Curriculum Framework

Master of Science in Audiology (M.Sc(Aud))

SEMESTER SCHEME
(CHOICE BASED CREDIT SYSTEM)

Norms and Guidelines

Course Content

Effective from Academic Session 2025-26

Two Years Duration

भारतीय पुनर्वास परिषद

REHABILITATION COUNCIL OF INDIA
www.rehabcouncil.nic.in

APPROVED BY

OSMANIA UNIVERSITY
HYDERABAD

Preamble

The rehabilitation Council of India, the apex body entrusted with the responsibility of maintenance of standards in the training of rehabilitation personnel and professionals in India, periodically undertakes revision of curriculum of its training programs. There was a sense of urgency in this year's proposal for revision because the components of the New Education Policy 2020 – the flagship program of the Government of India – had to be incorporated. The present revision has included many salient features of the NEP 2020, namely, major – minor subjects dimension, choice of subjects across multidisciplinary fields of study, ratio of theory to clinical/practical subjects and the credits system, to name a few. The present revision has also considered and included aspects of National Credit Framework, 2023 of UGC. The prospective students have to log in 80 credits, spread over major, minor, and clinical subjects, for a Master's degree in Audiology

In addition, the guidelines recommended by the National Medical Commission under Graduate Medical Education Regulations 2023 to define the profile of the trained graduates in the field have been adopted. The program objectives have been tuned to reflect this.

Rules, Regulations and Curriculum
(Semester Scheme)

1.0 Name of the Program Offered

The nomenclature of the program shall be **Master of Science (Audiology)**. **M.Sc (Aud)** shall be the short form.

2.0 Objectives of the M.Sc (Aud) Program

The objectives of the M.Sc (Aud) program are to equip students with knowledge and skills to:

a) Function as teachers in institutions of higher learning,
b) Undertake research in audiology and related areas
c) Diagnose and manage disorders of hearing and hearing-related vestibular disorders across the lifespan,
d) Follow and be guided by evidence-based practice,
e) Understand the socio-cultural aspects relating to hearing issues in the community
f) Implement rehabilitation programs for persons with hearing and vestibular disorders,
g) Function as a disability certification authority in hearing,
h) Educate and empower persons with hearing disorders on government policies, services for Divyangjan, and medico-legal issues,
i) Liaise and communicate with professionals in allied fields,
j) Advise the government on policy issues relating to hearing,
k) Establish and administer institutions of higher learning,
l) Implement public education programs on hearing health.

3.0 Duration of the Program

a) The program shall be of 4 semesters (2 academic years).
b) Students have to successfully complete the program within 4 years from the date of admission.
c) An academic year consists of two semesters, and each semester shall extend over a minimum period of eighteen weeks excluding examination days. The semester spread shall be as follows:

Odd semesters–1, 3	July -November
Even semesters–2, 4	January-May
Examinations and vacation	December and June

d) There shall be examination at the end of each semester.

4.0 Medium of Instruction

Medium of instruction shall be English.

5.0 Eligibility for Admission

a) Candidates with BASLP/ B. Sc (Speech & Hearing) degree of any university recognized

by the Rehabilitation Council of India with a minimum of 55% marks in aggregate.

b) Admission to Master's program shall preferably be on the basis of an entrance examination conducted by the respective university.

c) The eligibility of persons with disability shall be assessed by a committee consisting of an expert in speech-language pathology, audiology, clinical psychology, pediatrics, and otolaryngology, among others.

d) In general, admission of students under "Disability Category" for the BASLP program shall be governed by the same guidelines (No. U. 14021-8-2023-UGMEB / Dated the 12th June 2023) issued by the National Medical Commission for admission of students under "Disability Category" to the MBBS program.

6.0 Time Structure of the Program

Time structure of the program shall be as follows:

Months/ Semester	6
Weeks/Semester	24 weeks
Examination+ Vacation	6 weeks in each semester
Study duration in each semester	16 weeks
Days per week/Semester	5 days/90 days
Hours/ day/ Semester	7 hours/630 hours per semester

	Theory	**Total Hrs**	**Clinical**	**Total Hrs**
Semester 1	5 papers	240hrs	1 paper	240 hrs
Semester 2	4papers	210 hrs	1 paper	240 hrs
Semester 3	4papers+1	310 hrs	1 paper	240 hrs
Semester 4	2papers+1	305 hrs	1 paper	240 hrs
Total	**17 papers**	**1065 hrs**	**4 papers**	**960 hrs**

7.0 Attendance

a) Attendance shall not be less than 80% in theory and 90% in clinicals in each semester for students to be eligible to appear for examination at the end of each semester.
b) The attendance will be calculated from the date of commencement of classes as per the almanac communicated by the Osmania University.
c) Students who have failed to meet the attendance requirements will be declared fail and have to repeat the course work of that semester by taking fresh admission.
d) The students who have put up 40% and above attendance in I semester of I year can retain the seat, however, the candidate has to repeat the course work and pay the tuition fee.
e) Attendance at N.C.C. camps or sports(University, District, State or National level) or Seminars/Conferences or educational excursions or such other activities with prior permission and approved by authorities, will not be counted as absence, however, such absence should not exceed 10 days of the total period of instruction in a semester. In internship they can avail only 10 days for both semesters.
f) Condonation of shortage of attendance in genuine cases shall be from the University.
g) Readmission for any semester: Readmission process should be completed as per

almanac

8.0 Examination Pattern

The examination pattern and papers shall be as shown in the table below :

Code	Subject	Hrs /week	Total Hrs.	Marks			Credits
				IA	**Univ. Exam(UE)**	**Total**	
Aud 101M	Auditory Physiology	4	60	20	80	100	4
Aud 102M	Hearing Sciences	4	60	20	80	100	4
Aud 103MC	Research Methods, Epidemiology & Statistics	3	45	20	80	100	2
Aud 104MC	Technology in Audiology	3	45	20	80	100	2
Aud 105MO	Minor Optional- Speech Production & Analysis (or) Teaching learning in Audiology	2	30	10	40	50	1
Aud 106M	Clinicals in Audiology	15	240	50	50	100	6
		31	**480**	**140**	**410**	**550**	**19**
Aud 201M	Physiological Assessment of Hearing	4	60	20	80	100	4
Aud 202M	Auditory Disorders	4	60	20	80	100	4
Aud 203M	Speech Perception	4	60	20	80	100	4
Aud 204MO	Minor(Optional) – Bioethics (or) Entrepreneurship	2	30	10	40	50	1
Aud 205M	Clinicals In Audiology	15	240	50	50	100	6
		29	**450**	**120**	**330**	**450**	**19**
Aud 301M	Implantable Auditory Devices	4	60	20	80	100	4
Aud 302M	Vestibular System & its Disorders	4	60	20	80	100	4
Aud 303MC	Genetics of Hearing	3	45	20	80	100	3
Aud 304MC	Advances in Pediatric Audiology	3	45	20	80	100	3
Aud 305M	Dissertation	6	100	20	00	20	2
Aud 306M	Clinicals in Audiology	15	240	50	50	100	6
		35	**550**	**150**	**370**	**520**	**22**
Aud 401M	Advances in the Management of Auditory Disorders	4	60	20	80	100	4
Aud 402MC	Geriatric Audiology	3	45	20	80	100	2
Aud 403M	Dissertation	12	200	00	80	80	8
Aud 404M	Clinicals in Audiology	15	240	50	50	100	6
		34	**545**	**90**	**290**	**380**	**20**
		129	**2025**	**500**	**1400**	**1900**	**80**

8.2 Course content shall be as in Annexure1

8.3 The students shall successfully complete 80 credits, as shown below, to be eligible for the award of the degree of Master of Science (Aud).

Major(M)	Audiology	Theory	32 credits
Major(M)	Audiology	Clinicals	24 credits
Minor Compulsory (MC)	Related Areas		12 credits
Minor Optional(MO)	Related Areas		2 Credits
Dissertation			10 Credits
Total			80 Credits

8.4 Internal Assessment: Performance in at least one written test (40 Marks) and one assignment (10 marks) shall be the basis for awarding 50% internal assessment marks in each semester. The remaining 50% of IA shall be awarded on the basis of continuous assessment by the faculty teaching a given subject. Each institute can develop its own criteria for continuous assessment.

8.5 Examinations for all Minor Optionals: (MO 105 & MO 204) as well as Clinical Internals (Aud 106 and Aud 306) shall be conducted by the respective institution, but the marks awarded shall be entered in the university marks card.

8.6 Awarding of IA Marks for Clinicals:

For Clinical Internals (Aud 106M and Aud 306M), as well as Clinical Externals (Aud 205M and Aud 404M), the awarding of marks shall follow the same guidelines as described in Section 8.4 above. However, all faculty and clinical staff members responsible for the clinicals in the given semester shall participate in awarding the marks.

8.7 Clinical Examinations:

Two internal examiners (nominated by the head of the department/institution from among the faculty of the department) shall conduct the clinical examinations for Aud 106 and Aud 306 at the end of the 1st and 3rd semesters.

8.8 An external examiner shall conduct the clinical examinations for Aud 205 and Aud 404 at the end of the 2nd and 4th semesters, respectively. All faculty of the department shall contribute to awarding IA marks based on the assessment of the student's work throughout the semester.

The clinical examination shall involve a clinical population, with audio/video records of clinical samples. Examiners shall also evaluate the records of clinical and practical work completed by the students. An internal faculty member may assist the external examiner(s) during Clinical Externals (Aud 205 and Aud 404), but they shall not be responsible for awarding marks.

8.9 Minor Optional:

The institutions offering M.Sc program are free to design the curriculum of the minor (optional) courses. The minor (optional) can be one or more of the following:

Sl.No	Subject	Semester	Credits
1	Speech Production and Analysis	I	1
2	Teaching Learning in Audiology	I	1
3	Bioethics	II	1

4	Entrepreneurship	II	1

8.10 Question Paper Pattern:

For 80 marks question paper: There shall be two sections. There shall be 5 short answer questions carrying 4 marks each (5 x 4=20marks) in Section A and 5 essay questions with internal choice carrying 10 marks each (5 x 12= 60 marks) in Section B, the questions should cover all the units.

For 40 marks question paper: There shall be two sections. There shall be 2 short answer questions carrying 5 marks each (5 x 2 = 10 marks) in Section A and 3 essay type questions with internal choice carrying 10 marks each (3 x 10= 30 marks) in Section B.

9.0 Dissertation

Students shall complete a dissertation in the 3rd and 4th semester of the course and shall submit the same at the end of 4th semester before final examination. The dissertation shall be the result of experimental research. One or more external examiners shall assess the dissertation as per the policy of the respective university.

9.1 III & IV Semester Dissertation Assessment for 100 marks. Marks distribution for dissertation shall be as follows.

III Semester: Internal Assessment:

- ●Research Proposal : 10 Marks — 1 Credit
- ●Progress Seminar: 10 Marks — 1 Credit.

IV Semester: Internal & External Assessment:

- Dissertation : 50 Marks (Internal & External) — 5Credits
- Viva voce during final presentation : 30 Marks (Internal & External) — 3 Credits

9.2 Candidates who fail to submit their dissertation on or before the stipulated date shall not be permitted to appear for the final semester examination.

10.0 Criteria for Passing

a. Student should have minimum of 80% attendance in theory and 90% attendance in practical's to register for semester exams.
b. Student is required to obtain a minimum of 50% in internals and University exam separately in each of theory papers, practical's, clinical exams and dissertations to be declared as pass.
c. Pass in practical and clinical examination of the given semester is mandatory to proceed to the next semester.
d. Each theory paper should be successfully completed within 3 attempts including the first one.
e. Student should have passed 50% of theory papers of previous year to proceed to next year.
f. Backlog exams will be conducted at the end of even semesters.
h. Transitory regulation: whenever there is change of syllabus a student will be given one more chance to appear for the examination with the existing old syllabus
i. Student should complete the course in 4 years and if he / she fail to do so has to repeat the course work by taking fresh admission in I year.

Note: Student passing the examination in one attempt will only be eligible for scholarship and prizes.

11.0 Board of Examiners

There shall be a Board of Examiners for scrutinizing and approving the question papers as well as scheme of valuation

12.0 Award of Degree

The University shall award the degree and issue the certificate only after the candidate successfully completes all the examinations stipulated.

13.0 Infrastructure for Starting the Course

Institutions that have the required infrastructure, as outlined in Annexure 2, shall be permitted to offer the Master's program in Audiology, after completing the necessary formalities.

14.0 Others

Registration at Rehabilitation Council of India: Successful postgraduates will be registered as Audiologists in the Central Rehabilitation Register of the Rehabilitation Council of India with additional qualification.

On all other issues not mentioned in these rules and regulations like the pattern of question paper, grading, award of grace marks, and declaration of rank, among others, the rules and regulations of the respective University shall prevail.

These revised rules and regulations, guidelines and curriculum shall override all other rules and regulations in force. These rules and regulations shall come into force from the academic year 2025-26.

Question Paper Pattern: For 80 marks question paper:

FACULTY OF SCIENCE

M.Sc(Aud.) - (CBCS) - Semester Examination,

Subject :

Paper –

Time: 3 Hours **Max. Marks: 80**

PART – A
(Answer all the questions)

(5 x 4 = 20 Marks)

1.
2.
3.
4.
5.

