

HEARING TESTS AND MEASUREMENT
Audiology and Speech Language Pathology 438 (3.0 credits)
David L. McPherson, Ph.D. - 129 TLRB
422-6458 (office) - 375-9166 (home)

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HEARING TESTS AND MEASUREMENT**Audiology and Speech Language Pathology 438 (3.0 credits)**

Monday, Wednesday & Friday - 9:00am - 9:50am - 177 TLRB

David L. McPherson, Ph.D. - 129 TLRBmailto:david_mcperson@byu.edu**422-6458 (office) - 375-9166 (home)****COURSE DESCRIPTION**

This course is required for all undergraduate students majoring in Audiology and Speech-Language Pathology. This course meets the American Speech-Language-Hearing Association's (ASHA) certification requirements for course work in assessment and pathologies of the auditory system.

This course presents primary skill development in the administration and interpretation of basic tests of auditory disorders including pure tone air- and bone-conduction threshold testing, speech audiometry, fundamentals of middle ear and inner ear measurements, and infant and school hearing screening. Anatomy and physiology of the normal and pathological auditory system are reviewed.

COURSE OBJECTIVES

- A. To develop a theoretical and practical knowledge of hearing tests and measurements in the field of communicative disorders.
- B. To become proficient in the administration of standard audiological testing in adults and children.
- C. To understand the role of audiology in auditory and speech-language disorders.
- D. To gain the fundamentals of gathering case history information and report writing.

TEXTBOOK

Gelfand, S.A. (2001). *Essentials of Audiology*. New York: Thieme. [ISBN 1-58890-017-7]. Required text. It is highly recommended that this text be purchased and kept for future reference. It will be referred to in other audiology courses, and for speech-language majors it is a valuable resource.

CONTACTING THE INSTRUCTOR

My office hours are primarily by appointment, however, if I am not involved in some activity you are welcome to see me at any time. If you call my office telephone and leave a message be sure to leave a time and phone number that you will be available for me to return your telephone call. I will make two attempts at returning your telephone call. If you contact me using e-mail be sure to put 'ASLP 438' in the subject heading. I prioritize my e-mail by subject heading, with no heading getting the lowest priority. My home telephone is for 'emergencies' and is not to be used to schedule appointments or leave messages. I do not mind being contacted at home for specific questions.

WEB SITE INFORMATION

Registered students in this course are to use BlackBoard[®] for this course. Login to Route Y



then select Blackboard in the lower section.

PREREQUISITES

ASLP 334 and Physics 167 are prerequisites for this course. Students that have not completed these prerequisites are required to discontinue this course until such time the prerequisite courses have been completed.

HONOR CODE

The student is expected to be familiar with the Honor Code. The Honor Code is enforced in this class and students will be required to conform to its principles and practices. Cheating and plagiarism may result in a class failure, at the discretion of the instructor.

“Brigham Young University exists to provide a university education in an atmosphere consistent with the ideals and principles of The Church of Jesus Christ of Latter-day Saints. This atmosphere is preserved through commitment to conduct that reflects those ideals and principles” (Undergraduate Catalog, Brigham Young University).

COURSE MEETING TIMES

This is a 3 credit hour course scheduled to meet Mondays, Wednesdays, and Fridays. You are expected to attend every class. No, it is not all right to miss class. I do not give midterm or final examinations other than the posted times. Please make your lifestyle arrangements according to the University calendar.

PREVENTING SEXUAL HARASSMENT

Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity receiving federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, activities, and student-to-student sexual harassment. BYU's policy against sexual harassment extends not only to employees of the university but to students as well. If you encounter unlawful sexual harassment or gender based discrimination, please talk to your professor; contact the Equal Employment Office at 422-5895 or 367-5689 (24-hours); or contact the Honor Code Office at 422-2847.

STUDENTS WITH DISABILITIES

Brigham Young University is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have any disability, which may impair your ability to complete this course successfully, please contact the Services for Students with Disabilities Office (422-2767). Reasonable academic accommodations are reviewed for all students who have qualified documented disabilities. Services are coordinated with the student and instructor by the SSD Office. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures. You should contact the Equal Employment Office at 422-5895. D-382 ASB.

Students in this class must be registered with the Services for Students with Disabilities Office before accommodations will be made. It is in this manner that I may best, and fairly, make necessary accommodations. Accommodations will be made for all course activities, as needed, following registration, and no consideration will be given for course activities completed prior to the instructor being officially notified by the Services for Students with Disabilities Office. Please see me if you should have any questions.

ARCHIVING OF STUDENT WORK

All materials not claimed by the end of the fourth week of the term following this class will be destroyed. After that date it will not be possible to contest scores or grades. The instructor reserves the right to fully review all contested material and adjust scores accordingly.

DEVOTIONALS

Brigham Young University provides devotionals and forums throughout the year on most Tuesdays from 11:00 am to 11:50 am. On days that these enriching experiences are provided, the instructor is not available nor should any of the facilities be used as part of this course during that time period.

COURSE SCHEDULE AND OUTLINE – ASLP 438*All assignments are due at the beginning of class on the date due*

