan

Week	Subject	Related Preparation
1)	Introduction to biophysics, Basic structure of living organisms, Molecular structure of living organisms	
2)	Water, Biophysical properties of the water, Adhesion, Cohesion	
3)	Biophysical features of biomolecules; Enzymes and their physical characteristics	
4)	Bioenergetics	
5)	Cell membrane, Structure of cell membrane; Transport mechanisms through membranes; Ion channels	
6)	Membrane potentials; Resting and action potential	
7)	Nerve conduction, Muscle contraction; Basic Principles of ECG, EEG and EMG	
8)	Midterm Exam	
9)	Sensory system; Trace elements	
10)	Biomechanics	

11)	Fluid Mechanics; Blood and its features; Biophysics of blood circulation; Biophysics of respiration	
12)	Biophysics of hearing; Biophysics of vision	
13)	Radiation biophysics	
14)	Clinical applications of imaging and diagnosis in dental practice	
15)	Final exam	

Sources

Course Notes / Textbooks:	Biophysics Demystified, Daniel Goldfarb, 3Mc Graw Hill Publications, 2011.
References:	1. Biyofizik Yöntemler Biyolojik Etkiler Önlemler, Prof. Dr. Hamza Esen ve Prof. Dr. Ferhan Esen, Hacettepe Taş Yayınları, 2017. 2. Biyofizik, Prof. Dr. Ferit Pehlivan, 8. Baskı, Pelikan Yayınları, 2015. 3. Bütünleştirilmiş Moleküler ve Hücrel Biyofizik, Valeria Raicu ve Aurel Popescu, Çeviri editörü: Prof. Dr. Rüstem Nurten, İstanbul Medikal Yayınları, 2014. 1. Biyofizik Yöntemler Biyolojik Etkiler Önlemler, Prof. Dr. Hamza Esen ve Prof. Dr. Ferhan Esen, Hacettepe Taş Yayınları, 2017. 2. Biyofizik, Prof. Dr. Ferit Pehlivan, 8. Baskı, Pelikan Yayınları, 2015. 3. Bütünleştirilmiş Moleküler ve Hücrel Biyofizik, Valeria Raicu ve Aurel Popescu, Çeviri editörü: Prof. Dr. Rüstem Nurten, İstanbul Medikal Yayınları, 2014. 4. Biophysics Demystified, Daniel Goldfarb, 3Mc Graw Hill Publications, 2011. 5. Biyofizik Ders Kitabı, Editör Prof. Dr. Şefik Dursun, İstanbul Üniversitesi Yayın No: 4890, Cerrahpaşa Tıp Fakültesi Yayın No: 278, 2010. 6. Biyofiziğe Giriş, Osman Ziya Sayhan, Evrim Kitapevi, 2010. 7. Biyomedikal Fizik; Gürbüz Çelebi; Barış Yayınları Fakülteler Kitabevi; 2008. 8. Physics for Scientists and Engineers, Raymond A. Serway and John W. Jewett, 6th Edition, Thomson Brooks/Cole, 2004. 9. An Introduction to BIOPHYSICS, Roland GLASER, ISBN 978-3-642-25212-9 10. Temel Biyofizik Cilt 1: Biyomekanik Konu Anlatımlı, Problem Çözümlü, Test Soruları İsmail Günay Çukurova Nobel Tıp Kitapevi

Course - Program Learning Outcome Relationship

Course Learning Outcomes	1	2	3	4	5	6	7	8
Program Outcomes								
1) Has basic and up-to-date knowledge in the field of dentistry, follows scientific publications, and applies evidence-based data to	2	2	2	2	2	2	2	