PART – B

(Answer all the questions)

(5 x 12 = 60 Marks)

6. a)

OR

b)

7. a)

OR

b)

8. a)

OR

b)

9. a)

OR

b)

10. a)

OR

b)

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Question Paper Pattern: For 40 marks question paper:

FACULTY OF SCIENCE

M.Sc(Aud.) - (CBCS) - Semester Examination,

Subject :

Paper –

Time: 3 Hours **Max. Marks: 40**

PART – A
(Answer all the questions)

(2 x 5 = 10 Marks)

1.

2.

PART – B

(Answer all the questions)

(3 x 10 = 30 Marks)

6. a)

OR

b)

7. a)

OR

b)

8. a)

OR

b)

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Adjudication of Dissertation

Semester III

Research Proposal: 10 marks

Sl. No	Criteria	Description	Marks allotted (10 Marks)**	Marks obtained
1.	Title & Research Problem	Clear, focused title and well-defined research problem/question	2	
2.	Objectives & Research Questions	Specific, measurable, and aligned with the problem	1	
3.	Literature Review Summary	Relevant background and identification of research gap.	2	
4.	Methodology	Clear explanation of research design, data collection & analysis methods.	2	
5.	Feasibility & Timeline	Practicality of the study and realistic time plan.	1	
6.	Presentation & Structure	Well-organized, clear language, formatting, and references	2	

Progress Report: 10 marks

Sl. No	Criteria	Description	Marks allotted (10 Marks)**	Marks obtained
1.	Clarity of Research Problem & Objectives	Clear articulation of research question, aims, and objectives	2	
2.	Literature Review Progress	Extent and relevance of reviewed literature, proper citations	2	
3.	Methodology Development	Appropriateness and clarity of the chosen research methodology	2	
4.	Work Completed & Results So Far	Description of tasks completed (e.g., data collection, analysis) and initial findings if any	2	
5.	Presentation & Report Quality	Structure, language, formatting, and adherence to guidelines	1	
6.	Planning & Timeline for Remaining Work	Realistic and well-structured plan for the next phases	1	

Semester IV:

Dissertation valuation (Internal / External examiner): 25 marks

Sl. No	Criteria	Description	Marks allotted (25 marks)	Marks obtained
1	Introduction & Objectives	Clarity of research problem, aim, and objectives. Relevance and originality of the topic.	3	
2	Literature Review	Depth, relevance, critical analysis, and synthesis of existing research. Proper citations.	4	
3	Research Methodology	Appropriateness of design, sampling, data collection and analysis techniques. Justification for choices.	4	
4	Data Analysis & Interpretation	Quality, accuracy, depth of analysis, interpretation of results, and linkage to research questions.	5	
5	Discussion & Conclusion	Reflection on findings, relevance to objectives, implications, limitations, and future scope.	3	
6	Originality & Critical Thinking	Innovation, problem-solving, analytical depth, and independent thinking.	3	
7	Presentation & Format	Clarity, structure, language, visuals (tables/figures), referencing, and adherence to guidelines.	3	

Viva Voce (Internal + External): 30 marks

Sl. No	Criteria	Description	Marks allotted (30 marks)	Marks obtained
1	Understanding of Research Topic	Clarity in explaining the research problem, objectives, and significance.	5	
2	Methodology Justification	Understanding and defense of the chosen methods; ability to justify their appropriateness.	5	
3	Analysis and Interpretation	Ability to explain data analysis, interpret results, and relate them to the research questions.	5	
4	Critical Thinking & Problem Solving	Depth of insight, handling of unexpected issues, and ability to engage in academic discussion.	5	
5	Response to Questions	Clarity, confidence, accuracy, and ability to address questions from examiners effectively.	5	
6	Communication Skills & Presentation	Clarity of speech, structure of answers, confidence, use of technical terms, and time management.	5	

Total Score: 100 marks

To be submitted in **Semester III** to University: 10 + 10 = 20 marks
To be submitted in **Semester IV** to University: 25+25+30(Avg. of I +E) = 80 marks

Annexure1

Annexure1

Course Content: 2-year M.Sc(Aud)Program

Semester 1

Aud 101M: Auditory Physiology

Hours:60 **Marks:100**
Credits: 4

Objectives:
After completing this course, the student shall be able to:
a) Identify and describe the macro- and micro-anatomic structures of the peripheral as well as central auditory system.
b) Describe the physiology of the peripheral as well as central auditory system.
c) Institute methods to study the physiology of the different components of the auditory system.
d) Apply the knowledge of auditory physiology to make appropriate clinical decisions.

Unit 1: Anatomy and Physiology of the Outer and Middle Ear

a) Anatomy of the external ear.
b) Resonance properties of the external ear and their significance to hearing and sound localization.
c) Head-related transfer function (HRTF).
d) Bone conduction hearing: theories, factors affecting it, skull properties.
e) Anatomy of the middle ear and middle ear cleft.
f) Middle ear transformer action.

Unit 2: Cochlear Anatomy and Physiology

a) Macro- and micro-anatomy of the cochlea.
b) Innervations and blood supply to the cochlea.
c) Cochlear fluids: generation, composition, and dynamics.
d) Cochlear transduction and electrophysiology; cochlear potentials, their generation and properties.
e) Basilar membrane mechanics and non-linearity.
f) Hair cell micromechanics and non-linearity.
g) Proteins and nutrients related to cochlear physiology.
h) Hair cell regeneration.

Unit 3: Anatomy and Physiology of the Auditory Nerve

a) Structure and tonotopic organization of the VIII cranial nerve.
b) Action potential: generation, properties, and conduction.
c) Physiology of the auditory nerve:

- Non-linearity observed at the auditory nerve.
- Stimulus coding: frequency, intensity, and temporal coding.

- Coding of complex signals at the auditory nerve.

d) Synapse: Neurotransmitters vs. neuromodulators, properties and functions of neurotransmitters, afferent and efferent neurotransmitters.

Unit 4: Anatomy and Physiology of the Auditory Brainstem and Subcortical Regions

a) Auditory nuclei and their interconnections:
- Cochlear nucleus.

b) Superior olivary complex.
c) Lateral lemniscus.
d) Inferior colliculus.
e) Medial geniculate body.
f) Tonotopic organization.
g) Coding of signals at brainstem and subcortical levels:
- Simple and complex signals.
- Speech.
- Role in sound localization.

h) Role of the brainstem in sound localization.
i) Application in understanding auditory disorders.

Unit 5: Anatomy and Physiology of the Auditory Cortex and Efferent Pathway

a) Anatomy of primary and secondary auditory cortex.
b) Tonotopic organization.
c) Neurobiological relationship between the auditory cortex and other cortical areas.
d) Coding of signals in the auditory cortex:

- Simple and complex signals.
- Speech.
- Role in sound localization.

e) Efferent auditory pathways: olivocochlear bundle, corticofugal pathway, cortico-cortical connections.
f) Physiology of auditory efferent pathways and their influence on auditory physiology.
g) Application in understanding auditory disorders.

Recommended Reading

a) Altschuler, R. A., & Hoffman, D. W. (1986). Neurobiology of hearing: the cochlea.New York: Raven Press.
b) Tony, L., Sahley., Richard, H., Nodar., Frank, E., Musiek. (1997). EfferentAuditory System: Structure and Function.
c) Dallos,P.(1973).Auditoryperiphery:Biophysics&physiology.NewYork: Academic Press.
d) Drescher,D.G.(1985).Auditorybiochemistry.Springfield:CharlesC.Thomas.
e) Gelfand,S.A.(2004).Hearing:IntroductiontoPsychologicalandPhysiological Acoustics. (4th Edn.). New York: Marcel Decker.
f) Gulick,W.L.,&Others.(1989).Hearing:Physiology,acoustics,neuralcoding& psychoacoustics. New York: Oxford University Press.
g) Günter,E.,&Romand,R.(1997).Thecentralauditorysystem.UnitedKingdom: Oxford University Press.
h) Jahn,A. F., & Santos-Sacchi, J. (1989). Physiology of the Ear. New York:Academic Press.
i) Moller, A. R. (2000). Hearing: Its physiology and pathology. San Diego: AcademicPress.
j) Pickels, J.O. (2012).An introduction to the physiology of hearing. United Kingdom: Emerald Group Publishing Inc.

k) Richard,A.(1991).Neurobiology ofHearing.USA:Raven Press.
l) Zemlin, W. R. (1998). Speech & Hearing science: Anatomy & Physiology. Boston:Allyn & Bacon.

Aud102M: Hearing Sciences

Hours: 60 **Marks:** 100
Credits: 4

Objectives

- Upon completing this course, students will be able to:
- Understand the psychophysical components of sound and their measurement techniques.
- Analyze and critically evaluate different methods for estimating thresholds, frequency analysis, and the application of masking.
- Conduct experiments to estimate auditory thresholds and measure pitch, loudness, and temporal aspects of sound.

Unit 1: Introduction to Psychoacoustics

- **Physical Properties of Sound:** Study the fundamental characteristics of sound waves, including frequency, amplitude, and waveform.
- **Theory of Signal Detection:** Explore the basic concepts of signal detection theory and its applications in hearing sciences.
- **Psychophysical Procedures:** Examine methods used to assess human perception of sound, including methods of limits, methods of adjustment, and the method of constant stimuli.
- **Absolute and Differential Hearing Sensitivity:** Understand the concepts of absolute thresholds (the minimum level of sound that can be detected) and differential thresholds (the smallest detectable difference between two sounds).

Unit 2: Loudness and Pitch

- **Loudness:**
  - Scales: Learn about different scales used to measure loudness, such as phon and sone scales.
  - Spectral, Temporal, and Intensity Effects: Explore how these factors influence loudness perception.
  - Loudness Perception in Hearing Impaired: Discuss the challenges faced by individuals with hearing loss in perceiving loudness.
  - Models of Loudness: Review existing models that explain loudness perception, such as the Stevens power law.
- **Pitch:**
  - Scales: Study the different scales for measuring pitch, including mel and cent scales.
  - Spectral (Place) and Temporal (Rate) Theories: Analyze how pitch perception is explained by both place theory and temporal theory in simple and complex tones.
  - Pitch Perception in Hearing Impaired: Investigate how hearing impairment affects pitch perception.

Unit 3: Masking

- **Peripheral Masking:**
  - Critical Band Concept and Power Spectrum Model: Understand the role of critical bands in masking.
  - Estimating the Shape of Auditory Filter: Examine methods such as psycho-physical tuning curves and notched noise to assess auditory filters.
  - Auditory Filter Shapes in Normal and Hearing Impaired: Discuss the differences in auditory filter shapes between normal hearing individuals and those with hearing loss.
  - Masking Patterns and Excitation Patterns: Analyze how masking patterns differ in normal and hearing-impaired listeners.
- **Non-Peripheral Masking:**

- Central Masking: Explore how central nervous system processes contribute to masking.
- Informational Masking: Investigate how the complexity of a sound may affect masking.
- Co-modulation Masking Release: Learn about conditions under which masking can be released due to co-modulation.
- Effect of Hearing Loss on Non-Peripheral Masking: Discuss how hearing loss alters non-peripheral masking effects.

Unit 4: Temporal Processing

- **Concept of Temporal Processing:** Understand key concepts such as temporal resolution and temporal integration.
- **Methods to Assess Temporal Resolution:** Study various methods to evaluate temporal resolution, including gap detection and discrimination tasks, and temporal modulation transfer functions.
- **Factors Affecting Temporal Integration:** Investigate the variables that influence the ability to integrate temporal information over time.
- **Models of Temporal Resolution and Integration:** Review theoretical models that explain how auditory systems process temporal information.

Unit 5: Spatial Perception and Auditory Scene Analysis

- **Basic Principles of Auditory Localization and Lateralization:** Understand how humans locate sound sources in space.
- **Cues for Auditory Localization:** Explore binaural cues, head-related transfer functions (HRTFs), and the role of head movements in sound localization.
- **Binaural Release from Masking:** Examine how binaural listening can help overcome masking effects.
- **Precedence Effect:** Study the phenomenon where the first sound perceived influences the perception of later sounds.
- **Models of Binaural Hearing:** Review existing models that describe how the auditory system processes binaural information.
- **Auditory Spatial Perception Abilities in Hearing Impaired:** Understand the challenges faced by hearing-impaired individuals in spatial perception.
- **Basic Principles of Auditory Perceptual Organization:** Learn how the brain organizes auditory information.
- **Perceptual Cues for Auditory Grouping/Secregation:** Explore the cues that help us group or segregate sounds in complex auditory environments.
- **Models of Auditory Scene Analysis:** Review theoretical frameworks that explain how we perceive complex auditory scenes.

Recommended Reading

a) Brain C.J., Moore (2007). Cochlear Hearing Loss: Physiological, Psychological and Technical Issues. England: John Wiley and Sons Ltd.
b) Garrett,S.L.(2020).UnderstandingAcoustics:AnExperimentalist'sViewof AcousticsandVibration.(2ndedition). Springer.
c) Gelfand,S,A.(2005).Introductiontopsychologicalandphysiologicalacoustics. New York: Marcel Dekker.
d) Gullick,W.L.(1971).Hearingphysiologyandpsychophysics.NewYork:Oxford University Press.).
e) Howard, D and Angus, J (2013).Acoustics and Psychacoustics.Oxford: Taylor

&Francis
f) Lass,N.J.(2023).Hearingsciencefundamentals.(2ndEdition).Plural Publishing
g) Mcdougal,N. (2022). SpatialHearingandAuditoryPerception.AmericanMedical Publishers.
h) StuartRosenandDeterHowell(1991).Signalsandsystemsforspeechandhearing. CA:AcademicPressInc
i) Tan, S. L., Pfordresher, P., & Harré, R. (2017). Psychology of music: From sound to significance. (2nd edition). Routledge.
j) Van Dijk, P., Başkent, D., Gaudrain, E., De Kleine, E., Wagner, A., & Lanting, C. (2016). Physiology, psychoacoustics and cognition in normal and impaired hearing. Springer Nature.