| Class no. | | Day | Date | Lecture | Assignments |
|-----------|----|-----------|------------|---|---|
| 1 | DM | Wednesday | 9/4/2002 | Introduction to Course | |
| 2 | DM | Friday | 9/6/2002 | Writing a Term Paper | |
| 3 | DM | Monday | 9/9/2002 | Writing a Term Paper | |
| 4 | DM | Wednesday | 9/11/2002 | Physical Exam and Tuning Forks | Chapters 1&2 |
| 5 | DM | Friday | 9/13/2002 | Sound Measurement and Psychoacoustics | Chapter 3 |
| 6 | DM | Monday | 9/16/2002 | Psychoacoustics | Chapter 3 |
| 7 | DM | Wednesday | 9/18/2002 | The Audiogram | Chapter 4 Due: Term paper topic due (email) |
| 8 | MK | Friday | 9/20/2002 | Demonstration: Otoscopy | Chapter 4 Due: Essay 1 (Describe the Method of Limits) Ret: Term paper approval returned to student (email) |
| 9 | DM | Monday | 9/23/2002 | Pure-Tone Audiometry (AC) | Chapter 4 |
| 10 | DM | Wednesday | 9/25/2002 | Pure-Tone Audiometry (AC) | Chapter 4 |
| 11 | MK | Friday | 9/27/2002 | Demonstration: Audiometers | Quiz 1: Chapters 1-3 |
| 12 | DM | Monday | 9/30/2002 | Pure-Tone Audiometry (BC-theory and principles) | Chapter 4 |
| 13 | DM | Wednesday | 10/2/2002 | Pure-Tone Audiometry (BC) | Chapter 4 Due: Term paper outline (email) |
| 14 | MK | Friday | 10/4/2002 | Review Session | Chapter 4 (Class nos. 4-13) Ret: Outline returned to student (email) |
| 15 | DM | Monday | 10/7/2002 | Masking (theory) | Chapter 4 |
| 16 | DM | Wednesday | 10/9/2002 | Masking (theory & application) | Chapter 4 Due: Essay 2 (Describe the Ascending-Descending method of threshold determination). |
| 17 | DM | Friday | 10/11/2002 | Masking (application) | Chapter 4 |
| 18 | DM | Monday | 10/14/2002 | Case Reviews | Quiz 2: Chapter 4 |

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| 19 | DM | Wednesday | 10/16/2002 | Case Reviews | |
| 20 | DM | Friday | 10/18/2002 | Case Reviews | |
| 21 | MK | Monday | 10/21/2002 | Review Session | (Class nos. 14-20) |
| 22 | MK | Wednesday | 10/23/2002 | MID TERM EXAMINATION | (Class nos. 2-20) Due: Lab 1 |
| 23 | MK | Friday | 10/25/2002 | ASHA Code of Ethics | Document on Blackboard |
| 24 | MK | Monday | 10/28/2002 | ASHA Scope of Practice | Document on Blackboard |
| 25 | MK | Wednesday | 10/30/2002 | ASHA Identification Audiometry and Delivery of Services in the Schools. ASHA Delivery of SLP and Audiology Services in Home Care. | Document on Blackboard |
| 26 | MK | Friday | 11/1/2002 | ASHA Clinical Management of Communicatively Handicapped Minority Language Populations. ASHA Clinical Supervision in SLP and Audiology. | Document on Blackboard |
| 27 | DM | Monday | 11/4/2002 | Speech Audiometry I | Chapter 5 |
| 28 | DM | Wednesday | 11/6/2002 | Speech Audiometry II | Chapter 5 Due: Lab 2. |
| 29 | | Friday | 11/8/2002 | NO CLASS | Due: First draft of term paper for peer review (this time has been set aside for peer review.) |
| 30 | DM | Monday | 11/11/2002 | Acoustic Immittance (theory) | Chapter 6 Due: Peer review evaluation sheet. |
| 31 | DM | Wednesday | 11/13/2002 | Acoustic Immittance/ Tympanometry | Chapter 6 |
| 32 | MK | Friday | 11/15/2002 | Demonstration: Acoustic Immittance and Tympanometry | Chapter 6 Due: Essay 3 (Describe the 5 dB method for obtaining a SRT) |
| 33 | DM | Monday | 11/18/2002 | Acoustic Immittance: Case Studies | Chapter 6 Due Lab: 3. |
| 34 | DM | Wednesday | 11/20/2002 | Acoustic Immittance: Case Studies | Chapter 6 Quiz 3: Chapters 5 & 6 |
| 35 | DM | Friday | 11/22/2002 | Otoacoustic Emissions | Chapter 6 |

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| 36 | DM | Monday | 11/25/2002 | Auditory Evoked Potentials | Chapter 6 Due: Second draft of term paper (paper copy) |
| 37 | MK | Tuesday* | 11/26/2002 | Mini Examination (in class) | Friday Class Instruction Class nos. 23-36 |
| 38 | DM | Monday | 12/2/2002 | Disorders of the Middle Ear | Chapters 7, 9, 10. Due: Lab 4 |
| 39 | DM | Wednesday | 12/4/2002 | Disorders of the Inner Ear | Chapter 11 Ret: Second draft of term paper (paper copy) |
| 40 | DM | Friday | 12/6/2002 | Disorders of the Auditory Nerve and Central Auditory Pathway. | Chapters 12, 13 Quiz 4: Chapters 7-13 |
| 41 | DM | Monday | 12/9/2002 | Amplification and Cochlear Implants | Chapter 14 |
| 42 | DM | Wednesday | 12/11/2002 | Amplification and Cochlear Implants | Due: Final copy of term paper (paper copy) Due: Lab 5. Note: Report from Writing Center must be dated no later than 12/6/2002. |
| | | Thursday | 12/19/2002 | 7:00 - 10:00am | FINAL EXAMINATION (Comprehensive) Ret: Final copy of term paper (pick-up in department office) |

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COURSE REQUIREMENTS

Assignments

All assignments must be typewritten unless otherwise noted. If computer generated, an easily readable font must be used. Originals and copies must be clear with dark print. Unless otherwise noted all assignments are due by the beginning of the class period on the due date. Penalties are assigned for late assignments which amount to 20% of the total earned for that assignment.

Reading assignments are to be completed prior to the beginning of the class period.

Grading Standard

Each assignment will be weighted according to the following percentages:

| | |
|----------------------------|--------------|
| Final examination | 30 % |
| Midterm examination | 30 % |
| Mini Examinaton | 10% |
| Term paper | 20% |
| Quizzes (5) | 5% |
| Laboratory assignments (5) | 5% |
| TOTAL | 100 % |

The grade equivalent is based on the following percentages:

| | | | |
|----|----------|----|-------------|
| A | 96-100 % | C+ | 78-80 % |
| A- | 92-95 % | C | 75-77 % |
| B+ | 88-91 % | C- | 70-74 % |
| B | 84-87 % | D | 65-69 % |
| B- | 81-83 % | E | 64% & below |

Examinations

There will be two examinations, a midterm (30%) and a final (30%). They will be essay or short answer type. Additional points on each question may be awarded for exceptional answers without penalizing other students. Students are encouraged to meet with the instructor following the midterm examination to discuss each question/answer. Examinations are given as scheduled. A sample question is included in the course syllabus ([click here for link](#)).