his/her professional practice.								
Course Learning Outcomes	1	2	3	4	5	6	7	8
2) Knows well and effectively uses devices, tools, and materials specific to diagnosis and treatment in the field of dentistry.								
3) Evaluates the knowledge in the field of dentistry critically, integrates it with the knowledge of disciplines in the field of health, uses it by analyzing and synthesizing it.								
4) Produces projects related to the field of dentistry, can work with other health disciplines, takes part as a member of the research team and evaluates and reports the results obtained at a scientific level.								3
5) Uses information that will contribute to the dentistry profession during practice, takes responsibility, and produces solutions in unforeseen situations.	1	1	1	1	1	1	1	
6) Shares, compares, and exchanges dental knowledge with professional colleagues in social and scientific environments in written, verbal, and visual forms.								
7) Within the framework of social, scientific, and ethical values including patient privacy, communicates with patients and their relatives, knows all the characteristics of the patient, and recommends the most appropriate treatment with a patient-centered approach.								
8) Follows technological developments, participates in national and international studies, and shares and presents own observations, experiences, and research to further advance dental practices.								
9) By adopting the principle of lifelong learning throughout the dentistry profession, follows current evidence-based dental knowledge and uses it during his professional practice.								
10) During dental practice, in cases such as abuse and addiction, performs the treatment by exhibiting the behaviors required by social ethics and legal rules, and collects and records the relevant data.								
11) Uses basic and current knowledge in the field of dentistry during professional practice for the benefit of society within the framework of national values and country realities.								
12) In natural disasters and emergency cases, takes the protective measures required by the dentistry profession; performs								

professional practices that benefit patients and society								
Course Learning Outcomes	1	2	3	4	5	6	7	8
13) Generates ideas regarding health policy in dentistry, prioritizes individual and public health, and carries out preventive and therapeutic medical practices within the framework of scientific, ethical, and quality processes.								
14) Differentiates the signs and symptoms commonly encountered in the dentistry profession, makes a treatment plan and refers when necessary, and manages diseases and clinical situations regarding their urgency and patient priority.								
15) Can assume the leadership responsibility of the team he/she works for, manage it following scientific criteria, and support the professional development of the team.								

Course - Learning Outcome Relationship

No Effect	1 Lowest	2 Average	3 Highest

	Program Outcomes	Level of Contribution
1)	Has basic and up-to-date knowledge in the field of dentistry, follows scientific publications, and applies evidence-based data to his/her professional practice.	2
2)	Knows well and effectively uses devices, tools, and materials specific to diagnosis and treatment in the field of dentistry.	
3)	Evaluates the knowledge in the field of dentistry critically, integrates it with the knowledge of disciplines in the field of health, uses it by analyzing and synthesizing it.	
4)	Produces projects related to the field of dentistry, can work with other health disciplines, takes part as a member of the research team and evaluates and reports the results obtained at a scientific level.	1
5)	Uses information that will contribute to the dentistry profession during practice, takes responsibility, and produces solutions in unforeseen situations.	1
6)	Shares, compares, and exchanges dental knowledge with professional colleagues in social and scientific environments in written, verbal, and visual forms.	
7)	Within the framework of social, scientific, and ethical values including patient privacy, communicates with patients and their relatives, knows all the characteristics of the patient, and recommends the most appropriate treatment with a patient-centered approach.	

8)	Follows technological developments, participates in national and international studies, and shares and presents own observations, experiences, and research to further advance dental practices.	
9)	By adopting the principle of lifelong learning throughout the dentistry profession, follows current evidence-based dental knowledge and uses it during his professional practice.	
10)	During dental practice, in cases such as abuse and addiction, performs the treatment by exhibiting the behaviors required by social ethics and legal rules, and collects and records the relevant data.	
11)	Uses basic and current knowledge in the field of dentistry during professional practice for the benefit of society within the framework of national values and country realities.	
12)	In natural disasters and emergency cases, takes the protective measures required by the dentistry profession; performs professional practices that benefit patients and society	
13)	Generates ideas regarding health policy in dentistry, prioritizes individual and public health, and carries out preventive and therapeutic medical practices within the framework of scientific, ethical, and quality processes.	
14)	Differentiates the signs and symptoms commonly encountered in the dentistry profession, makes a treatment plan and refers when necessary, and manages diseases and clinical situations regarding their urgency and patient priority.	
15)	Can assume the leadership responsibility of the team he/she works for, manage it following scientific criteria, and support the professional development of the team.	

Assessment & Grading

Semester Requirements	Number of Activities	Level of Contribution
Midterms	1	% 30
Final	1	% 70
total		% 100
PERCENTAGE OF SEMESTER WORK		% 30
PERCENTAGE OF FINAL WORK		% 70
total		% 100

Workload and ECTS Credit Calculation

Activities	Number of	Preparation for the	Spent for the	Completing the Activity	Workload
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	Activities	Activity	Activity Itself	Requirements	
Course Hours	14	0	2		28
Midterms	1	7	1		8
Final	1	10	1		11
Total Workload					47