Aud103MC: Research Methods, Epidemiology & Statistics

Hours :45 **Marks:100**
Credits: 3

Objectives:
After completing this course, the student will:

a) Have the skills to frame research questions and design experiments.
b) Decide on the appropriate statistical methods to test hypotheses and interpret the results.
c) Be aware of epidemiological issues and their relevance in hearing research.
d) Undertake evidence-based practice in audiology.
e) Observe ethical practices in research.

Unit 1: Experimental Designs and Their Applicability in Hearing Research

a) Types of research: post facto, normative, standard group comparison, experimental research, clinical and applied research, sample surveys, evaluation research.
b) Methods of observation and measurement, strategies and designs in research.
c) Experimental designs: single-subject designs and group designs.
d) Critical analysis of the research methods employed in audiology.
e) Documentation and research writing.
f) Ethical considerations in research: National and international guidelines.

Unit 2: Epidemiology

a) Epidemiology: Definition and basic concepts – scope and function of epidemiology.
b) Study designs in epidemiology: cohort studies, case-control studies, cross-sectional studies, clinical trials.
c) Measures in epidemiology: Ratios, proportions, rates, relative risk, odds ratio.
d) Identify biases and their consequences in published literature.
e) Describe criteria for characterizing the causality of associations.
f) Application of epidemiological concepts in evaluation and screening procedures employed in audiology.
g) Application and impact of epidemiology on national and local policy; influence of epidemiology on ethical and professional issues.

Unit 3: Statistical Measures and Their Features

a) Review of data description and exploratory data analysis (numerical and graphical summaries).
b) Probability concepts and models.
c) Statistical inference – Estimation and confidence intervals.
d) Statistical inference – Basic concepts related to hypothesis testing:

- Null hypothesis, alternative hypothesis, significance level, statistically significant, critical value.
- Acceptance/rejection region, p-value, power, types of errors: Type I error.
- One-sided (one-tailed) test, two-sided (two-tailed) test.

e) Parametric and non-parametric approaches to hypothesis testing.
f) Categorical data analysis – contingency tables, Chi-square test for independence of attributes.
g) Measures of association (Contingency coefficient, Cramer's V), Kappa coefficient.

Unit 4: Regression, Univariate, and Multivariate Analysis

a) Correlation, regression analysis and prediction including multiple regression; logistic

regression; path analysis

b) Analysis of Variance (ANOVA)- Basic models, assumptions, one way and two way ANOVA; Consequence of failure of assumptions underlying ANOVA; Tests for additivity, homogeneity, transformation; Post – hoc tests; Analysis of Covariance (ANOCOVA); Repeated measure ANOVA
c) Multivariate analysis: Need for multivariate analysis, various methods including MANOVA, MANCOVA
d) Introduction to principal component analysis, factor analysis, discriminate function, multidimensional scaling
e) Evaluation of application of statistics to different research designs used in different publications
f) Criticalanalysisofresearcharticlesinthefield:Analysisofresearchdesignsin different areas of Speech-language Pathology

Unit 5: Evidence Based Practice

a) Introduction to Evidence Based Practice (EBP) and Steps to EBP from formulating foreground question, finding best current evidence, critical appraisal of best current evidence, summarizing evidence, integrating evidence and tracking progress.
b) Concepts related to practical significance (effect size) vs. statistical significance, precision of measurement (confidence intervals)
c) Levels of evidence: For experimental and non-experimental designs; treatment efficacy- randomized control study, quasi experimental study, correlation and case study, single subject designs, expert committee report, consensus conference
d) Measures of diagnostic accuracy – positive and negative likelihood ratios; positive predictive value, negative predictive value, diagnostic odds ratio
e) Concepts related to randomized control trials: Comparative groups- allocation concealment / random allocation; importance of participation and follow up in understanding, evaluating and applying randomized controlled trial results
e) Methods of carrying out therapy trials; execution, indexing and reporting of therapy trials–efficacy studies; Conventions to study outcomes -i)Absolute risk reduction, ii) Absolute benefit increase, iii) Absolute risk increase, and iv) Absolute benefit reduction
f) Systematic review and meta-analysis; importance of research publications in terms of systematic review, meta-analysis, clinical practice guidelines, health technology assessments.
g) Challenges in implementation of EBP in Speech-language Pathology in India and future directions

Recommended Reading

a) AndyField(2009).DiscoveringStatisticsUsingSPSS.(3rdEd.).SAGEPublications
b) Bernard Rosner. (2011). Fundamentals of Biostatistics (7th Ed.). Cengage Learning, Inc.
c) DavidC.Howell.(2014).FundamentalStatisticsfortheBehavioralSciences(8th Ed.). Jon-David Hague publishers.

d) DavidL.Irwin,NormanJ.Lass,MaryPannbacker,MaryEllenTekieliKoay, Jennifer S. Whited (2020). Clinical research methods in speech-language pathology and audiology (3rd Edition), San Diego, CA: Plural Publishing.
e) Hegde M. N. (2024).Acourse book on Scientific and professional writing for speech language pathology (6th Edition), San Diego, CA: Plural Publishing, Inc.
f) Hegde, M. N. (2021). Clinical research in communicative disorders: Principles and strategies. (4th Edition), San Diego, CA: Plural Publishing.
g) Kothari, CR (2004). Research Methodology- Methods &Techniques. (3rd Ed.). New Age International (P) Limited, Publishers.
h) Lauren K. Nelson, Jaimie L. Gilbert (2021). Research in Communication Sciencesand Disorders: Methods for Systematic Inquiry. (4th Edition), San Diego, CA: Plural Publishing.
i) Sabine, Landau, Brian S. Everitt. (2004). A Handbook of Statistical Analyses using SPSS.Chapman & Hall/CRC Press LLC.
j) VinayaManchaiah,EldréW.Beukes,RossJ.Roeser(2022).Evaluatingand Conducting Research in Audiology. San Diego, CA: Plural Publishing.
k) VisweswaraRao,K(2010).BioStatisticsinBriefMadeEasy.JaypeeBrothers Medical Publishers.
l) WendyL.Martinez,&AngelR.Martinez.(2002).ComputationalStatisticsHandbook with MATLAB. Chapman & Hall/CRC Press LLC.

Aud104MC: Technology in Audiology

Hours: 60 **Marks:100**
Credits:4

Objectives:
After completing this course, the student will:
a) Have the skills to acquire and process signals.
b) Develop and apply software-based tools.
c) Develop and apply tele-technology strategies.
d) Decipher the technology behind amplification devices.

Unit 1: Transducers and Signal Processing
a) **Transducers used in speech, language, and hearing**
- Microphones: Basic structure & principle of operation of dynamic, condenser, and electret microphones.
- Essential characteristics of microphones for sound recording, sound measurement, and hearing aids.
- Loudspeakers: Basic structure & principle of operation of moving coil and balanced armature types.
- Essential characteristics of headphones and insert receivers.

b) **Digital Signal Processing (DSP)**
- Basic structure of a digital signal processing system.
- Analog-to-digital conversion and digital-to-analog conversion: Influencing parameters.
- Basic concepts of digital signal processing: signal decomposition, processing, and synthesis.
- Implementation of filters using DSP: FIR and IIR.

c) **Speech Signal Processing**
- Converting a speech signal from the time domain to the frequency domain.
- Feature extraction using short-time analysis techniques.

Unit 2: Information and Communication Technology & Power Supply
a) **Information and Communication Technology**
- Computer architecture.
- Role of the operating system, RAM, and hard disk in the performance of a computer.
- Implementation of computer networks in clinics.
- Basic structure of a satellite communication system.
- Cloud-based computing.

b) **Tele-practice**
- Technology for tele-diagnosis in audiology.
- Technology for tele-rehabilitation.

c) **Applications of Artificial Intelligence and Machine Learning.**
d) **Power Supply**
- Requirements for mains supply to clinics, electrical grounding (general and special), measures to reduce electro-magnetic interference (EMI).
- Safety of medical electrical instruments: standards and classes, degree of protection.
- Uninterrupted power supply for the entire clinic vs. individual instruments.

Unit 3: Technology Involved in Hearing Aids, Cochlear Implants, and Speech Processing
a) **Technology involved in hearing aids**

- Basic architecture of digital hearing aids.
- Technologies for channel separation.
- Technologies for non-linear amplification.
- Technologies for noise suppression.
- Technologies for feedback cancellation.

b) **Technology involved in cochlear implants**

- Basic architecture of a cochlear implant.
- Speech processing strategies.

c) **Techniques of speech analysis**

- LPC (Linear Predictive Coding) analysis.
- Cepstrum analysis.

d) **Applications of speech processing**

- Speaker recognition.
- Automatic speech recognition.
- Speech synthesis.

Unit 4: Instrumentation in Hearing Science

a) **Instrumentation in audiology**

- Audiometer.
- Middle ear analyzer.
- Otoacoustic emission analyzer.
- Instrumentation for auditory evoked potentials.
- Multichannel EEG and ERP systems.

b) **Calibration and maintenance of audiological equipment**

- Audiometer.
- Middle ear analyzer.
- Otoacoustic emission analyzer.
- Instrumentation for auditory evoked potentials.

c) **Acoustic measurements**

- Sound level meter: Concept of frequency weighting, averaging time.
- Noise auditing: Traffic noise, ambient noise in audiometric test rooms and classrooms.
- Measurement of reverberation time.

Unit 5: Software for Analysis

a) **Software packages and applications in hearing diagnostics and research**

- MATLAB, Adobe Audition, Audacity, PRAAT.

b) **Basic features**

- Vectors and matrices, built-in functions, and plotting.

c) **Editing audio files**

- Applying effects in waveform editor: Amplitude compression, modulation effects, filter and equalizer effects, noise reduction/restoration effects, basic multi-track controls, saving, and exporting.

d) **Computer-based assessment and intervention programs related to hearing.**

Recommended Reading

a) Silmaon,S.,Emmer,M.B.,Silverman,C.A.and Brody,A(2022). Instrumentation for Audiology and Hearing Science: Theory and Practice. Plural publishers.
b) Moser,P.(2015).ElectronicsandInstrumentationforAudiologists.PsychologyPress.
c) Boulston,F.R.&Dvorak,J.D(2015).MatlabPrimerforSpeechLanguagePathology and Audiology.San Diego: Plural Publishing Inc
d) Villchur, E. (1999).Acoustics forAudiologists (1 edition.). San Diego, Calif: Delmar Cengage Learning.
e) Baber, C. & Noyes, J.M. (1993). Interactive Speech Technology: Human Factors Issues in the Application of Speech Input Output to Computers. London: Taylor and Francis.
f) Daniloff, R.G (1985). Speech Sciences: Recent advances. London: Taylor and Francis.
g) Gottingen,M.R.S.(Ed.)(1985).Speech andSpeakerRecognition.Basel:Kager.
h) Haton, J.P. (Eds) (1981). Automatic speech analysis & recognition. USA, D. Reidel Publishing Company.
i) Keller, E. (ed.) (1994). Fundamentals of Speech Synthesis and Speech Recognition: Basic Concepts, State of the art and Future challenges. New York: John Wiley &sons.
j) Morgan, D.P. & Scofield, C.L (1991). NeuralNetworks and Speech Processing. Boston, Kluwer Academic Publishers.
k) Nakagawa,S.&etal.(1995).Speech,HearingandNeuralNetworkModels.Oxford: IOS,Press
l) Oppenheim & Schafer (1989). Digital signal processing. New Delhi: Prentice Hall of India.

Aud1.5 (A)MO: Speech Production and Analysis

Hours: 30 **Marks: 50**
Credits: 1

Objectives: After completing this course, the student will

1. Understand the anatomical and physiological processes of speech production.
2. Have a skill to analyze speech acoustically using software tools and interpret key features,
3. Have a skill to recognize the connection between articulatory movements and acoustic signals.