Quizzes

There will be four quizzes and each quiz will be weighted to 2% of your final grade, for a total of 8% of your final grade. These will be similar to the explanations given above for the midterm and final examination. Quizzes are given as scheduled.

Extra Credit

In some instances extra credit may be given, at the discretion of the instructor, for participating in projects, attending seminars or other professional experiences. Extra credit is not given for purposes of grade deficiencies.

Course Participation

The student is expected to be prepared. This includes having read the material prior to class. Students that are not prepared may be penalized one percentage point for each class period. Absence from class, except for medical purposes, is considered unprepared.

Laboratory Assignments

There are five laboratory assignments. Each assignment is worth 1% of your total grade. These assignments require the scheduling of portable audiometers or the scheduling of a room which has immittance equipment. The due date for these assignments are listed in the course syllabus. However, if you wait until the last day to complete the assignments scheduling problems will occur and you might not be able to complete the assignments by the due date.

The laboratory assignments will be practical experiences in audiometric assessment. The audiometers may be obtained from the secretary in room 136 TLRB, during posted office hours. Speech audiometry will not be required because of the limited space in the audiological testing suites. Therapy rooms may be scheduled for audiometric testing, however you will also need to schedule a portable audiometer. Portable audiometers are due by 8:30 am the following morning. For weekend use the audiometers may be checked out after 10:00 am Friday morning, and must be returned by 8:30 am on Monday. The same type of procedure is required for official university holidays (if you leave early or arrive late, do not check out an audiometer). Not following these guidelines will most likely result in some or all of the assignments not being accepted. Please be considerate of other students.

Laboratory 1

Objective:

The intent of this lab is to familiarize the student with pure tone testing.

Directions:

Perform a pure tone air and bone conduction test on two individuals.

1. Check out an audiometer from the secretaries in room 136.
2. Print out 2 copies of an audiogram.
3. Place earphones on your subject's ears.
4. Perform pure tone test using ascending/descending method.
5. Plot the results on your audiogram.
6. Answer the following questions.
7. In class, turn in both the audiograms and the answers to the questions.
8. Return the audiometer to the secretaries in TLRB 136.

Questions:

Answer the following questions with a brief paragraph. Answers must be typed.

1. What did you learn from this experience?
2. What problems occurred during the lab and how did you resolve these problems?
3. Explain the ascending/descending method used for pure tone testing.
4. What effects did the test environment have on your test results?
5. What bone conduction placement was used? Why did you test bone conduction?

Laboratory 2

Objective:

The intent of this lab is to familiarize the student with pure tone testing and to introduce masking.

Directions:

Perform the following experiment on two individuals. (You must test different individuals than those tested in lab no. 1).

1. Check out an audiometer from the secretaries in room 136.
2. Print out 2 copies of an audiogram.
3. Place earphones on your subject's ears.
4. With the headphones on both ears, determine the air conduction threshold at 500 through 4000 Hz for both ears on each subject using the ascending/descending method.
5. With the earphones off, determine the bone conduction pure tone threshold at 500 through 4000 Hz.
6. With headphones on both ears, put 15 dB SL of masking in the better ear and begin at threshold to test for the AC threshold in the worse ear (if both ears are equal then choose one ear for masking and the opposite ear for threshold determination).
7. Keeping masking in the same ear, find the masked BC threshold of the test ear with 15 dB SL of masking in the non test ear.
8. Plot the results on your audiogram.
9. Answer the following questions.
10. In class, turn in both the audiograms and the answers to the following questions.
11. Return the audiometer to the secretaries in TLRB 136.

Questions:

Answer each of the following questions with a brief paragraph. Answers must be typed.

1. What did you learn from this experience?
2. What problems occurred during the lab and how did you resolve these problems?
3. How do your results relate to the physiology and the anatomy of the auditory system?
4. How did the test environment effect your test results?

Explain the occlusion effect and its effect on air conduction and bone conduction testing.

Laboratory 3

Objective:

The intent of this lab is to help students understand the plateau method of masking and the effects of undermasking and overmasking.

Directions:

Perform the following experiment on two individuals. (You must test different individuals than those tested in labs no. 1 and 2).

1. Check out an audiometer from the secretaries in room 136.
2. Obtain two sets of earplugs from the secretaries in TLRB 136 for 25 cents per pair.
3. Print out 2 copies of the plateau graph.
4. Print out 2 copies of an audiogram.
5. Conduct a masked air and bone conduction test on both individuals.
6. Plot the results on your audiogram.
7. Steps 8-13 only need to be performed on one individual.
8. Place earphones on your subject's ears.
9. With the headphones on both ears, determine the unmasked air conduction threshold at 250 Hz for both ears on each subject using the ascending/descending method.
10. Without the headphones on, determine the unmasked bone conduction threshold at 250 Hz.
11. Put the bone conduction vibrator on one ear and the headphone that delivers masking on the other ear. Begin the tone at 0 dB SL and turn the masking on at 5 dB SL.
12. Increase the masking in 10 dB steps until the masking is 70 dB SL (do not exceed 70 dB SL of masking).
13. Mark the results of each increment on the graph.
14. Answer the following questions.
15. In class, turn in the audiograms, plateau graphs, and the answers to the following questions.
16. Return the audiometer to the secretaries in TLRB 136.

Questions:

Answer each of the following questions with a brief paragraph. Answers must be typed.

1. What did you learn from this experience?
2. What problems occurred during the lab and how did you resolve these problems?
3. Explain interaural attenuation and the effect it has on air and bone conduction testing.
4. Explain the following terms undermasking, effective masking, overmasking.
5. Explain the plateau method of masking.

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Laboratory 4

Objective:

Complete 3 audiological evaluations and become familiar with tympanometry.

Directions:

Perform the following experiment on three individuals. (You must test different individuals than those tested in labs no. 1, 2, and 3).

