REGULATIONS 2016

SYLLABUS

for Courses affiliated to the

Kerala University of Health Sciences

Thrissur 680596

POST GRADUATE COURSE IN

AUDIOLOGY AND SPEECH LANGUAGE PATHOLOGY

Course Code: 285

(2016-17 Academic year onwards)

2016

2. COURSE CONTENT

2.1. Title of course:

Name of the course shall be the "MASTER OF AUDIOLOGY AND SPEECH LANGUAGE PATHOLOGY" – Abbreviated as MASLP

2.2. Objectives of course

i. Prepare audiologists and speech-language pathologists to fill diverse roles in the broad area of speech-language pathology and audiology in a variety of professional environments;

ii. Provide the student with knowledge about the changing role of the speech-language pathologists and audiologists within oursociety;

iii. Facilitate an interdisciplinary view of disorders of human communication andhearing;

iv. Provide speech-language pathologists and audiologist with the course work and practicum experiences needed to meet national standards for clinical knowledge and skills and to earn the Certificate of Clinical Competence(CCC).

2.3. Medium of instruction:

Medium of instruction shall be English

2.4. Course outline

The regulation of the Master of Audiology & Speech Language Pathology (MASLP) being conducted by the Kerala University of Health Sciences is in accordance with the recommendations of the rehabilitation council of India with an emphasis on the health needs of the Kerala State.

2.5. Duration:

Which spread over 365 days per academic year.

2.6. Syllabus:

First year MASLP: Statistics and research methods, Advances in speech sciences, Clinical Linguistics, Auditory Physiology, Psychophysics of audition, Voice and Fluency Disorders, Speech and language Processing, Clinical Practicum- Speech Language Pathology, and Clinical Practicum- Audiology.

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Second year MASLP: Language Acquisition and Language Disorders in Children, Speech Perception and its disorders, Clinical phonology and motor speech Disorders, Diagnostic Audiology, Hearing Devices, Adult Language Disorders, Advances in the management of Persons with Hearing Disorders, Dissertation, Clinical Practicum- Speech Language Pathology, and Clinical Practicum- Audiology**.**

2.7. Total number of hours:

Recommended hours for each subject is 75 hours.

2.8. Branches if any with definition :

AUDIOLOGY & **SPEECH-LANGUAGE PATHOLOGY**

Definition of various Specialities

Audiology- Is defined as the science of hearing and balancing, art of its assessment and the habitation and rehabilitation of individuals with hearing and balancing disorders.

Speech Language Pathology- Is defined as the branch of science which deals with Speech, language, deglutition and its disorders.

2.9. Teaching learning methods:

As per syllabus

2.10. Content of each subject in each year

FIRST YEAR MASLP

SH 101 STATISTICS AND RESEARCH METHODS (75 hrs)

Objectives

1. *To orient the student on the basics of statistics, and its application to the field of speech and hearing.*
2. *To enable the student to select and carry out appropriate statistical calculations as required for research in the field of speech and hearing.*
3. *To equip the students with necessary knowledge to be able to interpret the analysed statistical related data to the field of speech and hearing.*

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4. *To familiarize the students on the importance and applications of research methods and techniques applicable to the field of speech and hearing.*

SECTION 1 A. STATISTICS

UNIT 1 **[15 hrs]**

Statistics – purpose – approach – methods – measures of central tendency – Dependability of these measures – research applications.

- Measures of variability – types and meaning of various measures – research applications.
- Standard score –normal distribution deviations – skewness and Kurtosis – conditions of applications – limitations in interpretation.

UNIT 2 **[15 hrs]**

- Theory of probability – principles and properties of normal distribution – binominal distribution – interpretation of data using the normal probability curve – causes of distribution – deviations from the normal forms.
- Correlation – meaning – coefficient of correlation – linear correlation – product moment correlation – rank correlation, biserial correlation, tetracoric correlation partial and multiple correlations – regression equation.

- Variance – concept – foundations – assumptions – one way classification. ANOVA MANOVA, ANCOVA, MANCOVA.