Unit I

a) Theories of Speech Production
   i. Acoustic theory of speech production with its critical evaluation.
   ii. Quantal theory
   iii. MyoElastic-AeroDynamic (MEAD) theory
b) Measures of Respiratory Analysis and instrumentation.
   i. Intra-oral pressure
   ii. Sub glottal pressure
c) Articulatory phonetics
   i. classification of consonants (place, manner, voicing)
   ii. classification of vowels

Unit II

a) Acoustic analysis of speech
   i. (techniques of digital signal processing, Long Term Average Spectrum, Spectrogram); Acoustic and Aerodynamic Characteristics of Speech Sounds
b) Physiological measurements:
   i. Stroboscope,
   ii. Electroglottography,
   iii. Ultrasound,
   iv. fMRI,
   v. PET.
c) Applications of acoustic analysis in speech disorders
   i. Forensic applications: semiautomatic and automatic methods
   ii. Infant cry analysis- characteristics of normal and abnormal cries, models, infant cry as a tool for early identification of high-risk babies

Recommended Reading:

1. Borden, G. J., & Harris, K. S. (2011). Speech Science Primer, Philadelphia. Lippincott, William & Wilkins.
2. Ferrand, C. T. (2007). Speech Science – An Integrated Approach to Theory and
3. Practice.2nd Edition, Boston, Allyn& Bacon.
4. Hixon, T. J., Weismer, G., &Hoit, J. D. (2014).Preclinical Speech Sciences; Anatomy
5. Physiology Acoustics Perception.San Diego, Plural Publishing.
6. Hollien, H. (2002). Forensic Voice Identification. NY, Academic Press Inc.
7. Kent, R. D., & Read, C. (2002).The Acoustic Analysis of Speech. New York, Delmar Learning.
8. Ladefogd, P. (2001). An Introduction to the Sounds of Languages; Vowels and Consonants. Oxford, Black Well

9. Raphael, L. J. (2007). Speech Science Primer.Philadelphia, Lippincott Williams & Wilkins.

Aud1.5 (B)MO: Teaching Learning inAudiology

Hours: 30 **Marks: 50**
Credits: 1

Objectives: By the end of this course, the learner will be able to:

1. Understand fundamental theories and principles of teaching and learning as they apply to audiology education.
2. Apply appropriate teaching methodologies to enhance knowledge transfer in both classroom and clinical settings.
3. Design and evaluate curricula and instructional materials that integrate audiological content with effective pedagogical strategies.
4. Identify learning styles and adapt instruction to meet diverse learner needs, including students with disabilities.
5. Utilize effective assessment tools to evaluate student learning and clinical competencies.
6. Demonstrate skills in clinical supervision, mentorship, and feedback to support students in real-world audiological settings.
7. Engage in reflective teaching practices and commit to continuous professional development as an educator.
8. Explore the use of technology and innovation in audiology education, including e-learning, simulations, and interdisciplinary methods

Unit 1: Foundations of Teaching and Learning in Audiology

1.1 Principles of Teaching and Learning

- Definitions and scope of teaching and learning
- Learning theories (Behaviorist, Constructivist, Cognitive, Social)
- Teaching principles: active learning, motivation, feedback, and reinforcement
- Adult learning principles and their application in audiology education

1.2 Educational Psychology and Learning Styles

- Learning styles: visual, auditory, kinesthetic
- Multiple intelligences theory and implications for audiology training
- Cognitive development and auditory learning
- Factors influencing learning (age, attention, memory, emotion, and language)

1.3 Curriculum Development in Audiology

- Components and structure of an effective curriculum
- Instructional design models (ADDIE, Bloom's Taxonomy)
- Competency-based curriculum and outcome-based education
- Integration of theory and clinical practice

1.4 Teaching Strategies and Instructional Methods

- Lecture, demonstration, group discussion, case-based learning
- Clinical teaching methods: bedside teaching, simulation, role play
- Use of multimedia and e-learning tools in audiology
- Designing lesson plans and teaching modules

Unit 2: Assessment, Supervision, and Professional Development

2.1 Student Assessment and Evaluation

- Principles and tools of assessment
- Formative vs. summative assessment
- Objective Structured Clinical Examination (OSCE)

- Self-assessment, peer evaluation, and reflective practices

2.2 Clinical Supervision and Feedback

- Models of clinical supervision (Dyad, One-minute preceptor, Pendleton model)
- Giving constructive feedback and mentorship
- Observation and evaluation of clinical skills
- Documentation and reporting in clinical teaching

2.3 Professional Development for Educators

- Roles and responsibilities of a clinical educator
- Continuing professional development (CPD) in audiology
- Ethics in teaching and mentoring
- Research in teaching-learning methods

2.4 Innovations in Audiology Education

- Use of technology: Learning Management Systems (LMS), virtual labs, telepractice
- Interdisciplinary and collaborative learning
- Problem-based learning (PBL) and Evidence-based education
- Inclusive education practices for diverse learners

Recommended Reading:

1. **Biggs, J., & Tang, C. (2011).** *Teaching for Quality Learning at University* (4th ed.). Open University Press.
   – Excellent for understanding constructive alignment and student-centered learning.
2. **Knowles, M. S., Holton, E. F., & Swanson, R. A. (2015).** *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development* (8th ed.). Routledge.
   – Essential for understanding adult learning principles.
3. **Harden, R. M., & Laidlaw, J. M. (2017).** *Essential Skills for a Medical Teacher: An Introduction to Teaching and Learning in Medicine* (3rd ed.). Elsevier.
   – Practical guide to clinical teaching and feedback, relevant to audiology education.
4. **Brookfield, S. D. (2015).** *The Skillful Teacher: On Technique, Trust, and Responsiveness in the Classroom* (3rd ed.). Jossey-Bass.
   – Focuses on teaching techniques, student engagement, and reflective practice.
5. **Merriam, S. B., & Bierema, L. L. (2013).** *Adult Learning: Linking Theory and Practice*. Jossey-Bass.
   – Useful for understanding how theory translates into teaching practice.
6. **Grant, J., & Marsden, P. (Eds.). (2012).** *Making Sense of Clinical Teaching: A Hands-on Guide to Success*. Radcliffe Publishing.
   – Focuses on clinical teaching strategies, useful for audiology placements.
7. **Brown, G., & Atkins, M. (1988).** *Effective Teaching in Higher Education*. Routledge.
   – Good general overview of teaching methods in a higher education setting.
8. **Ramsden, P. (2003).** *Learning to Teach in Higher Education* (2nd ed.). Routledge.
   – For deeper understanding of pedagogy in academic institutions.

AUD 106M: Clinicals in Audiology

Hours: 180+ **Marks:** 100
Credits: 6

General Considerations

- Students should be able to carry out complete audiological evaluation and management of individuals with hearing impairments.
- Upon completion of clinical postings, the student will have the ability to apply, demonstrate (in a clinical diary/logbook), and perform the following tasks on patients/clients.

Know-How

a) Gather, review, and examine information from referral sources to facilitate the audiological assessment process
b) Record BCABR in cases of Anotia and Atresia.
c) Perform ABR in anesthetized patients.
d) Differentiate between middle ear pathologies based on pure tone audiogram and immittance evaluation.
e) Prepare referral letters.

Demonstrate

a) Generation of stimuli for recording auditory evoked potentials (AEPs).
b) Modify protocols for recording ABR based on the client being tested.
c) Perform stacked ABR and CHAMP.
d) Analyze normal and abnormal auditory evoked potential waveforms.
e) Perform bone conduction ABR with contralateral masking.

Do

a) Record tympanograms in manual mode, and measure peak pressure, peak admittance, and ear canal volume manually using a cursor (10 cases).
b) Interpret case results indicating the presence of various middle ear pathologies (25 cases).
c) Vary different stimulus and procedure-related parameters and note their effect on test results (e.g., probe tone frequency, rate of pressure change, direction of pressure change, number of trials, probe insertion depth, sneezing before measurement, speaking during measurement) (25 ears).
d) Record acoustic reflexes and differentially diagnose auditory disorders based on the results of pure tone audiometry, speech audiometry, and immittance evaluation (25 cases).
e) Measure resonant frequency of the middle ear and interpret results (25 cases).
f) Perform tests of Eustachian tube functioning and interpret the status of the Eustachian tube (25 cases).
g) Carry out Acoustic Reflex Decay test and quantify the decay (10 cases).
h) Record electrocochleography and measure SP/AP amplitude and area ratio.
i) Record MLR, LLR, ACC, MMN, P300, and measure latency and amplitude of waves.
j) Carry out hearing aid trial selection (5 cases).
k) Carry out therapy for children with hearing loss (5 cases).
l) Carry out newborn hearing screening (10 babies)

Evaluation

Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.

Semester2

Aud 201M: Physiological Assessment of Hearing

Hours:60 **Marks:100**
Credits: 4

Objectives:
After completion of this course, the student will be able to:
a) Administer multi-component/frequency tympanometry, wideband tympanometry, and advanced OAE tests, and interpret the results.
b) Record different auditory evoked potentials (AEPs) and describe their clinical applications and generator sites.
c) Choose the appropriate AEP to record in any given clinical situation.
d) Set the parameters for recording and analyzing various AEPs.

Unit 1: Middle Ear Immittance Measures and Otoacoustic Emissions

a) Middle ear immittance measures: multi-component & multifrequency tympanometry, wideband tympanometry, reflexometry.
b) Otoacoustic emissions:

- Cochlear mechanisms in the generation of OAEs.
- The influence of ear canal acoustics and round-trip gain of the middle ear.
- Mechanism-based taxonomy of OAE.
- Stimulus-frequency OAEs: methods of recording and their applications.
- Fine structure OAEs and their applications.
- Suppression of OAEs: ipsilateral, contralateral, and bilateral.

Unit 2: Principles of Recording AEPs

a) Stimuli for recording AEPs and the various stimulus paradigms used for AEP recording.
b) Neurophysiological mechanisms:

- Electrical dipole, action potential versus post-synaptic potentials, open versus closed neural circuitry, volume conduction, scalp distribution.

c) Acquisition of EEG signal:

- Common mode rejection.
- A/D conversion.
- Amplification.
- Anti-aliasing filter.

d) Signal processing techniques:

- Analog filters & digital filters.
- Time-locked acquisition.
- Amplitude-based techniques for artifact rejection.
- Unweighted and weighted time-domain averaging.
- Unweighted and weighted frequency-domain averaging.

e) Rationale for nomenclature and generators of auditory evoked potentials.
f) Continuous acquisition of EEG.
g) High-density EEG recording.
h) Recording AEPs for intraoperative monitoring.

Unit 3: Early AEPs

a) Acquisition, analysis, and applications of:

- Electrocochleography.
- Chirp-evoked ABRs.

- Frequency-specific ABRs.
- CHAMP.
- Stacked ABRs.
- Complex ABRs.
- EABR.

Unit 4: Middle and Late Latency AEPs, Auditory Steady-State Responses

a) Acquisition, analysis, and applications of:

- Middle latency responses.
- Frequency-following responses and envelope-following responses.

b) Factors influencing middle latency responses:

- Stimulus-related, acquisition-related, subject-related factors.

c) Acquisition, analysis, and applications of:

- Auditory steady-state responses.

d) Factors influencing late latency responses:

- Stimuli-related, acquisition-related, subject-related factors.
- Acquisition, analysis, and applications of:
    - Late latency responses (P1, N1, P2, N2).
    - ACC.

Unit 5: Endogenous AEPs

a) Overview of endogenous potentials.

b) Acquisition, analysis, factors affecting, and application of:

- MMN (Mismatch Negativity).
- P300.
- N400.
- P600.
- CNV (Contingent Negative Variation).
- Other endogenous potentials.

c) Multi-modality stimulation.

d) Special techniques involved in the acquisition and analysis of endogenous potentials.

Recommended Reading

a) Burkard,R.F.,Don,M.,&Eggermont,J.J.(Eds.)(2007).AuditoryEvokedPotentials: Basic Principles &Applications. Baltimore: Lippincott Williams & Wilkins.

b) Hall,J.W.(2007).NewHandbookofAuditoryEvokedResponses.Boston:Pearson.

c) Hall, J.W., & Mueller, H.G. (1997) Audiologists' Desk Reference. Volume 1: Diagnostic Audiology Principles, Procedures and Protocols. San Diego: Singular Publishing Group.

d) Hood, L.J. (1998). Clinical applications of auditory brainstem response. San Diego: Singular Publishing Group Inc.

e) Katz, J. (Ed.). (1994). Handbook of Clinical Audiology. Baltimore: Williams and Wilkins.

f) Kilney, P.R. (2017). Audiologists handbook of intraoperative neurophysiological monitoring.San Diego: Plural Publishing Group

g) Krishnan,A.(2021).Auditorybrainstemevokedpotentials:Clinicalandresearch Applications. San Diego: Plural Publishing Group

h) Markand, O. N. (2020). Clinical Evoked Potentials: An Illustrated Manual. Springer Nature.

i) McPherson,L.D.(1995).Latepotentialsoftheauditorysystem.London:Singular Publishing Group.

j) Picton, T. (2011). HumanAuditory Evoked Potentials.San Diego: Plural Publishing

Group.
k) Rance,G(2008). AuditorySteadyStateResponses.SanDiego:PluralPublishing Group

AUD 202M: Auditory Disorders

Hours: 60 **Marks:** 100
Credits: 4

Objectives:
After completing this course, the student shall be able to:

- a) Explain the pathophysiology of auditory disorders.
- b) Assess and accurately diagnose auditory disorders.
- c) Recommend the most appropriate intervention strategy.