1. Check out an audiometer from the secretaries in room 136.
2. Obtain two sets of earplugs from the secretaries in TLRB 136 for 25 cents per pair.
3. Print out the tympanogram graphs.
4. Print out 3 copies of an audiogram.
5. Perform a tympanogram on both ears of each individual. (You will need to come to an assigned lab time to use the tympanometer).
6. Draw the results of the tympanogram, and label the curve.
7. Conduct an unmasked pure tone AC audiogram.
8. Have subject put ear plug in one ear (at least $\frac{1}{2}$ of the ear plug should be in the canal).
9. Repeat unmasked AC audiogram on plugged ear.
10. Conduct an unmasked BC audiogram.
11. Find true thresholds by masking AC as needed.
12. Find true thresholds by masking BC as needed.
13. Conduct a masked air and bone conduction test on both individuals.
14. Plot the results on an audiogram.
15. Answer the following questions.
16. In class, turn in the audiograms, tympanogram results, and the answers to the following questions.
17. Return the audiometer to the secretaries in TLRB 136.

Questions:

Answer each of the following questions with a brief paragraph. Answers must be typed.

18. What did you learn from this experience?
19. What problems occurred during the lab and how did you resolve these problems?
20. How did the test environment effect your test results?
21. Explain the theory behind tympanometry.
22. Briefly define Jerger's 5 types of tympanograms (this includes all of the type A graphs plus the other four graphs).

Laboratory 5

Objective:

Develop a better understanding of and compassion for those who have a hearing impairment.

Directions:

Wear ear plugs in a social setting four 4 hours and then write a one page summary.

1. Purchase a pair of ear plugs from the secretaries in TLRB 136 for 25 cents.
2. Insert a plug in each ear (at least $\frac{1}{2}$ of the plug should be in the canal).
3. Print out 1 copy of an audiogram.
4. Perform an unmasked pure tone audiogram on a classmate.
5. Have one of your classmates perform an unmasked pure tone audiogram to test your hearing.
6. Wear the plugs in a social setting for at least 4 hours.
7. In class, turn in copies of each audiogram (the one you performed and the one detailing your hearing loss), and the one page summary.
8. Return the audiometer to the secretaries in TLRB 136.

Questions:

Write a one page summary about the experience. Include statements about the following:

1. The severity of your hearing loss.
2. What situations you were in.
3. How you compensated for your loss.
4. How you felt.
5. How you think others reacted.

WRITING ASSIGNMENTS

The Function of Writing in Audiology and Speech-Language Pathology

The discipline of Audiology and Speech-Language Pathology includes both an academic area and a clinical area. Writing within both of these areas has two main objectives: first, to provide information that will advance the basic science knowledge within the profession; and second to communicate clinical findings regarding the practice of Audiology and Speech-Language Pathology. Both types of writing require a knowledge base of the topic, professional and scientific writing skills, clarity of thought, and the ability to integrate information.

Writing in Audiology and Speech-Language Pathology is primarily directed to professionals. For the academic area, it is in the form and style dictated by the scientific journals within the area of Audiology and Speech-Language Pathology. For the clinical area, it is in the form dictated by the health care profession, educators, and school administrators. Consequently, writing in Audiology and Speech-Language Pathology is a life long skill that will reflect the professional knowledge and competency of the individual.

ESSAYS

Writing to Learn

There will be essays assigned throughout the term. The purpose of these essays is to let you explain concepts obtained from your reading or laboratory experiences. Some of these concepts will not be covered in lecture.

- Each essay will be graded on a 3 point scale. A total of 3 points may be earned for each essay which include one point each for: a) completing the assignment on-time; b) grammar, syntax, and style; and c) clarity of content (i.e., the ability to explain the concept in a clear and accurate manner using terminology consistent with the course content).
- The assignment is to be transferred to the instructor via email (unless encompassed as part of another assignment) and will be read, graded, and returned to you by email at the sending address. Do not request a different return e-mail address (it won't happen).
- The essays are to be of moderate length, not more than 100-120 lines of text using 12 point Times or Times Roman, and single spaced.
- It is recommended that you use another student in the class to review your work before submitting it.
- Class notes and the course text may be used.
- The email response must be received before 9:00am of the date it is due. Late essays will receive a two point penalty if not received within the next 24 hours.

Format: No specific format is required except for the following that is to be placed at the end of the essay:

Grading: ___/1 Completion ___/1 Style ___/1 Clarity ___/3 Total

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Sample Essay

Essay 1: Cochlear Transduction

John Erickson

Transduction in the cochlea refers to the shifting of mechanical energy entering the cochlea via the oval window from the middle ear into electrical energy which results in the depolarization of the inner hair cell. Although we think of the cochlea primarily as an electrical activity, it is also mechanical in nature due to the electromotility of the outer hair cells and movement of the basilar membrane.....

Grading: ___/1 Completion ___/1 Style ___/1 Clarity ___/3 Total

TERM PAPER

Each student will be required to submit a 20 to 25 page term paper. The term paper will be weighted to 20% of your final grade. It will be typed according to the American Psychological Association's (APA) style manual. This manual is available at the bookstore, the library, and at www.apa.org. Also, the class presentation on the term paper may be found on my web site as well for class members only on the BlackBoard site at <http://ry.byu.edu> and login using your Route Y username and password. Then select Blackboard in the lower section.

General Guidelines

The following guidelines outline the steps in completing the term paper. The process is designed to assist in developing skills in writing research papers and critical thinking. Although this is an extensive project, the result should be of benefit beyond the borders of this particular course. If you should have questions please contact the instructor.

Topic Approval

A topic should be selected that is directly related to audition. The topic must be approved by the instructor. As part of the approval request the student is to submit a one or two page description and justification of the topic. This assignment will also include an annotated bibliography using two to three sources. This assignment is to be transmitted via email to david_mcperson@byu.edu Be sure that "ASLP 438" is in the subject heading.

Outline

An introduction, outline with no more than three levels, and annotated bibliography of at least five sources will be submitted to the instructor. This assignment is to be transmitted via email to david_mcperson@byu.edu Be sure that "ASLP 438" is in the subject heading.

