Jordan University of Science and Technology
Faculty of Applied Medical Sciences
Department of Allied Medical Sciences
Anatomy & Physiology of Hearing
First Semester 2016-2017
Course Syllabus

Course Information	
Course Title	Anatomy & Physiology of Hearing
Course code	AS225
Credit Hours	2 credit hours (theory)
Lecturer	Dr. Safa Alqudah
Office Location	Faculty of Applied Medical Science building, Second floor
E-mail	Salqudah@just.edu.jo
Course Description	
Advanced study of the anatomical and physiological properties of the human auditory and vestibular systems.	

Text Book	
Readings from various journals, textbooks and websites will be explained during the lectures in the format of PowerPoint presentation	
More Useful Resources Reserved in the library	Outer and Middle Ear http://quizlet.com/17943137/hearing-anatomy-ch-8-outer-ear-and-middle-ear-flash-cards/ http://www.allearseducation.org/resources/Tutorial-2-ANATOMY-OF-OUTER-EAR.pdf http://musom.marshall.edu/anatomy/grosshom/allppt/pdf/EarLectureff2.pdf http://www.who.int/occupational_health/publications/noise2.pdf http://www.dartmouth.edu/~humananatomy/part_8/chapter_44.html http://www.ghorayeb.com/middleearanatomy.html Inner Ear: http://oto2.wustl.edu/cochlea/intro1.htm http://oto2.wustl.edu/cochlea/intro2.htm http://oto2.wustl.edu/cochlea/intro3.htm http://oto2.wustl.edu/cochlea/ep.htm http://oto2.wustl.edu/cochlea/res1.htm http://www.cochlea.eu/en/cochlea/organ-of-corti http://www.interactive-biology.com/1939/the-function-of-the-organ-of-corti-episode-39/

Assessment Policy	
Assessment Type	**Weight**
First Exam	20%
Second Exam	20%
Final Exam	40%
Quizzes	15%
Participation	5%
Total	100%

Course Objectives	Percentage
Increasing the student's knowledge of anatomy of auditory system	25%
Discussing the physiological function of several structures inside the central and peripheral auditory system	25%
Provide the students with a basic and applied understanding of the structure of the human vestibular system	25%
Giving particular attention to the function of the vestibular system in maintain the balance in human species	25%

Teaching & Learning Methods
Textbook, handouts, audio-video presentation, power point presentations. **Teaching duration**: • Duration: 15 weeks • Lectures: 30 lectures, 60 minutes each, including 1 hour 1st ,2nd exams.

Additional Notes	
Assignments	The student has one week from the time any test, assignment, or lab summary is returned to the class to appeal the grade. Quizzes might be given for each chapter.
Exams	The course will be broken into 3 exams. Exams will include short essay and multiple choice questions Make-up exam including quizzes will be granted for excused absence only Extenuating circumstances (PRIOR approval should be obtained or direct contact made with the instructor within 24 hours)
Cheating	The instructor will follow JUST's rules and regulation
Attendance	Attendance will count for points in this class. The student is responsible for any information discussed in lecture. It is **imperative** to attend all classes!
Graded Exams	Exams will include essay and multiple choice questions The student has one week from the time any test is returned to appeal the grade.
Expected work load	Students are expected to work hard in order to ensure a high quality learning
feedback	Concerns or complaints should be expressed in the first instance to the course instructor. Questions about the material covered in the lecture, notes on the content of the course, its teaching and assessment methods can be also sent by e-mail to the following address salqudah@just.edu.jo

Learning Outcomes: Upon successful completion of this course, students will be able to