Unit 1: Disorders of the External and Middle Ear

- a) **Aetiology, Pathophysiology, Audiological and Non-Audiological Profile, Assessment Methods (Audiological & Non-Audiological), and Intervention Methods** of:
  - Congenital malformations of external and middle ear
  - Otitis media and its complications
  - Otosclerosis, neoplasms, ossicular chain discontinuity
  - Disorders of Eustachian tube
- b) **Reconstruction of External and Middle Ear Hearing Mechanisms**:
  - Reconstructive and rehabilitation procedures

Unit 2: Disorders of the Cochlea

- a) **Aetiology, Pathophysiology, Audiological and Non-Audiological Profile, Assessment Methods (Audiological & Non-Audiological), and Management of**:
  - Congenital cochlear anomalies
  - Ototoxicity, Meniere's disease, sudden sensorineural hearing loss
  - Hearing loss secondary to autoimmune disorders and systemic diseases
  - Noise-induced hearing loss and acoustic trauma, Hearing conservation - national and international guidelines

Unit 3: Disorders of Auditory Nerve and Brainstem

- a) **Aetiology, Pathophysiology, Audiological and Non-Audiological Profile, Assessment Methods (Audiological & Non-Audiological), and Management of**:
  - Space-occupying lesions of auditory nerve and brainstem
  - Hidden hearing loss
  - Auditory neuropathy spectrum disorder
  - Hearing loss due to vascular loop
  - Hearing loss due to temporal bone fractures

Unit 4: Assessment of Auditory Processing Disorders

- a) **Normal Central Auditory Processes**
- b) **Prevalence of Auditory Processing Disorders, Etiology, and Comorbid Conditions**
- c) **Theories and Models to Explain Auditory Processing and Auditory Processing Disorder**
- d) **Assessment of Auditory Processing Disorder**:
  - Behavioral tests and physiological measures
- e) **Diagnosis and Classification of Auditory Processing Disorders**

Unit 5: Management of Auditory Processing Disorders

- a) **Signal Enhancement**
- b) **Environmental Modifications**

- c) **Direct Remediation Techniques**
- d) **Compensatory Strategies** including metalinguistic and metacognitive strategies
- e) **Management of Auditory Processing Disorder**: Direct remediation techniques, metalinguistic and metacognitive approaches

Recommended Reading

- a) Berlin, C. I., Hood, L. J., & Ricci, A. (2002). *Hair Cell Micromechanics and Otoacoustic Emissions*. New York: Thomson Learning Inc.
- b) Chasin, M. (2009). *Hearing Loss in Musicians: Prevention and Management*. San Diego: Plural Publishers
- c) Chermak, G. D., & Musiek, F. E. (2013). *Handbook of (Central) Auditory Processing Disorders – Comprehensive Intervention, Vol. II*. San Diego: Singular Publishing Group
- d) Geffner, D., & Ross-Swain, D. (2013). *Auditory Processing Disorders: Assessment, Management, and Treatment*. 2nd Edn. San Diego: Plural Publishing Inc.
- e) Hall, J.W. (2007). *New Handbook of Auditory Evoked Responses*. Boston: Pearson.
- f) Hood, L.J. (1998). *Clinical Applications of Auditory Brainstem Response*. San Diego: Singular Publishing Group Inc.
- g) Musiek, F. E., & Chermak, G. D. (2014). *Handbook of Central Auditory Processing Disorder: Auditory Neuroscience and Diagnosis*. 2nd Edn, Vol: 1. San Diego: Plural Publishing Group Inc.
- h) Musiek, F. E., Shinn, J. B., Baran, J. A., & Jones, R. O. (2020). *Disorders of the Auditory System*. Plural Publishing.
- i) Roeser, R. J., Valente, M., & Hosford-Dunn, H. (2007). *Audiology: Diagnosis*. New York: Thieme Medical Publishers.
- j) Sanbridge, S.A. (2009). *Ear Disorders*. San Diego: Plural Publishers
- k) Sininger, Y. & Starr, A. (2001). *Auditory Neuropathy: A New Perspective in Hearing Disorders*.

AUD 203M: **Speech Perception**

Hours: 60 **Marks: 100**
Credits: 4

Objectives:
At the end of the course, the student will be able to:
a) Explain coding of speech in the auditory pathway in normal hearing and hearing-impaired individuals.
b) Critically evaluate theories of speech perception and methods of synthesis of speech.
c) Explain speech perception in relation to short-term memory.
d) Describe aspects of dichotic speech perception and the bases of this.

Unit 1: Theories of Speech Perception
a) Basic concepts of speech perception: hearing, listening, perception, and comprehension; acoustic cues of different classes of speech sounds.
b) Definition and concept of categorical and continuous speech perception.
c) Normalization in speech perception: Definition and methods used for normalization of vowels and consonants.
d) Coding of speech in the auditory pathway - cochlea, auditory nerve, and the central auditory pathway.
e) Theories of speech perception (acoustic, neurological, auditory, motor, analysis-by-synthesis, dual-stream, reverse hierarchy theory).

Unit 2: Perceptual Cues for Vowels and Consonants
a) Perception of vowels, diphthongs, and consonants in persons with normal hearing – major and minor cues to identify place, manner, and voicing features of stops, fricatives, affricates, and nasals.
b) Perception of vowels and consonants in persons with hearing impairment.
c) Perception of vowels and consonants through amplification.
d) Perception of vowels and consonants through implantable devices.

Unit 3: Speech Perception of Segmental and Suprasegmental Features
a) Effects of co-articulation on speech perception.
b) Perception of segmental features in normal hearing individuals.
c) Perception of suprasegmental cues in normal hearing individuals.
d) Perception of segmental and suprasegmental cues in persons with hearing impairment.

Unit 4: Factors Related to Speech Perception
a) **Memory and speech perception:**
- Stages of memory, coding, and capacity at different stages.
- Models of short-term memory: Dual Coding Model, Modal Model, A Model for Auditory Memory and Contrast, Working Memory Model.
- Role of short-term memory in the perception of consonants and vowels.

b) **Dichotic listening:**
- Theories and physiological bases.
- Testing of dichotic listening and the clinical significance of the results.
- Factors influencing dichotic perception.

c) **Music perception:**
- Methods of studying the perception of music.
- Perception of music through amplification and implantable devices.

Unit 5: General Issues Related to Speech Perception

a) **Infant perception:**

- Theories of infant speech perception (Universal Theory, Attunement Theory, Perceptual Learning Theory, Maturational Theory, Perceptual Magnet Theory).
- Methods of studying infant speech perception.
- Perception of consonants and vowels in infants and comparison with adults.

b) **Speech perception in animals:**

- Methods of studying speech perception in animals.
- Perception of consonants and vowels.
- Categorical perception and normalization.
- Animal vs. human perception.
- The need for studying speech perception in animals.

c) **Methods to study speech perception:**

- EEG/electrophysiological and behavioral methods to study speech perception.
- Study designs.
- Role of cognition in speech perception.

Recommended Reading

a) Greenberg, S., Ainsworth, W. A., & Fay, R. R. (Eds.).(2004). Speech Processing inthe Auditory System. New York: Springer.
b) Holt,L.L.,Peelle,J.E.,Coffin, A.B.,Popper, A.N.,&Fay,R.R.(Eds.).(2022). Speech perception. Springer.
c) Martin,P.(2020).Speechacousticanalysis.(1stedition).Wiley-ISTE.
d) Pardo, J.S., Nygaard, L.C., Remez, R.E., & Pisoni, D. B. (Eds.). (2021). The Handbook of Speech Perception. (2nd edition). Blackwell Publishing Ltd.
e) Raphael, L. J., Borden, G. J., & Harris, K. S. (2011). Speech science primer: Physiology, acoustics, and perception of speech. (6th edition). LippincottWilliams&Wilkins.
f) Richter, M. M., Paul, S., Kepuska, V., & Silaghi, M. (2022). Signal processing and machine learning with applications. Springer.
g) Seki, Y. (Ed.). (2023).Acoustic Communication inAnimals: From Insect Wingbeats to Human Music (Bioacoustics Series Vol. 1). Springer Nature.
h) Tatham, M., & Morton, K. (2011).A Guide to Speech Production and Perception (1 edition). Edinburgh: Edinburgh University Press
i) Uhrig, S. (2021). Human information processing in speech quality assessment. Springer.

AUD 204 MC: Advances in Pediatric Audiology

Hours: 30 **Marks:** 50
Credits: 2

Objectives:
Upon completing this course, the student will be able to:

- a) Design protocols and recommend guidelines for hearing screening in the pediatric population.
- b) Select appropriate tests/protocols to diagnose hearing loss in children.
- c) Employ appropriate strategies to manage hearing loss in children.
- d) Advise parents on the different communication options available for young children with hearing impairment.
- e) Identify factors that affect acoustic accessibility and strategies to manage them at home and in the classroom.
- f) Assess hearing and manage hearing loss in children with multiple disabilities.

Unit 1: Pediatric Hearing Assessment

- **a)** National and International Guidelines for Screening Hearing of Neonates, Infants, and School Children:
  - Challenges involved in screening hearing in pediatric populations.
- b) Screening for Central Auditory Processing Disorders in School Children:
  - Guidelines for identifying auditory processing issues.
- c) Choosing an Appropriate Test Battery for Assessing Hearing in Children:
  - Value-added tests and factors to be considered when selecting the right test battery.
- d) Differentiating Auditory Maturation Delay, Auditory Neuropathy Spectrum Disorder, and Cochlear Hearing Loss:
  - Approaches to distinguishing these conditions during pediatric assessment.
- e) Choosing Appropriate Tests for Assessing Speech Perception in Children:
  - Factors to consider when assessing how children perceive speech.
- f) Issues Related to the Assessment and Diagnosis of Hearing Loss in Children:
  - Discussing common challenges in the diagnostic process for pediatric hearing loss.
- g) Counseling Parents/Caregivers Regarding Hearing Impairment, Sequel, and Management of Children with Unilateral Hearing Loss and Mild Hearing Loss:
  - Providing parents with guidance on managing hearing loss, particularly in cases of unilateral or mild loss.

Unit 2: Management of Hearing Loss in Children

- **a)** Fitting Appropriate Listening Devices (Hearing Aids and Cochlear Implants):
  - Optimizing hearing potential through hearing aids and cochlear implants.
- b) Choosing Appropriate Communication Options and Parent Support Counseling:
  - Counseling parents on selecting the best communication approach for their child.
- c) Overview of Listening and Spoken Language Approach, Auditory Training Design Principles, and Manual Approach:
  - Understanding the principles behind different communication strategies for children with hearing loss.
- d) Measuring Auditory and Spoken Language Outcomes, Identifying Red Flags:
  - Assessing progress in auditory and language development and identifying potential issues.
- e) Intervention at School Age:
  - Functional hearing assessment, communication assessment, and the management of auditory processing disorders.

- f) Adapting Auditory Verbal Strategies for Late-Identified Children:
    - Providing group listening training activities for children with varying levels of listening skills.
- **g)** Creating Optimum Listening and Learning Environments at Home and School:
    - Recommendations for parents and educators to enhance listening environments at home and in the classroom.
- h) Role of Educational Audiologists in the Management of School-Going Children:
    - Understanding the critical role audiologists play in supporting school-aged children with hearing impairments.

Unit 3: Assessment and Management of Hearing Loss in Children with Additional Needs

- **a)** Assessment of Children with Multiple Disabilities:
    - Selecting the appropriate test battery and modifications needed while assessing children with visual, cognitive, and neuro-motor disabilities.
- b) Management of Children with Multiple Disabilities:
    - Considerations for hearing aid fitting and strategies used for children with hearing impairment and additional disabilities (visual, cognitive, or neuro-motor problems).

Recommended Reading

a) Bess,F.H.&Gravel,J.S.(2006).FoundationsofPediatricAudiology.SanDiego: PluralPublishing Inc
b) Cole, E.B., & Carol, F. (2007).Children with hearing loss- Developing Listening &Talking. United States of America: Plural Publishing Inc.
c) Driscoll,C.&McPherson,B(2010).NewbornScreeningSystems:Thecomplete perspective. San Diego: Plural Publishing Inc
d) FlexerC A (2008).Pediatric Audiology:Diagnosis,Technology,andManagement. New York: Thieme Medical Publishers.
e) Jack, Katz., Marshall, Chasin., Kristina, English., Linda, J., Hood., Kim, L., Tillery. (2014). Handbook of clinical audiology:
f) Jane,R.,Madell.,Carol,Flexer.(2019).PediatricAudiology:Diagnosis,Technology, and Management.
g) Martini,A,etal.(1996)GeneticsandHearingimpairment,London:Whurr Publishers.
h) McCreery,R.W.&Walker,E.A.(2017). PediatricAmplification:Enhancing Auditory Access. San Diego: Plural Publishing Inc
i) Northern,J.L.&Downs,M.P.(2014).HearinginChildren.SanDiego:Plural Publishing Inc
j) Shprintzen,R.J.(1997).Genetic,Syndromesandcommunicationdisorders.San Diego: Singular Publishing Group Inc.
k) Thorpe,A.M.&Seewald,R(2016).ComprehensiveHandbookofPediatricAudiology. San Diego: Plural Publishing Inc

Aud205(A)MO: Bioethics

Hours:30 **Marks:50**
Credits: 1

Objectives: After completion of this course curriculum, the student will:

1. Understand concepts related to bioethics and its applications for an ASLP.
2. Discuss case scenarios and identify the bioethical dilemmas and have strategies to resolve them.
3. Have an understanding of WHO/ UNICEF/ UN related laws in place with special needs.
4. Have the knowledge of rights of persons with special needs and Consumer Protection Act.
5. Will understand the code of conduct for professional behaviour.

Unit I:

1. Terminologies related to ethical considerations –

- Autonomy & Consent
- Equality, Justice & Equity
- Privacy & Confidentiality
- Benefit & Harm
- Human Dignity & Human Rights
- Human Rights of patients with special needs
- Ethics and Professionalism
- Ethical Deliberation and Ethical decision-making
- Morals & Ethics

2. Principles and code of ethics
Purpose and scope of bioethics;

Unit II:
3. Ethical challenges in health care**.**
4. Bioethics and its applications in Audiology and Speech Therapy using case scenarios.
Example: 1. Ethical Vs unethical activity related to hearing aid prescription.
2. Not giving option of AAC to a non-verbal child despite ineffective Speech Language Therapy
5. ISHA / ASHA code of conduct. Oaths taken by Medical; Allied professionals.
6. Privacy and confidentiality of patients. Mandatory requirements for taking informed consent**.**

List of Practicals:

1. Watching videos/ movies followed by discussion about **<u>Bioethical</u>** dilemmas.
   A) Short videos – giving all options / but forcing to buy high end product.
   B) Debate--------
      i. Patient wants to be only on oral-feeds though he is at risk for aspiration. He refuses RT/PEG. What should be done? Pros & Cons
      ii. How to reveal to the patient about any mishap during the session?
         a. Eg: Burn due to electric stimulation.

b. Probe stuck in the ear- canal during Impedance Audiometry.
c. Injury while eliciting gag./ Injury while doing otoscopy.
d. Repeat dose of sedation without consultation of Physician/ information to patients.
e. Not giving an option of AAC to a NV child.