First Draft

A first draft will be completed and submitted for peer review. Groups of three to four students will exchange papers, make comments on the paper, and grade the paper. The group will then meet, discuss the papers and return the "Peer Review Sheet" to the instructor. The students will be graded on the peer review process

Second Draft

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A second printed draft will be submitted in paper form to the instructor in class on the due date. The instructor will make comments on the paper and grade the paper as if it were a final product; however, the grade will not be recorded. The instructor will then return the paper to the student thus allowing for final revisions based on the instructor's comments.

Final Paper

The final paper will be submitted in paper form according to the technical requirements of the project.

Students that make use of the Writing Center will receive an extra 5 points on the final assignment if notification is dated prior to five days from the due date of the term paper. The Writing Center may be used at any stage of the writing process.

Technical Requirements

- Margins will be 1.5" on the bound edge (left side), and 1.0" on the top, bottom, and non-bound edge (right side).
- The paper will be typed using a 12 point Times or Times Roman font. The print must be clear, sharp, and of good contrast.
- Figures should be scanned, not taped, and placed at the end of the paragraph where it is referenced in the text, but before the following paragraph. Do not wrap text.
- Tables follow the same convention as figures. Tables should be prepared using the word processor's table function, and not with tabs etc. Be sure to check the APA manual for style. The exception to the APA manual requirement is that tables may be single spaced instead of double spaced.
- Term papers done in other classes may not be used to complete this assignment.
- References must primarily be from scholarly journals with a few specific references from books. Internet, encyclopedias, lay publications, and the National Inquirer may not be used.
- The grading sheet at the end of this syllabus must be the first page of your term paper.
- Term papers are NOT to have hard covers and must be securely fastened with staples or other permanent fasteners. Do not use "sliding" fasteners.

Failure to follow these technical requirements will result in points being deducted from the term paper.

Peer Review Process

1. The first draft must be distributed to each member in the group at least three class periods prior to the group discussion.
2. Each student is to read the paper, make comments on the draft, and complete the Peer Review Sheet.
3. Twenty minutes per paper should be allowed for discussion.
4. Following the group discussion the drafts will be returned to the student and the Peer Review Sheets stapled together and returned to the instructor.

Suggested Topics

The topic for term papers must be approved by the instructor. The following are suggested topics, but are not all inclusive.

1. Age related hearing loss on the effects of speech production.
2. Behavioral development of the auditory system.
3. Disease factors causing hearing loss.
4. Effects of aging on hearing.
5. Effects of hearing loss on language development.
6. Genetic hearing loss.
7. Hearing loss in infancy.
8. Localization and hearing.
9. Neurologic insults on hearing.
10. Noise induced hearing loss.
11. Ototoxic hearing loss.
12. Speech communication in noise.
13. The effects of the classroom environment on the hearing impaired.

Grading Criteria

The following table shows a summary of the grading criteria that will be used to grade your paper. Both the Peer Review Sheet and the Term Paper Cover Sheet briefly state the criteria for each area of grading. Also, an additional 5 points will be awarded for utilizing the Writing Center.

| Grading Criteria | Points |
|--|--------|
| Topic Approval | 1 |
| Outline and Bibliography | 4 |
| First Draft | 3 |
| Second Draft | 3 |
| Relevance of Topic | 4 |
| Depth of Content | 25 |
| Clarity of Writing | 15 |
| Quality of Content | 20 |
| References | 20 |
| APA Style and Technical Requirements | 5 |
| Writing Center (optional) | (5) |
| TOTAL | 100 |

SAMPLE APA STYLE PAPER

A sample term paper is included on the next few pages. This should assist the student in visualizing the format requirements as well as what an “A” paper represents. The sample paper is in the form and style the student submitted it to the instructor. The student received a grade of “A” on the paper.

(title page)

Cochlear Implants for Deaf Children

Student Name

Brigham Young University

August 19, 1999

(*separate page*)-----

ABSTRACT

COCHLEAR IMPLANTS IN DEAF CHILDREN

Student Name

Brigham Young University

Cochlear implants have developed to the point where they are now routinely used in children. Eligibility for cochlear implants include bilateral deafness and an evaluation that shows the child will not benefit from hearing aids. The main advantages of a cochlear implant over traditional hearing aid amplification is in increased ability for the recognition of speech. Rehabilitation has a significant impact on cochlear implant use and...

Introduction

In recent years, technological advances have made it possible for persons with profound hearing impairments to benefit from certain types of amplification. Of these advances, the most notable has been the cochlear implant for the profoundly hearing impaired. Otolaryngologists (ear, nose, and throat doctors) and audiologists have explored the advantages and disadvantages of such devices and agree that the cochlear implants are mostly beneficial. However, some controversy over the effects of the implant have made parents of deaf children wary of the devices. The concerns of parents warrant investigation of the positive and negative effects of cochlear implants.

The Cochlear Implant

A cochlear implant is a device that is worn both externally and internally deep inside the skull. Figure 1 shows a schematic diagram of the Nucleus cochlear implant. The implant works briefly like this: First, sound enters the system through the microphone, which rests behind the individual's ear, much like a hearing aid. The sound is then sent from the microphone through a thin cord to the speech processor. The processor selects sounds most useful for speech/sound recognition. The codes are sent back through the same cord to the transmitter coil, which sends the codes across the skin to the internal processor via the internal coil. The internal processor converts the codes into electrical signals and sends them along the electrical array implanted in the cochlea. For the Nucleus cochlear implant, twenty-two electrodes are arranged along a narrow piece of flexible tubing. Each electrode is connected, by a wire, to the internal processor. The coded electrical signal is delivered to specific electrodes, each of which is programmed separately and can deliver signals at varying intensities and pitches. The electrodes stimulate

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different hearing nerve fibers, which send the messages to the brain for interpretation (Cochlear, 1990). Most cochlear implants work in similar fashion, but the Nucleus cochlear implant uses the most complex technology to date (Horn, Nozza, & Dolitsky, 1991) and will be the main focus in this research.