UNIT 3 **[15 hrs]**

- Item analysis – item pool – its selection – item difficulty item variance – item conduction – time validity – difficulty index.
- Non – parametric statistics – its nature and condition and application – non parametric analysis of variance and measures of association – tests of difference with correlated and uncorrelated data – tests of similarity.

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- Selection appropriate statistics methods in the research, receivers operating characteristics

SECTION 2 B. RESEARCH METHODS

UNIT 4 **[15 hrs]**

- Methods of research in behavioural sciences – research designs – measuring purpose – principles – needs – applications between group designs and single subject research designs.
- Basic of research – science scientific approach – problems – hypothesis – constructs – variables.
- Types of research- empirical rationale-experimental and export-factor research laboratory experiments - field studies – survey research - fundamental research epidemiology-clinical and applied research.

UNIT 5 **[15 hrs]**

- Technique of sampling – sampling and randomness-principles of randomization – random assignment – methods – random sampling-stratified sampling, incidental sampling – purposive samples of one to tone matched sampling – size of sample.
- Measurement – foundations – types – reliability – validity.

- Variance – implication to research – variance control.
- Techniques of equation – experimental and control groups – matching and randomization – advantages, disadvantages and limitations.
- Research designs – various types of group designs – various types of single subject research designs.
- Analysis and interpretation – principles, indices – cross breaks – factor analysis – multivariate statistics – time series analysis.
- The research report – cardinal characteristics – purpose – structure presentation and writing style.

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LIST OF BOOKS

STATISTICS AND RESEARCH METHODS

1. Hegde, M. N. (2006). Clinical Research in Communicative Disorders [2nd Edition] Principles and strategies. Singular Publishing.
2. Mary & Grace. Introduction to Clinical Research in Communication Disorders.
3. Pannbacker, M. H., & Middleton, G. F. (1994). Introduction to Clinical Research in Communication Disorders, San Diego: Singular Publishing.
4. Maxwell, D. L., &Satake, E. (1997). Research and Statistical Methods in communicative disorders. Baltimore: Williams and Wilkins.
5. Stein, F., & Cutler, S. K. (1996). Clinical Research in Allied Health and Special Education. San Diego: Singular Publishing Group Inc.
6. Portney, L.G. and Walkins, M. P. (1993). Foundations of Clinical Research. Connection: Appleton and Lange. ISBN 0-8385-1065-5
7. Woods, A. Fletcher, P and Hughes, a (1986). Statistics in Language studies. Cambridge: University Press ISBN 0-521-253268.

SH 102 ADVANCES IN SPEECH SCIENCES [75 hrs]

Objectives

1. To equip the student with theoretical knowledge and operational skills required for understanding the speech production mechanism.

2. To sensitize the students on various methods of analysis of various parameters of speech.

UNIT 1 (15 hrs)

Physiology of speechproduction

- Physiology of respiration- purpose of respiration, description of respiratory movements, types of respiration, methods of respiratory analysis. ☆

Aerodynamics of speech production, Upper airway dynamics, lower airway dynamics. Aerodynamics of vowels, aerodynamics of consonants: stops, fricatives and nasals.

- Physiology of laryngeal function – muscles of larynx, vocal fold physiology, molecular and cellular structure of vocal fold tissue,
- Laryngeal biomechanics - Mechanical properties of the vocal fold vibration (stress strain relation, whip like motion, effects of impact stress).
- Models of vocal fold vibration – one mass model, two mass model, multiple mass model, EGG Model, simple Unitary mass model, triangular Unitary mass model.
- Physiology of articulatory and resonatory system- Patterns of velopharyngeal closure, effects of vowel height on velopharyngeal airway resistance, neuromotor mechanism of articulatory system

UNIT 2 **(15 hrs)**

- Life span changes in speech mechanism including developmental milestones
- Models of speech production- open loop and closed loop model, KozhavnikovChristovich model, Associative chain model, Wickelgren's model, McNeilage's model, Garett's model, and Dell's activation model.
- Acoustics of speech – Acoustic theory of speech production, Acoustic phonetics, Basics of acoustics, acoustics of vowels and consonants.