2. Making of material for advocacy of rights of PWD.

Recommended Reading:

- Motilal Tayade; Textbook of medical bioethics, Attitude and Communication- for medical students. Cbs Publishers and Distributors, (2016)
- Bioethics core curriculum. Section 2- Study material , UNESCO 2011
- Vaughn L. Bioethics : principles, issues, and cases. 4th ed. New York: Oxford University Press; 2020.
- Jerry Reb Manlangit; Fundamental Concepts, Principles and issues in Bioethics, (2020)
- Ethics Education for Speech-Language Pathologists: An Evolving and Essential Aspect of Clinical and Professional Practice. *Journal of Clinical Practice in Speech-Language Pathology*, Volume 25, Number 2 2023

Aud205(B)MO: Entrepreneurship

Hours:30 **Marks:50**
Credits: 1

Course Objectives:

- To introduce students to the fundamentals of entrepreneurship in audiology.
- To explore the scope of private practice and business opportunities in the field.
- To equip students with knowledge on financial planning, marketing, and legal aspects of running an audiology practice.
- To develop leadership and business management skills relevant to audiology practice.

UNIT-I

1. Introduction to Entrepreneurship in Audiology

Definition and characteristics of an entrepreneur, Importance of entrepreneurship, Scope and opportunities in audiology (Private practice, tele-audiology, hearing aid centers, rehabilitation centers)

2. Business Planning and Strategies

Elements of a business plan, identifying target markets and services (e.g., pediatric audiology, geriatric audiology, industrial audiology), Market research and competitive analysis, setting up an audiology clinic.

3. Legal, Ethical & Financial Considerations

Business registration, licensing, insurance, and reimbursement policies, Regulatory compliance (RCI, ISO, NABH).Cost analysis, revenue generation, funding sources (loans, grants, and private investments), Risk management and business sustainability.

Unit II

4. Marketing and Branding in Audiology

Patient engagement and customer relationship management, Role of professional networking and collaborations, Pricing strategies and service differentiation

5. Financial Management and Funding

Cost analysis and revenue generation, funding sources for clinic setup (loans, grants, private investments), financial risks and strategies

References:

- Katz, J. (2015). *Handbook of Clinical Audiology* (7th ed.). Wolters Kluwer.
- Baguley, D., & Preece, J. A. (2020). *Audiology Practice Management*. Thieme.
- Roeser, R. J., Valente, M., & Hosford-Dunn, H. (2007). *Audiology: Diagnosis and Treatment*. Thieme.
- American National Standards Institute (ANSI). (1999). *Maximum permissible ambient noise levels for audiometric test rooms (ANSI S3.1-1999)*. ANSI.
- International Organization for Standardization (ISO). (2010). *Acoustics—Audiometric test methods—Part 1: Pure-tone air and bone conduction audiometry (ISO 8253-1:2010)*. ISO.
- Rehabilitation Council of India (RCI). (n.d.). *Standards for Audiology Practice in India*. RCI.
- Government of India. (n.d.). *Micro, small & medium enterprises and Startup India policies*. Retrieved from https://www.startupindia.gov.in

AUD 206M: Clinicals in Audiology

Hours: 180+ **Marks:** 100
Credits: 6

General Considerations:
By the end of the clinical postings, the student should be able to:

- a) Conduct a complete audiological evaluation **and** manage individuals with hearing impairment.
- b) After completing clinical postings, the student will have the ability to **apply, show** (in a clinical diary/logbook), and perform the following on patients/clients:

Know-How:

- **a)** Recognize the counseling needs **of** individuals with hearing impairment based on their narratives, responses to questionnaires, and validation measures.
- **b)** Conduct sound field testing while fitting bone-anchored and other implantable devices.
- **c)** Perform real-ear measurements to establish audibility and comfort.
- **d)** Verify the benefit of compression**,** directionality, and noise reduction algorithm performance.

Demonstrate:

- **a)** Carry out earmold modifications**.**
- **b)** Perform visible speech mapping**.**
- **c)** Demonstrate to the client and/or parents the daily use, care, and maintenance of hearing devices and hearing assistive technology systems.
- **d)** Perform RECD (Real-Ear to Coupler Difference) and REDD (Real-Ear Dynamic Range).
- **e)** Select assistive listening devices for clients with hearing loss.
- **f)** Diagnose and plan management for persons with auditory processing disorders.
- **g)** Differentiate between various auditory disorders.

Do:

- **a)** Record ABR (Auditory Brainstem Response) for hearing threshold estimation for clicks and 500 Hz tone bursts (20 cases).
- **b)** Estimate hearing thresholds using ASSR (Auditory Steady-State Response) (5 cases).
- **c)** Record ABR for site of lesion testing (10 cases).
- **d)** Complete an audiological evaluation on 25 persons with hearing loss and prepare a detailed report with appropriate recommendations.
- **e)** Select and fit appropriate hearing devices to individuals with different degrees, configurations, and types of hearing loss (25 cases).
- **f)** Plan and carry out an appropriate aural rehabilitation program for children (10 cases).
- **g)** Perform electroacoustic measurements of different types of hearing aids and interpret the findings (5 hearing aids).
- **h)** Evaluate and counsel/carry out appropriate audiological management for 5 persons with tinnitus.
- **i)** Record aided ALLRs (Auditory Late Latency Responses) (2 cases).
- **j)** Carry out assessment of auditory processing disorder for at least 2 persons.

Evaluation:

- Internal Evaluation**:** Based on attendance, clinical diary/logbook, and learning conference.
- External Evaluation**:** Involving clinical population, spot test, OSCE (Objective Structured Clinical Examination), record, and viva-voce.

Semester 3

Aud301M: Implantable Auditory Devices

Hours:60 **Marks: 100**
Credits:4

Objectives:
At the end of the course, the students should be able to:

a) Identify and describe the types of implantable hearing devices.
b) Describe the purpose of different components of any implantable hearing devices.
c) Determine candidacy for implantable hearing devices.
d) Assess benefits from implantable hearing devices and guide the clinical population.
e) Work in a multidisciplinary team and advise the other members of the team.
f) Advise and counsel the parents/caregivers of the clinical population.
g) Understand and contribute to the formulation of government policies and schemes relating to implantable hearing devices.

Unit 1: Development of Technology, Criteria/Candidacy, and Program
a) Candidacy for bone conduction implantable devices (BCID), middle ear implants (MEI), cochlear implants (CI), auditory brainstem implants (ABI), and midbrain implants (MBI): Evidence from research.
b) Comprehensive candidacy assessment for implantable hearing devices (IHD - Audiological and non-audiological).
c) Safety standards and regulations for IHD.
d) State and central government schemes for cochlear implants and other implantable devices.
e) Pre-requisites to start an IHD program.
f) Comprehensive policy issues relating to IHD.

Unit 2: Bone Conduction Implantable Devices and Middle Ear Implants
a) Types of BCID and components (percutaneous, transcutaneous, and intra-oral).
b) Types of MEI and components.
c) Intra-operative and post-operative measurements/assessment for device function (troubleshooting) and performance outcomes.
d) Programming BCID and MEI.
e) Contraindications and management of device failures and poor performance.
f) Limitations and future development/requirements.

Unit 3: Cochlear Implants
a) Concepts and types of CI:

- External components (sound processor - body-worn, BTE, off-the-ear).
- Internal components (electrode type/design, MRI compatibility & reliability).
- Totally implantable cochlear implants.

b) Expanding criteria - audiological and non-audiological assessment:

- Single-sided deafness, ski sloping SN hearing loss, bilateral asymmetric HL.
- Cochlea/nerve anomaly (classification), auditory neuropathy spectrum disorder (ANSD), and multiple disabilities.

c) Speech/Sound Coding Strategies:

- Within and across devices.
- Evidence from research and critical analysis of each strategy.

- Features for enhancing speech and music perception.

d) Surgical procedures:
- Posterior tympanotomy, veria technique, hearing preservation technique.
- Surgical complications and management.

e) Intra-operative measurement:
- Device function (impedance/voltage/compliance telemetry).
- Patient function (eCAP, eSRT, eABR, and facial nerve monitoring).
- Special considerations in anomalous cochlear/nerve, ANSD, and multiple disabilities.

Unit 4: Programming Cochlear Implants

a) Psychophysics of programming:
- Parameters (pulse width, rate of stimulation, frequency allocation/re-allocation, map law).
- Pre-requisites for mapping:
    - Pre-implant radiological report, post-implant radiological report.
    - Discharge report of the surgeon.
    - Non-physiological objective measures (electrode impedance, compliance, electrode voltage).
- Special considerations in cochlea/nerve anomaly, ANSD, multiple disabilities, and SSD.
- Effect of map parameters on perception of loudness, pitch perception, and gap.

b) Programming techniques:
- Evidence from research: behavioral maps, objective maps (eCAP, eSRT & eABR-based programming).
- Evidence and target-based programming (artificial intelligence).
- Self-programming.

c) Measuring performance and MAP optimization:
- Assessment of benefit: speech and non-speech.
- Electrophysiological measures (EABR and other evoked potentials).
- Optimization of:
    - Hearing aid in the contralateral ear for bimodal implants.
    - Bilateral cochlear implants.
    - Electroacoustic stimulation and SSD.

d) Complications:
- Identifying and managing device failures.
- Identifying and managing infection, magnet migration, electrode extrusion.
- Identifying and managing poor performance.
- Decision-making in subjects with poor performance.
- Special considerations in revision implantation.
- Outcome audit.

e) Limitations and future developments/requirements (device, techniques, and procedures).

Unit 5: Auditory Brainstem Implant (ABI) and Auditory Midbrain Implant (MBI)

a) **Pre-op (ABI and MBI):**
- Candidacy for children and adults.
- Audiological and non-audiological assessment.
- Evidence from research for predicting outcomes.
- Counseling and expectations.
- Device type and components.

b) **Intra-op (ABI and MBI):**
- Surgical procedures – overview.
- eABR, cranial nerve monitoring, and decision-making.

c) **Post-op:**
- Programming ABI (subjective and objective methods).

- Technique for pitch ranking, identifying auditory and non-auditory electrodes.
- MAP optimization (pitch, loudness, auditory, and non-auditory sensation).
- Techniques to identify auditory and non-auditory sensation.
- Assessment of benefit: speech and non-speech.
- Role of eABR, aided cortical potentials, PET, and fNIRS in programming and monitoring outcomes.

d) **Managing and monitoring persons with ABI:**

- Rehabilitation strategy.
- Identifying and managing complications (device failure, infection, trauma, device migration, radio imaging).
- Identifying poor performance – auditing outcome.
- Decision-making in complications and poor performance.

Recommended Reading

a) Boheim,K.(2010).Active middle ear implants.Basel:Karger.
b) Clark, G., (2003). Cochlear implants - fundamentals & Applications. New York: Springer – AIP Press.
c) Eisenberg, L. S. (Ed.). (2016). Clinical management of children with cochlear implants. Plural Publishing.
d) Gifford, R. H. (2020). Cochlear implant patient assessment: Evaluation of candidacy, performance, and outcomes. Plural Publishing.
e) Hughes, M. L. (2013). Objective measures in cochlear implants. San Diego: Plural Publishing Inc.
f) Kirwin, S.H. (2014). Cochlear Implants: Technological advances, psychological/social impacts and long-term effectiveness. Ney York: Nova Biomedical.
g) Kompis, M., &Caversaccio,M.D.(Eds.). (2011). Implantable Bone Conduction Hearing Aids. (New Delhi) Switzerland: Karger.
h) Lim, H. H., Lenarz, M., &Lenarz, T., (2009). Auditory midbrain implant: A review. Trends in Amplification, Sept. 13(3), 149–180.
i) Manenkar, G. (2014). Implantable hearing devices other than cochlear implants. New D Suzuki, J.I,Tokyo (1988).Advances in audiology-Middle ear implant: Implantable hearing aids. Switzerland: Karger. Delhi: Springer-Verlag.
j) Niparko, J. K. (2009). Cochlear Implants: Principles and practices. 2ndEdn. Philadelphia: Lippincott: Williams & Wilkins.
k) Ruckenstein, M. J. (Ed.). (2020). Cochlear implants and other implantable hearing devices. Plural Publishing.
l) Sevier, J. D. (2022). Complex Cochlear Implant Cases: Management and Troubleshooting. Plural Publishing.
m) Wolfe, J. (2018). Cochlear implants: audiologic management and considerations for implantable hearing devices. Plural Publishing.
n) Wolfe, J., & Schafer, E. C. (2010). Programming Cochlear Implants. San Diego: Plural Publishing Inc.

Aud302: Vestibular System and its Disorders

Hours75(45 + 30) **Marks:100**
Credits: 4

Objectives:
After passing this course, the students should be able to:
a) Describe the anatomy and physiology of the human vestibular system.
b) Perform tests for vestibular assessment and interpret the results.
c) Identify vestibular pathologies and differentially diagnose between them.
d) Carry out vestibular rehabilitation and make appropriate referrals.
e) Counsel the affected individuals and their family members.