Eligibility for Cochlear Implants

Because cochlear implants are so successful, several professionals believe that the only criterion for receiving one is possession of profound deafness. However, this is not true (Tyler, 1993). Cochlear implants are only available to a select few individuals who have the necessary background and traits required for the procedure. The first thing to consider when choosing a candidate is the degree of hearing loss the individual suffers from.

Degree of Hearing Loss. "The child must exhibit a severe to profound hearing loss. In addition, the child must not benefit significantly from hearing aids or other conventional amplification devices" (Horn, Nozza, & Dolitsky, 1991, p. 83). The degree of hearing loss is measured in decibels (dB) on various frequencies. To be severely hearing impaired, at least an average hearing loss of +70 dB would be exhibited. Profound deafness begins at the average of +90 dB. Normal hearing is anywhere between -10 and +25 dB (Bess & Humes, 1990). Some severely deafened children and adults can still hear with conventional hearing aids. Those people would not be considered for implantation since the hearing gained from the implant may be less than what they already hear from a hearing aid.

Physical Structures. The second consideration for the success of the cochlear implant depends upon the existing physical structures within the potential recipients ear. There are numerous causes of deafness that can usually be broken down into.....

(separate page)-----

References

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(end of paper) -----

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SAMPLE LABORATORY ASSIGNMENT

LABORATORY ASSIGNMENT #1

(Student name)

(Course)

(Date)

Laboratory Assignment: Puretone audiogram

Puretone audiograms (three) were completed on other students that were reported to have normal hearing. A portable audiometer (Beltone 10C) was used. The testing was done in a quiet room. Both air- and bone-conduction audiograms were recorded.

Note: The student must attach copies of each audiogram and other forms (stapled) to the cover sheet.

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SAMPLE CASE HISTORY AND REPORT

AUDIOLOGIC EVALUATION

(Student name)

(Course)

(Date)

Patient Name: Clyde Gates

Date of Birth: 15 June 1956

Sex: Male

Age: 35 years

Date of Evaluation: December 7, 1991

Complaint

The patient reported that he was unable to hear people in noisy situations. Also he stated that his wife complained because the television was too loud. The patient complained of ringing in his ears, aperiodic. The ringing did not keep him awake, but was annoying. He also noted that although he can “hear” people, he has difficulty understanding what they are saying.

History

No significant medical history was noted and the patient states he is in general good health. The patient is employed as a pipe fitter and works in a situation that he described as “high noise levels.” The patient enjoys SCUBA diving and reports frequent acute ear infections. He also reported having difficulty clearing his ears on moderate to deep dives. The patient reported he did not experience any dizziness or gait problems. No other significant history was noted.

Clinical Observation

Speech and language appear normal for age and social conditions. The patient understood all of my questions when facing him, but on a couple of occasions had difficulty understanding when my face was not readily visible suggesting he relies on speech reading to some extent.

Evaluation

[A description of the tests or evaluations used would be placed in narrative with a summary description of the results. For example]:

Otoscopic Examination: The ear canals were clear and the tympanic membranes appeared normal, bilaterally.

Tympanometry: Jerger type B tympanograms showing reduced compliance was noted, bilaterally. The acoustic reflex at 500, 1000, 2000, and 4000 Hz was absent, bilaterally.

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Pure tone Testing: Pure tone air- and bone-conduction thresholds show a 50 dB HL hearing loss in the low and middle frequencies. A sloping mid-to-high frequency hearing loss ranging from 50 dB HL at 3000 Hz to 80 dB HL at 8000 Hz was observed. There was a 25 to 30 dB air-bone gap in the low-to-mid frequencies which was not observed in the higher frequencies. This would suggest the patient has both bilateral conductive and sensorineural hearing losses. Most likely there is a mild sensorineural hearing loss in the low frequencies, about 30 dB HL, sloping to a severe high frequency sensorineural hearing loss in the high frequencies, 70-80 dB HL.

Speech Testing: Speech recognition thresholds were 40 dB HL in the left ear, and 45 dB HL in the right ear. Speech discrimination, in quiet, showed 66% in the right ear and 48% on the left ear.

Impression

This patient has a moderate-to-severe bilateral mixed (i.e., conductive and sensorineural) hearing loss with aperiodic tinnitus. The most obvious etiology is a combination of noise exposure in the work place and barotraumas from SCUBA diving.

Recommendations

1. Medical referral to an otolaryngologist.
2. Repeat audiological evaluation following any medical intervention.
3. Hearing aid evaluation to determine amplification needs.
4. Annual audiological evaluations since the patient is in high risk activities.

The patient was counseled regarding the findings and recommendations. Also I spend time with the patient about noise exposure in the work environment and gave the patient a set of disposal earplugs to use along with the recommendations that he routinely use them in noisy environments.

(Signature)

Mark D. Smith, M.A., CCC

attachments: Audiogram, tympanograms

cc: Chart files

SAMPLE EXAM QUESTION

Blue books, using double spacing, may be required for some or all examinations and quizzes except for 'take home' examinations which are to be typewritten, double spaced.

Exam question: Describe and characterize the measures used in the auditory brainstem evoked potential recording and their relationship to stimulus intensity.

Response: The auditory brainstem evoked potential may be described as a biphasic waveform with quantitative properties of amplitude and latency. In addition a qualitative feature may be described in terms of its morphology.

Amplitude may either be described in voltage, usually microvolts, from the baseline to corresponding peak, or from positive peak to corresponding negative peak. As stimulus intensity increases, the amplitude of the response increases. The converse is also true. The first amplitude changes from baseline, in ideal recording conditions, may be seen as early as 10 dB above behavioral threshold for the stimulus; especially sharply rising (i.e., clicks) stimuli.

Latency is defined as the time, in milliseconds, from the onset of the stimulus to a peak. For consistency, wave V, which may be broad, is defined as the breaking point, or departure point, from the linear descending slope. Latency decreases as stimulus intensity increases. The converse is also true.

It should be noted that there is a point where both amplitude and latency asymptote.