	Outcomes
1	Give a brief introduction about the anatomy and physiology of auditory system
2	Describe the anatomy of pinna and external auditory canal.
3	Describe the physiological functions of pinna and external auditory canal.
4	Explain all the nerves, arteries and veins responsible for the innervation and blood supply of pinna and external auditory canal
5	Explain the anatomy of the ossicular chain and the Eustachian tube.
6	Identify the main functions of ossicular chain and Eustachian tube
7	Define the position and the layers composed the tympanic membrane
8	List the main landmarks served as a clue for a normal tympanic membrane
9	Explain the role of tympanic membrane in processing the auditory signal
10	Define the lever action of ossicular chain and the mechanical advantage arise from this action
11	Name the muscles attached the small bony ossicles in addition to describe their involvement in the hearing
12	Explain the innervation and blood supply of the middle ear
13	Determine the main two sensory parts of the inner ear
14	Describe the cochlear structures and substructures participating in the hearing sense
15	Explain the composition, source, and location of the perilymph and endolymph fluids inside the cochlea
16	Explain the process of converting the mechanical energy to hydroelectric impulses done by cochlear structures

17	Learn the differences in the shape, anatomy, location, and function between the outer and inner hair cells
18	Explain the efferent and afferent neural systems attached to the outer and inner hair cells, respectively.
19	Name the common electrical potentials of the cochlea and eight cranial nerve
20	Understand the process of initiating the action potential
٢١	Describe the neural transmission of the electrical signals through the auditory vestibular nerve
٢٢	Learn the variations in the physiology and anatomy of the cochlear and vestibular branches
٢٣	Discussing the central auditory pathway with listing the major nuclei involving in the auditory signal processing at the level of brain
٢٤	Describe the orientation of semicircular canals
٢٥	Identify the important role of the semicircular canals in detecting the angular acceleration
٢٦	Determine the sensory structure of the semicircular canals that is sensitive to the head movement
٢٧	Explain the special organization in the saccule and utricle
٢٨	Illustrate the primary involvement of saccule and utricle in identifying the liner acceleration
٢٩	Explain the neural pathway of transmitting the balance information to the brain
٣٠	Link all the information regarding the individual function of each hearing structure together to make a full understanding of the hearing physiology

Topic Outline and Schedule

Date	Topic	Readings & Assignments
Week 1	**Introduction to Course** **The anatomy and Physiology of outer ear** • **Pinna** • **External auditory canal**	

Week 2	**The vascular system and neural innervation of outer ear** **The anatomy and physiology of tympanic membrane** **The anatomy and physiology of middle ear** • **Ossicles (malleus, incus, stapes**)	• **Quiz (1)**
Week 3	**Middle Ear:** • Ossicles (malleus, incus, stapes) • Eustachian tube • Middle Ear cavity **The vascular system and neural innervation of middle ear** **Exam review**	• **Quiz (2)**
Week 4	**Inner ear:** • Cochlea (Organ of Corti) ➢ Hair cells ➢ Basilar membrane	

Week 5	**Inner ear:** • Cochlea ➢ Perilymph fluid ➢ Endolymph fluid ➢ Tectorial membrane ➢ Stria vascularis ➢ Fibrocytes ➢ Supporting cells **The vascular system and neural innervation of middle**	• **Quiz (3)**
Week 6	**Auditory vestibular nerve** • Internal auditory canal • Afferent and efferent systems • The tuning characteristics of auditory vestibular nerve • Fibers type I and II	• ***Quiz (4)***
Week 7	***Auditory Central system (1)***	• **Quiz (5)**
Week 8	***Auditory Central system (2)*** ***Exam review***	• **Quiz (6)**

Week 9	**Vestibular system** • Angular Acceleration ➢ Semicircular canals	• **Quiz (7)**
Week 10	**Vestibular system** ➢ Semicircular canals (cont) • Liner acceleration ➢ Utricle ➢ Saccule • Vestibular Auditory nerve	• **Quiz (8)**
Week 11	**Processing Vestibular signals (1)**	• **Quiz (9)**
Week 12	**Processing Vestibular signals (2)**	• **Quiz (10)**
Week 13	***Final Review***	

The instructor reserves the right to make changes in the above syllabus at any time. The student has the right to be informed of any changes.

Best wishes in your semester