Unit 1: Anatomy and Physiology of the Systems of Balance
a) Anatomy and physiology of the peripheral vestibular system (semicircular canals, utricle, saccule, vestibular nerve).
b) Anatomy of the central vestibular pathway and its connections.
c) Reflexes involving the vestibular system (vestibulo-ocular, vestibulospinal reflex, and sacculocollic reflex).
d) Proprioceptive (somatosensory) system and visual system.
e) Association between the vestibular system and cognition.

Unit 2: Disorders of the Vestibular System
a) Diseases of the vestibular labyrinth (Meniere's disease, benign paroxysmal positional vertigo, among others).
b) Diseases of the nerve (vestibular neuritis, auditory neuropathy spectrum disorders, vestibular schwannomas, vestibular paroxysmia).
c) Diseases of the central nervous system (generalized neuropathy involving multiple systems, multiple sclerosis, tumors of the cerebellopontine angle, among others).
d) Pathologies affecting the entire balance pathway (presbystasis, diabetes mellitus, and other systemic diseases).
e) Vestibular disorders in children.

Unit 3: Assessment of the Vestibular System
a) **Questionnaire-based assessments:**
- Questionnaires for screening and diagnosis (standard case history, vertigo symptom scale, motion sensitivity quotient).
- Questionnaires for quality of life assessment (dizziness handicap inventory, activities-specific balance confidence scale, vestibular disorders activities of daily living, visual analog scales).

b) **Behavioral tests for bedside assessment and diagnosis:**
- Background, technique involved, interpretation, and usefulness (Romberg test and others).

c) **Physiological/electrophysiological tests:**
- Background, technique involved, interpretation, and usefulness (rotatory chair test, positional/positioning tests, and others).

Unit 4: Non-Medical Management of Vestibular Disorders
a) Treatment of BPPV of the posterior canal (Epley maneuver, Semont liberatory maneuver, Gans repositioning maneuver).
b) Treatment of BPPV of the lateral semicircular canal (Barbecue roll maneuver, Appiani maneuver, Guffoni liberatory maneuver, Zuma maneuver).
c) Treatment of BPPV of the anterior semicircular canal (Yacovino maneuver).
d) Habituation exercises for recurrent BPPV (Brandt-Daroff exercises).

e) Treatment for heavy and light cupula.
f) Concept of central compensation and decompensation in vestibular disorders.
g) Vestibular rehabilitation therapy: principle, candidacy, procedure, and efficacy.
h) Rehabilitation of children with disequilibrium.

Unit 5: Medical Management of Vestibular Dysfunction
a) Role of radiological evaluations and other lab tests in the diagnosis and management of vestibular disorders (purpose, findings, and implications).
b) Lab investigations: purpose, findings, and implications (blood investigations, urine, and others like ECG, vitamin profiles, etc.).
c) Dietary modifications: candidacy, effectiveness, and contraindications.
d) Vestibular suppressants: candidacy, use, effectiveness, and contraindications.
e) Surgeries for vestibular disorders: types, candidacy, procedure, effectiveness, and contraindications.
f) Other forms of medical management for specific disorders:

- **Intratympanic Gentamycin:** Candidacy, effectiveness, and contraindications.
- **Steroid Therapy:** Candidacy, effectiveness, and contraindications.

Recommended Reading

a) Ackley, R. S., Decker,T. N., & Limb,C. J. (2007).An essential guide to hearing and balance disorders. New Jersey: Lawrence Erlbaum Associates Inc. Publishers.
b) Desmond, A.L.(2004).Vestibularfunction:evaluationandtreatment.NewYork: Thieme Medical Publishers Inc.
c) Dispenza,F.,&DeStefano,A.(2013).Textbookofvertigo:diagnosisand management. JP Medical Ltd.
d) Jacobson,G.P.,&Shepard,N.T.(2008).Balancefunctionassessmentand management. San Diego: CA: Plural Publishing Inc.
e) Kaga,K.(2014).Vertigoandbalancedisordersinchildren.Japan:Springer.
f) Martines,F.,&Salvago,P.(2021).Dizziness:Prevalence,RiskFactors,and Management. Philadelphia, USA: Nova Science Publishers Inc.
g) McCaslin, D. L. (2019). Electronystagmography and Videonystagmography (Eng/Vng). San Diego, CA: Plural Publishing, Inc.
h) O'Reilly,R.C.,Morlet,T.,Cushing,S.L.,&Brodsky,J.R.(2019).Manualof ediatric balance disorders. Plural Publishing.
i) Singh,N.K.,&Vanaja,C.S.(2018).EvaluationandManagementofVestibularDysfunction. ISHA Monograph.

Aud 303MC:Genetics of Hearing

Hours:30 **Marks: 50**
Credits: 2

Objectives:
After completing this course, the student will be able to:
a) Understand the genetic basis of hearing loss.
b) Explain the importance of genetic testing in the diagnosis and management of hearing disorders.
c) Refer clients for genetic testing.
d) Counsel parents or caregivers of children with genetic hearing loss.

Unit 1: Molecular Genetics for Audiologists
a) Basic concepts of genetics.
b) Genetic inheritance: Mendelian, Non-Mendelian, and multifactorial.
c) Genetic mutations, copy number variations (CNVs), and single nucleotide polymorphisms (SNPs).
d) Overview of genetic testing (cytogenetic, biochemical genetics, molecular genetics), gene mapping, and localization.
e) Molecular basis of hearing, genes involved in auditory development and hearing.

Unit 2: Genetics and Hearing Loss
a) Genetics of hearing impairment, gene database for hearing loss.
b) Congenital hearing loss due to genetic disorders – syndromic and non-syndromic:

- Genes identified, genotype, phenotype.
  c) Late-onset hearing loss due to genetic disorders:
- Genes identified, genotype, phenotype.
  d) Genetic heterogeneity of hearing disorders.

Unit 3: Evaluation and Management of Genetic Hearing Loss
a) Screening for genetic hearing loss.
b) Genetic evaluation of persons/families with hearing loss.
c) Benefits and limitations of genetic testing, client selection for genetic testing, and ethical considerations during genetic testing.
d) Counseling clients/parents regarding genetic hearing loss.
e) Gene therapy for hearing disorders.

Recommended Reading

a) Cremers,C.W.R.J.,&Smith,R.(Eds.).(2002).Genetichearingimpairment:its clinical presentations (Vol. 61). Karger Medical and Scientific Publishers.
b) Jones,S.M.,&Jones,T.A.(2011).Genetics,Embryology,andDevelopmentof Auditory and Vestibular Systems. Plural Publishing.
c) Robin,N.H.(2008).Medicalgenetics:itsapplicationtospeech,hearing,and craniofacial disorders. Plural Publishing.
d) Shprintzen,R.J.(1997).Genetic,Syndromesandcommunicationdisorders.San Diego: Singular Publishing Group Inc.
e) TorielloHV.,&SmithSD.(2013).HereditaryHearingLossandItsSyndromes. United Kingdom: Oxford University Press.
f) WillemsPJ.(2004).GeneticHearingloss.USA:MarcelDeckeerInc.

Aud304M: Clinicals in Audiology

Hours:180+ **Marks100**
Credits: 6

General Considerations

a) The student should be able to carry out complete audiological evaluation and manage persons with hearing impairment and hearing-related vestibular disorders
b) After completion of clinical postings, the student will have the ability to apply, show (in a clinical diary/log book), and perform the following on patients/clients

Knowhow

a) Advise clinical clientele on the latest implantable devices available for persons with hearing impairment.
b) Setup vestibular assessment and management clinics/centers
c) Administer canalith repositioning maneuvers to individuals diagnosed with benign paroxysmal positional vertigo (BPPV).

Demonstrate

a) Administration of subjective balance assessment tests
b) Administration of objective balance assessment tests including VEMPs, vHIT and VNG
c) Plan management for 5persons different types of vestibular disorders
d) Troubleshoot cochlear implants
e) Cochlear implant mapping changing the parameters based on the needs of clients
f) Vestibular rehabilitation therapy for patients with vestibular problems

Do

a) Administer complete vestibular test battery, behavioral and electrophysiological tests on 10 individuals with vestibular disorder and prepare a report explaining the results of the test and make appropriate recommendations
b) Carryout pre-implant counseling for 5persons with hearing loss
c) Carryout mapping for 5 persons using cochlear implants
d) Counsel 5 persons regarding use and maintenance of cochlear implants
e) Plan and carry out therapy for 5 children with hearing loss (minimum of 10 sessions each)

Evaluation

a) Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
b) External evaluation: Spot test, OSCE, Record, Viva-voce, casework

Semester4

Aud 401M: Advances in the Management of Auditory Disorders

Hours: 60 **Marks:** 100
Credits: 4

Objectives:
At the end of this course, the students will be able to:

- a) Understand the different amplification/assistive devices and their changing technology.
- b) Decide on the approach to device selection and optimization.
- c) Develop need-based programs and intervention strategies for persons with different types of hearing impairment across age groups.
- d) List specific needs and understand psychosocial and communicative demands and strategies to solve these.
- e) Advise and counsel the needy on strategies for optimal utilization of devices.

Unit 1: Advances in Hearing Aid and Hearing Assistive Technology

- a) Application of Recent Advances in Hearing Aids and Hearing Assistive Technology:
  - Compression and expansion techniques.
  - Microphone directionality.
  - Advanced signal processing techniques, including noise reduction algorithms.
  - Wireless assistive technology.
  - Application of nanotechnology in hearing aids.
- b) Techniques to Control Acoustic Feedback, Distortion, and Circuit Noise:
  - Electromagnetic interference: measurement and solutions.
  - Techniques to improve compatibility of hearing aids with mobile phones.
- c) Application of LASER Technology in Earmold Production:
  - Earmold modifications for enhancing listening comfort and occlusion reduction – physical and acoustic modifications.
- d) Variables Affecting Electroacoustic Measurements and Its Implications
- e) International and Indian Standards/Legislations for Hearing Aids and ALDs

Unit 2: Selection and Fitting of Hearing Aid and Hearing Assistive Devices

- a) Selection, Verification, and Validation of Hearing Aids and Hearing Assistive Devices**:**
  - Behavioral measures, speech-in-noise tests.
  - Objective measures: Real-ear insertion gain measures.
  - Physiological measures: Acoustic reflexes, cortical evoked auditory potentials.
- b) Hearing Aid Programming, Optimization, Verification, and Validation**:**
  - Fine-tuning of hearing aids.
- c) Special Considerations for Fitting Hearing Aids for Persons with Different Types of Hearing Loss**:**
  - Sudden hearing loss, unilateral hearing loss, high-frequency hearing loss, cochlear dead region, auditory neuropathy spectrum disorder.
- d) Current Trends in Hearing Aids and Hearing Aid Fitting

Unit 3: Speech Perception Through Hearing Aids

- a) Factors Affecting Speech Perception Through Hearing Aids and Hearing Devices:
  - Auditory plasticity.
- b) Methods to Improve Speech Perception Through Hearing Aids and Hearing Devices:
  - Speech cue enhancement: Spectral shape, duration, intensity, enhancement of CVR.
  - Speech simplification and re-synthesis.
  - Enhancement of perception of telephone speech.
- c) Emerging Technology for Better Speech Perception

- d) Effect of Noise Reduction Algorithms and Advanced Hearing Aid Technology on Speech Perception

Unit 4: Rehabilitation of Individuals with Hearing Impairment

- a) Overview of Counseling Theories/Techniques
- b) Counseling of Users of Hearing Aids and Hearing Assistive Devices:
    - Techniques: Realistic expectations, adjusting to hearing devices, other management options.
- c) Counseling Caretakers/Significant Others of Hearing Device Users
- d) Care, Maintenance, and Troubleshooting of Hearing Aids and Hearing Assistive Devices
- e) Quality of Life of Persons with Hearing Impairment and Its Enhancement
- f) Measuring Outcomes of Different Management Strategies

Unit 5: Management of Tinnitus and Hypersensitivity of Hearing

- a) **C**haracteristics and Assessment of Tinnitus
- b) Pathophysiological and Neurophysiological Models to Explain Tinnitus and Management of Tinnitus
- c) Overview of Non-Audiological Management Techniques for Tinnitus
- d) Audiological Management Techniques for Those with Normal Hearing and Different Degrees of Hearing Loss:
    - Tinnitus Retraining Therapy (TRT), counseling, and others and their outcomes.
- e) Models to Explain Hypersensitivity of Hearing:
    - Hyperacusis, misophonia, phonophobia.
- f) Audiological Management of Persons with Hypersensitivity of Hearing
- g) Overview of Non-Audiological Management Techniques for Persons with Hypersensitivity of Hearing

Recommended Reading

a) Atcherson, S. R., Franklin, C. A., & Smith-Olinde, L. (2015). Hearing assistive andaccess technology. San Diego: Plural Publishing Inc.
b) Baguley,D. M.,& Anderson, G. (2007). Hyperacusis:Mechanisms,Diagnosisand Therapies. San Diego: Plural Publishing Inc.
c) Dillon,H. (2012).HearingAids.2ndEdn.Australia:Boomerang Press.
d) Hull, R. H. (2014). Introduction to aural rehabilitation. 2nd Edn. San Diego: Plural publishing Inc.
e) Jastreboff,P.J.,&Hazell,J.W.P.(2004).Tinnitusretrainingtherapy-implementingthe Neurophysiological model. United Kingdom: Cambridge University Press.
f) Mueller, H. G., Rickettes, T. A., & Bentler, R. (2014).Modern hearing aids: Pre-fitting Testing and selection considerations. San Diego: Plural Publishing Inc.
g) Taylor, B and Muller, G (2021).Fitting and Dispensing Hearing aids (3rd ed), Plural Publishing
h) Tye-Murray,N.(2015).Foundationsofauralrehabilitation -Children,Adults&Their Family Members. 4th Edn. United States ofAmerica: Stamford, Cengage Learning.
i) Tyler, R and Perreau (2022). Tinnitus Treatment - Clinical Protocols Thieme Publishing
j) Wong, L., & Hickson, L. (2012). Evidence-based practice in audiology: Evaluating interventions for children and adults with hearing impairment. San Diego: Plural Publishing Inc.