In formulating this question one point is awarded for each correct identification and discussion of the pertinent areas:

1. Description of amplitude
2. Description of latency
3. Description of morphology
4. Use of microvolts
5. Use of milliseconds
6. Relationship of amplitude to intensity
7. Relationship of latency to intensity
8. Statement of how amplitude is measured
9. Statement of how latency is measured
10. Relationship of amplitude and latency to morphological features

It should be noted that areas 1, 2, 4, 5, 6, 7 and 8 were covered providing 7 points for this answer. However additional discussions in some areas were significant enough that extra points were awarded:

1. Acknowledging that the response is biphasic.
2. Amplitude may be measured using one of two references.
3. Amplitude of a wave may first appear at about 10 dB SL.

Consequently, an additional three points are awarded for this question providing a total of 10 points. Such additional points are solely at the discretion of the instructor. Since a grading curve is not used, other students are not penalized.

REVIEW QUESTIONS

This list of review questions is under development. The instructor is under no obligation to provide review questions, but does so as a supplement to the course, as time and availability permits.

These questions are not met to be all inclusive, but represent the main themes of the lectures and readings. Many of the quizzes and examinations are based on these review questions.

1. Discuss what is the study of audiology.
2. What is the contribution of the Pinna to hearing?
3. Discuss the lever action of the middle ear (i.e. ossicles) and how it moves at different sound intensities.
4. Draw and label the major anatomical landmarks of the outer, middle and inner ear.
5. Draw and label the central auditory pathway from the eighth nerve leaving the cochlea through the brainstem to the central auditory cortex.
6. List and BRIEFLY discuss the major disorders of the auditory system.
7. What is an auditory evoked potential and what is its contribution to audiology?
8. What are the non-auditory pathologies (i.e. medical conditions that affect the auditory system)? BRIEFLY discuss (one or two sentences only).
9. What is Public Law 94-142 and how does it apply to the field of audiology?
10. What is the study of psychoacoustics and how does it relate to the field of audiology.
11. In detail, describe the three classical methods of psychophysics and how they are used in audiology (this is a difficult question that requires you to read the entire chapter before attempting an answer since the three methods vary in their usage in audiology)
12. Discuss the three psychoacoustic methods: 1) adaptive methods; 2) scaling procedures; and 3) matching methods.
13. Discuss the concept of hearing threshold and how it was derived.
14. Summarizes the concept of masking and include in your discussion special situation of narrowband masking.
15. In detail, discuss what loudness and it relationship to intensity and frequency.
16. Discuss the ability of the ear in frequency and intensity discrimination.
17. What is the advantage in frequency and intensity discrimination and the effect of threshold of hearing in binaural hearing?
18. What are the primary cues for sound localization.
19. BRIEFLY describe masking level difference.
20. What is the purpose of calibrating audiometric test equipment?
21. Explain a listening check. How frequently should this be done.
22. What is an artificial mastoid used for in audiometric calibration?
23. Compare and contrast the threshold of audibility and audiometric threshold (do not spend time on detailing the procedures, describe the differences and what the two are measuring and how they are used).
24. This is a question that requires DETAIL. Describe, in detail, the procedure for completing manual audiometric threshold testing. Discuss the variables that may affect the determination of audiometric threshold.
25. How does one determine the PTA and what does it mean?

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26. What is 'automatic' audiometry and is the type commonly used in audiology?
27. What is meant by clinical masking and why is it necessary?
28. Discuss the variable affecting masking?
29. What is meant by the occlusion effect and how does that relate to masking?
30. Explain the concept of effective masking.
31. What type of masking is preferred for pure tone audiometry and why is it preferred?
32. What are the major considerations when determining when to mask?
33. DETAIL the recommended masking procedure for air conduction (this is an extensive answer). for: 1)air conduction; 2) bone conduction and 3) speech audiometry).
34. What is the effect of overmasking? How can one determine if overmasking has occurred.
35. What is the effect of undermasking? How can one determine if undermasking has occurred.
36. What is the advantage in using an insert phone in audiometric testing?
37. What is the contribution of immittance measurements to masking problems? Why might doing this procedure FIRST be of benefit to the clinician?
38. When sound is applied to the skull how is it distributed across the skull?
39. What is meant by interaural attenuation and what are the values for air-conduction and bone-conduction?
40. What is the effect of the placement of the vibrator on various locations on the skull?
41. Define the following: SRT, SAT, SDT and ST.
42. What is the definition of speech reception threshold, how is it determined and what stimulus is used to determine the speech reception threshold?
43. What is a performance-intensity function?
44. Explain, in DETAIL, the ASHA recommended method for determining SRT.
45. What is meant by a spondee word list?
46. What is a PB word and how does it differ from a Spondee word?
47. Discuss the following and how each of these variable may affect speech discrimination scores: 1) Presentation level; 2) signal to noise ratio or competing noise; 3) work familiarity; 4) closed vs open set response; 5) response mode; 6) half- vs full- list presentation; 7) the use of a carrier phrase; 8) recorded vs MLV; and 9) instruction to the subject.
48. What is meant by a central auditory disorder and how does that differ from a peripheral hearing loss?
49. What type of test material is most commonly used in assessing central auditory disorders?
50. Explain the principles of acoustic immittance measurements (i.e. how it works). Be sure to include a schematic in your discussion.
51. Discuss the principles of tympanometry and how it relates to movement of the tympanic membrane.
52. Discuss the principles used in Eustachian tube function.
53. Discuss the principles used in acoustic reflex testing.
54. What is the primary use of tympanometry (i.e. what does it measure)?
55. What is the primary use of static acoustic immittance?
56. Draw a tympanogram that would be typical of a normal middle ear.
57. Draw a tympanogram that would be typical with serous otitis media.
58. Draw a tympanogram that would indicated some type of transient middle ear problem (i.e. the beginning or ending of middle ear effusion).