UNIT 3 **(15 hrs)**

- Principles, instrumentation and measurement procedures:
  - Digital filters, FIR and IIR, Basic algorithms, DFT and FFT, Short time speech analysis techniques, speech coding techniques, Autocorrelation, Cepstrum, Linear Prediction
  - Aerodynamic analysis of speech
  - Acoustic analysis of speech- Inverse filtering, LTAS, Spectrography, MFCC
  - Articulation measurements- X-Ray microbeam, NMR methods, Electropalatography, Ultrasound, EMA, EMMA

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- Perceptual analysis of speech- segmental and supra segmental aspects and speech intelligibility

UNIT 4 **(15hrs)**

- Speaker recognition system and speech recognition system
- Speech synthesis methods
- Speech analysis in forensic sciences.

UNIT 5 **(15hrs)**

- Infant cry – Studies on infant cry analysis, features of infant cry, spectrographic patterns of normal cry and cry in clinical population
- Analysis of laughter, features of laughter, spectrographic patterns of laughter.

LIST OF BOOKS

SH 102 ADVANCES IN SPEECH SCIENCES

1. Ainsworth, W.A. (1988). Speech recognition by machine, London Peter Pen prints
2. Ainsworth W. A. (Ed.). (1990). Advances in Speech, Hearing and Language Processing Research Annuals: Vol. 1, London, Jai press
3. Baber. C., & Noyes. J. M. (1993). Interactive Speech Technology Human latest technique with Application of Speech input output to computers. London Taylor and Francis
4. Haton. J. P. (Eds) (1981) Automatic speech analysis & Recognition. USA. D. Reidel Publishing Company
5. Hawley. M. E. (1977) Speech intelligibility & Speaker Recognition. Pennsylvania Dowden Hutchinson & Ross Inc.
6. Nakagawa. S & etal (1995) Speech, Hearing and Neural Network Models. Oxford: IOS. Press
7. Nolon, F (1983). The phonetic basis of speaker recognition; Cambridge. Cambridge University Press
8. Baer, T et al., (Eds) (1991). Laryngeal function in phonation and respiration. Singular Publishing Group, San Diego.

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9. Baken, R.J and Daniloff, R.G. (1991). Reading in Clinical spectrography of speech. Singular Publishing Group, San Diego.
10. Code, C. & Ball, M. (1984). Experimental Clinical Acoustics. College Hill Press. Houston.
11. Kent, R.D., & Read, C. (1992). Acoustic analysis of speech. Singular Publishing Group, San Diego.
12. Keller E. (1994) Fundamentals of Speech synthesis and speech recognition Basic concepts, state of the art and future challenges John Wiley and Sons New York
13. Kent R.D & Read C 1995. The acoustic analysis of speech, A.I.T.B.S Publishers &
14. Lass, N.J (1976). Contemporary issues in experimental phonetics. Academic Press, New York.
15. Liberman, P., &Blustein, S. (1988). Speech Physiology, speech perception and Acoustic phonetics. Cambridge University press. Cambridge.
16. Murry, T. &Murry, J (1980). Infant communication: Cry and early speech. College – Hill Press, Houston.
17. Nolon, F. (1983). The phonetic basis of speaker recognition. Cambridge. University press, Cambridge.
18. Potter, R.K., Kopp, G.A., & Green, H.G. (1966). Visible speech. Dover Publications, New York.

SH 103 CLINICAL LINGUISTICS [75hrs]

Objectives

1. To equip the student to understand the linguistic basis of different speech language disorders.
2. To train the students to record, analyse and transcribe clinical samples

UNIT 1 (15 hrs)

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- Language acquisition, semantics, syntax pragmatics, theoretical issues, theoretical issues, Deixis and anaphora, definiteness, discourse [focus on understanding normal and disordered language].