AUD 402MC: Geriatric Audiology

Hours: 30 **Marks:** 50
Credits: 2

Objectives:
Upon completing this course, the student will be able to:

- a) Identify and explain age-related changes in the peripheral and central auditory system.
- b) Modify assessment protocols and interpretation of results depending on the age of the client.
- c) Recommend hearing devices based on the age of the client.
- d) Plan rehabilitative strategies considering the age of the client.

Unit 1: Aging Auditory System

- **a)** Biology of Aging:
  - Differentiating between hearing loss due to normal aging and hearing loss caused by disease or disorder.
- b) Factors that Affect Communication in Older Adults:
  - Understanding various factors influencing communication abilities in aging individuals.
- c) Effect of Advancing Age on the Peripheral and Central Auditory System:
  - Exploring how aging impacts both the outer and inner ear, as well as the auditory processing systems.
- d) Factors Contributing to Hearing Loss in Older Adults:
  - Identifying various causes of hearing loss in older adults, including environmental and medical factors.
- e) Effect of Cognitive Decline and Other Associated Problems on Speech Understanding:
  - Examining how cognitive decline affects speech comprehension in older adults.
- f) Association Between Cognition and Hearing Abilities in Older Adults:
  - Investigating the relationship between hearing loss and cognitive functions, including memory and processing speed.
- g) Effect of Hearing Loss on Quality of Life of Older Adults:
  - Understanding how hearing impairment impacts the overall well-being and quality of life for older individuals.

Unit 2: Assessment of Hearing in Older Adults

- **a)** Behavioral Assessment of Hearing in Older Adults:
  - Discussing the factors to consider during hearing assessments of older adults, including the impact of age on test results and interpretation.
- b) Effect of Advancing Age on Electrophysiological Measures of Hearing:
  - Understanding how age affects objective measures like auditory brainstem responses (ABR), otoacoustic emissions (OAE), and other electrophysiological testing methods.
- c) Assessing Central Auditory Processing in Older Adults:
  - Exploring the challenges and methods for evaluating central auditory processing disorders (CAPD) in aging adults.

Unit 3: Rehabilitation of Older Adults

- **a)** Fitting Hearing Devices (Hearing Aids, Assistive Listening Devices, Cochlear Implants) to Older Adults:
  - Discussing the selection and fitting of hearing aids and other assistive technologies for older adults, considering their specific needs and challenges.
- b) Evaluating the Efficacy of Hearing Devices in Older Adults:

    - Methods for evaluating the effectiveness and functionality of hearing devices in improving communication for older adults.
- c) Counseling Older Adults and Their Significant Others Regarding Use, Care, and Maintenance of Hearing Devices:
    - Providing guidance to older adults and their caregivers on how to use, maintain, and care for hearing aids or cochlear implants.
- d) Listening Training for Older Adults:
    - Developing listening training programs to help older adults adjust to new hearing devices and improve their auditory skills.
- e) Training for Speechreading and Communication Strategies for Older Adults:
    - Teaching speechreading and other communication strategies to enhance verbal understanding, particularly for individuals with severe hearing loss.

Recommended Reading

a) Gordon-Salant,S., Frisina,R.D.,Fay,R.R(2010).Theagingauditorysystem. Springer New York.
b) Jack, Katz., Marshall, Chasin., Kristina, English., Linda, J., Hood., Kim, L., Tillery. (2014). Handbook of clinical audiology: Seventh edition.
c) Kauffman,T.L.,Scott,R.W.,Barr,J.O.,&Moran,M.L.(Eds.).(2014).A comprehensive guide to geriatric rehabilitation. Elsevier Health Sciences.
d) Manchaiah,V.,&Danermark,B.(Eds.).(2016).Theexperienceofhearingloss: journey through aural rehabilitation. Taylor & Francis.
e) Montano, J. J., & Spitzer, J. B. (Eds.). (2020).Adult audiologic rehabilitation. Plural Publishing.
f) Weinstein,B.E.(2000).GeriatricAudiology.Theime.Newyork

Aud 403 M: Dissertation

Hours:300+ **Marks:100**
Credits:10

Though dissertation, are port on the results of an experimental research, is shown only Semester 4, students are free to initiate the work in Semester 3 itself utilizing the free time.

Aud404M: Clinicals in Audiology

Hours:180+ **Marks:100**
Credits:6

General Considerations

a) The student should be able to carry out complete audiological evaluation and manage persons with hearing impairment.
b) After completion of clinical postings, the student will have the ability to apply, show (in a clinical diary/log book), and perform the following on patients/clients.

Knowhow

a) Setupaudio-vestibularassessmentandmanagementclinicsorcentersindifferentset- ups
b) Procedure for certification of persons with disability
c) Financial planning and insurance policies

Demonstrate

a) Administration of complete audiological test battery
b) Planmanagementfor10personswithdifferenttypesofaudio-vestibulardisorders (should include tinnitus and vestibular disorders)

Do

a) Administer complete audio-vestibular test battery, behavioral and electrophysiological tests on 20 individuals (should include presbycusis, NIHL, ANSD, BPPV) and prepare a report explaining the results of the test and make appropriate recommendations
b) Administer complete cochlear implant candidacy assessment, pre-implant counseling, switch-on, mapping AVT (for at least 3 months) on 5 children with hearing impairment
c) Administer tinnitus assessment and treatment on 5 individuals with tinnitus

Evaluation

a) Internal evaluation shall be based on attendance, clinical diary, log book and learning conference.
b) External evaluation: Involving clinical population, Spot test, OSCE, Record, Viva-voce

Annexure2

Infrastructure Requirements for M.Sc(Aud)Program
(Academic year 2024-25 onwards)

The following are the minimum requirements for starting/continuing a 12 student-intake M.Sc (Aud) program. This requirement is over and above the stipulated infrastructure (faculty, clinical staff)for other speech and hearing program in a given institute unless otherwise stated.

This statement on infrastructural requirement shall override all other statements/documents/guidelines on the topic issued by the Council.

Human Resource Requirement

Requirement of scientific / technical / administrative staff for the M.Sc (Aud) program with an intake of 12 students per year shall be as follows (see the notes below the table):

Type	Designation	No.
Core Faculty	Professor- Audiology	1
	Associate Professor- Audiology	1
	Assistant Professors-Audiology	2
Clinical Staff	Audiologist-Gr.I	1
Allied Faculty	Asst. Prof in Statistics	1
Allied Clinical staff	Clinical Psychologist	1
	Oto-laryngologist	1
	Neurologist	1
Supporting staff–Tech	Electronics Engineer	1
	Bio-medical/Computer technician	1
	Library& Information Officer	1
	Library Assistant	1
Supporting staff-Admin.	Administrative Secretary -Academics	1
	Secretary- Clinic	1
	Secretary- Admin	1

Note1:Corefaculty to student ratio should always be 1:3 (onefaculty member for every 3 students).The number of core faculty shall be the basis for determining intake. However, the intake for M.Sc programs shall not exceed 15 ideally.

Note2:Allied faculty, allied clinical staff, supporting staff – tech and supporting staff - admin can be part time functionaries, can be shared with other programs at the institute, and their appointment can be guided by the requirements in a given semester.

Note3:The M.Sc. (Aud) program can only be conducted by an independent institute/ college/ department in a University / department in a hospital / rehabilitation unit, with a full-time audiologist, or audiologist & speech-language pathologist as its head/ coordinator (administrative / academic / clinical).The head of the program should possess a doctorate in the core area.

Note 4: Core areas refer to Audiology

Professional qualification of core faculty and clinical staff

Designation	Qualifications
Professor	**Essential** a) M.Sc(Aud), M.Sc(Sp&Hg)/or M.ASLP) or its equivalent b) PhD(in the core area*) c) 10yearsteachingexperienceatPG/UG level d) Minimum of five publications with cumulative impact factor of 05. e) Valid RCI registration **Desirable** Experience of running under-graduate training programs
Associate Professor	**Essential** a) M.Sc(Aud)/M.Sc(Sp&Hg)/M.ASLPorits equivalent b) 8years teaching experienceatPG/UG level c) Minimum 5 publications with a cumulative impact factor of 4. d) Valid RCI registration **Desirable:** a) Ph.D(in the core area*) b) Experience of running under-graduate training programs
Assistant Professor-Audiology	**Essential** a) M.Sc(Aud) /M.Sc(Sp &Hg)/M.ASLPoritsequivalent b) 2yearsteaching/clinical/research experience c) ValidRCIregistration **Desirable:** a) Ph.D(inthecorearea*) b) Publications
Audiologist Grade I	**Essential** a) M.Sc(Aud) /M.Sc(Sp &Hg)/M.ASLPoritsequivalent b) ValidRCIregistration **Desirable**:1yearexperienceinthefield

Note1:*Audiology

Note2:Pay and emoluments for all faculty posts shall be on par with UGC norms.
RCI norms shall apply for all other clinical and technical posts

Clinical

Theinstitutionshouldhavefacilityfordiagnosis,management,andrehabilitationofalltypes of persons, and of all ages, with hearing and hearing-related disorders.

Size of the clinical population shall be 2 per student per semester in each of the followingmain clinical areas: persons with hearing disorders, vestibular disorders, CAPD and other hearing-related disorders.This requirement of clinical population shall be over and above that required for other speech and hearing training programs at the institute.

Library

Libraryshould accommodateat least 30%of thestaff and students ofthe instituteat any given time.

Libraryshould haveinternet andphotocopying facilities.

Theparticipatinginstitutionshallensurethatatleast25%ofbooksmentionedunderthe 'Recommended reading'are available.There shall be addition of at least 5 books every year.

Booksandjournalscanbeeitherhardcopiesore-versions,butaccessibletoall.

There should be at least 2 journals at the start of the M.Sc (Aud) program over and above that required for B.ASLP program at the institute.The institution should subscribe to two more journals in the core area every five years.

LibraryStaff*

a) Libraryand InformationOfficer/LibraryAssistant -1
Qualification:B.Lib Sciwithoneyearexperience inmanagingatechnicallibrary

* Librarystaffcanbecommonforallthecoursesatagiveninstitute

Space

Sl.No.	Category	Size	Number(Fora batch of12 students)
a)	Classrooms	Space @ 10 sq. ft per student + 20 Sq. ft for the teacher: Room witha minimum area of300sq.ft.	There shall preferably be one classroom forbatch of M.Sc (Aud)
b)	Seminarhall	Spacetoaccommodate 50%of totalstudentstrength	1hallforabatch of12 students
c)	Computer lab/multipurposehall	Space to accommodate 50% of total student strength	1 computer lab for a batch of 12 students
d)	Roomforreceptionwhere patients are registered.	10'x10'	1 room for a batch of 12 students
e)	Roomforcasehistory, diagnostic room and interviews	6'x8'	4roomsforabatch of 12 students

f)	AudiologyLab	15’ x15’	1
g)	Soundtreatedroom:2- room situation	16’ x10’	1
h)	Earmoldlab	10’ x10’	1
i)	BoardRoom	15’x20’	1 room
j)	Individual work space (with provision forstorage facilities)	10’x10’	1 room for every 2 faculty/staff members
k)	Academic/administrative office	10’x10’	1
l)	Principal’sOfficeroom	10’x10’	1
m)	Sanitaryfacilities	Separate facility for males and females, staff/students and clinicalpopulation	
n)	Hostel	Separate hostelforMen and Women: Accommodationforat least 50% of students	
o)	Barrierfreeaccess		
p)	Spaceforrecreation-both indoorand outdoor		

Note:All categories of space mentioned above except classrooms can be common to all other speech and hearing training programs in the institute.

Equipment-Audiology(Minimumforabatchof12 students)

Sl. No	Test/Equipment	Number
a)	Diagnostic/clinicalpuretoneaudiometer	1
b)	Diagnosticimmittanceaudiometer	1
c)	DiagnosticOAEanalyzer	1
d)	2-ChannelEPSystem	1
e)	Speechaudiometrytestsincludingthosefor assessment of CAPDs - in different languages	1setforabatchof 12 students
f)	HearingAidProgramming Software	1
g)	Mappingdeviceforcochlear implant	1
h)	Diagnostic material/equipment for assessment of hearing related vestibular disorders	1
i)	Realearmeasuringequipmentandhearingaid analyzer	1
j)	Ear mold laboratory or 3-D printing (by possession or through access)	1
k)	Hi-FiAmpliDeckwithspeakersandgood microphone	1
l)	Handheldotoscope	1

Note:Equipmentsandtestslistedhereexcept(a)to(d)canbecommonwithotherspeech and hearing training programs in the institute.