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59. What characteristics of a normal tympanogram differ in adults vs infants?
60. Draw and discuss the neural pathway of the acoustic reflex.
61. In using the acoustic reflex measure how would one test for recruitment?
62. What is acoustic reflex decay, how is it used and what is normal vs abnormal (use a schematic drawing)?
63. In taking a case history in pediatrics, what are the high risk factors developed by the joint committee of the AAP, AAOO, and ASHA?
64. What is the estimated prevalence of hearing loss in the newborn period?
65. In school age children approximate what percentage of middle ear hearing loss go undetected?
66. What is the purpose of a hearing screening program?
67. Discuss the advantages and disadvantages of group vs individual hearing screenings.
68. What is the referral criteria for hearing testing and/or for medical intervention?
69. What role does immittance audiometry play in a screening program?
70. Describe the development response to sound from birth to five years of age.
71. Describe the development of language from birth to five years of age.
72. What is meant by localization?
73. What is TROCA and how is it used?
74. BRIEFLY describe BOA, VRA, TROCA.
75. How might the acoustic reflex be used in trying to assess hearing sensitivity in infant and children?
76. How might auditory brainstem evoked potentials be used to assess hearing sensitivity in infants and children? What is the major limitation of this procedure?
77. In the newborn period what pre- and neo- natal factors would place an infant at risk for hearing loss?
78. What considerations must be addressed in using speech material to test young children?
79. What is an auditory perceptual disorder?
80. What characterizes an auditory perceptual disorder?
81. What is meant by binaural fusion?
82. What is meant by a developmental disorder of the auditory system and how or to what extent are other systems involved?
83. What is presbycusis, what effect does it have on the auditory system and how can one recognize it from an informal speech sample?
84. What does OSHA stand for?
85. Define TTS.
86. Define PTS.
87. What is the maximum continuous noise level in dBA that a worker may be exposed to before exceeding federal guidelines and hearing protection required?
88. What are the basic components of an industrial hearing conservation program?
89. What is pseudohypacusis?
90. Compare and contrast pseudohypacusis in adults and children.
91. What is a 'shadow' curve?
92. In comparing the SRT and PTA when would one suspect pseudohypacusis?
93. What is the Lombard test?
94. What happens in a delayed feedback test?
95. What psychoacoustic phenomenon is the Stenger test patterned after?

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96. Describe the effects of hearing loss on language development in children.
97. What are the effects of hearing loss on reading and writing?
98. What is the effect of hearing loss on the development of social skills?
99. What is the effect of hearing loss on expressive language?
100. What is PL 94-142 and the impact of this law on the education of the hearing impaired?
101. Discuss the different types of basic hearing aid cases available. Include in your discussion the physical differences and how and under what condition each of these would be used.
102. What is peak clipping?
103. What is amplitude compression?
104. Discuss monaural vs binaural fitting of hearing aids and under what conditions each would be used.
105. Discuss the four general degrees of hearing loss and the type of amplification, the prognosis for amplification use and what might be expected to be gained from the amplification.
106. In hearing aid orientation what are the key factors in successful hearing use?
107. What is the value of hearing aid orientation and how effective is such training?
108. What are the major needs of the geriatric client and what special considerations must be undertaken in hearing aid selection and orientation (i.e. auditory training)?
109. Define the following: SPL, HL, SL, LDL, UCL, MCL, SRT, WDS
110. What is an air-bone gap?
111. How should an earmold be cleaned?
112. What is meant by attenuation?
113. What is auditory closure?
114. When is a baseline audiogram used?
115. What is meant by cochlear reserve?
116. What type of auditory problems might accompany cleft lip?
117. Discuss the differences between SPL and HL and how the two are related and derived.
118. What is an equal loudness contour?
119. What is the measure of loudness?
120. What are the differences between frequency, intensity, pitch and loudness. How is each of these measured?
121. Draw and label the complete auditory system. The detail should emphasize those anatomical sites important to hearing.
122. What does tonotopic organization mean, and how and where is it represented in the auditory system?
123. Describe both morphologically and functionally the difference between the two sets of hair cells.

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Student Writer (name): _____

PEER REVIEW SHEET

All Peer Review Sheets for the same student writer are to be paper clipped together and submitted to the instructor as a single package

| Area | Expectation | Reviewer Comments | Points |
|--------------------|--|-------------------|------------|
| Relevance of topic | The topic is a current and significant to the field of audition. | | /4 |
| Depth of content | The topic is treated in depth and focused. | | /25 |
| Clarity of writing | Correct terminology and concepts are used that are common to professional writing in audiology. Professional language is used. | | /15 |
| Quality of content | Content is accurate, current, and represents scholarly work. Research is clearly separated from anecdotal types of statements. | | /20 |
| References | Show a good review of the topic in scholarly papers and journals. | | /20 |
| Style | APA style and the technical requirements have been followed. | | /5 |

I hereby acknowledge that I met with this student writer during a small group discussion of this paper and participated in the review of this paper.

Student Reviewer _____ Initial: _____
(print name)

Student Name: _____

SECOND DRAFT COVER SHEET

(This is to be attached to the front page of your second draft)

| Area | Expectation | Reviewer's Comment | Points |
|--------------------|--|--------------------|------------|
| Depth of content | The topic is treated in depth and focused. | | /25 |
| Clarity of writing | Correct terminology and concepts are used that are common to professional writing in audiology. Professional language is used. | | /15 |
| Quality of content | Content is accurate, current, and represents scholarly work. Research is clearly separated from anecdotal types of statements. | | /20 |
| References | Show a good review of the topic in scholarly papers and journals. | | /20 |
| Style | APA style and the technical requirements have been followed. | | /5 |

Student Name: _____

TERM PAPER COVER SHEET

(This is to be attached to the front page of your term paper)

| Area | Expectation | Instructor's Comment | Points |
|--------------------|--|----------------------|------------|
| Relevance of topic | The topic is a current and significant to the field of audition. | | /4 |
| Depth of content | The topic is treated in depth and focused. | | /25 |
| Clarity of writing | Correct terminology and concepts are used that are common to professional writing in audiology. Professional language is used. | | /15 |
| Quality of content | Content is accurate, current, and represents scholarly work. Research is clearly separated from anecdotal types of statements. | | /20 |
| References | Show a good review of the topic in scholarly papers and journals. | | /20 |
| Style | APA style and the technical requirements have been followed. | | /5 |
| | | Total Points | /89 |