UNIT 2 **(15 hrs)**

- Neuro linguistics – Language and the brain – localization – left brain - right brain differences – coding and decoding – Neuro anatomical and Neuro physiological bases of language learning and dysfunction – linguistic and Psycho – neuro linguistic models of language pathology

UNIT 3 **(15 hrs)**

- Psycho linguistics and language acquisition – issues involved in language acquisition – motherese / Child directed speech – second language acquisition – language acquisition in bi- and multi-lingual environments.

UNIT 4 **(15 hrs)**

- Issues in Socio-linguistics-Standard and Non-standard Dialects, Regional and Social Dialects Stylistic Variation of Language, Gender and Language, Registers, Creole, Pidgins, relation between language culture, religion, politics etc. Language Deficiency.

UNIT 5 **(15 hrs)**

- Multilingual and cultural issues. A brief introduction to the major language families of the world – Language Families and Major Languages of India. Linguistic Determinism Linguistic relatively, Sapir-Whorf Hypothesis. Cultural diversity of India, Cultural issues in Verbal and non-verbal communication. Multicultural and multilingual issues in Rehabilitation with special reference to India

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LIST OF BOOKS

SH 103: CLINICAL LINGUISTICS

1. Crystal, D. (1981). Clinical Linguistics. Wien, Springer-Verlag.
2. Geoffrey Finch (1997) How to Study Linguistics. Palgrave Macmillan
3. Grundy, K. (1981).Linguistics in Clinical practice. Whurr Publishers Ltd. London.
4. Grunwell, O. (1975). The Phonological Analysis of Articulation Disorders. BJDC,10, 31-42.
5. Lawrence D Shriberg&Raymong D Kent (2003).Clinical Phonetics .Pearson Education Inc.
6. Perkins,M., &Howard,S.,(ED) (1995). Case Studies in Clinical Linguistics. Whurr Publishers Ltd. London.
7. Reni Dirven&MarjolijnVerspoar. Cognitive Exploration of language & Linguistics (2004). John Benjamin Publishing Company.
8. Ziegler,W., &Deger,K.,(1998). Clinical Phonetics and Linguistics. Whurr Publishers Ltd. London.
9. Whitaker, A.H., & Stemmer, B., (Ed) (1998) Handbook of Neurolinguistics. Academic Press, US.

SH 104 AUDITORY PHYSIOLOGY [75 hrs]

Objectives

To equip the student to understand the physiological basis of auditory system, inter-relation and dependency of structure and function with nervous system.

UNIT 1 (15hrs)

1)External ear:

- Anatomy & Physiology of lower animals and humans. Role of Pinna & external auditory meatus in hearing. Resonance properties of external ear & auditory canal
- Non auditory physiology of external ear
- Developmental changes
- Application to clinical audiology

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- Temporal bone anatomy - role in hearing

2) Middle ear:

- Anatomy & Physiology.
- Middle ear transformer action
- Impedance
- Acoustic and non-acoustic reflex pathways
- Anatomy and physiology of the Eustachian tube

UNIT 2 **(15 hrs)**

1) Cochlea

- ***Anatomy in lower animals and humans***
  - Macro & Microanatomy
  - Blood supply and innervations
  - Cochlear fluids – origin, absorption, composition, dynamics and functions
  - Cochlear models
- ***Physiology of the Cochlea***
  - Modes of bone conduction
  - Cochlear mechanics – basilar membrane mechanics - historical and current status
  - Cochlear transduction
  - Cochlear electrophysiology
  - Cochlear non-linearity-two tone suppression, otoacoustic emission & other recent advances
  - Pathophysiology & perception
  - Repair, regeneration, protection in the cochlea

2) Theories of hearing

- Historical aspects
- Place theory – resonance & non-resonance
- Frequency theory
- Travelling wave theory
- Other recent advance like motor theory etc

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UNIT 3 **(15 hrs)**

1) **Auditory nerve**
    - Structure and tonotopic organization
    - Structure and contents of internal auditory meatus
    - Refractory period, adaptation, firing rates, types of responses
    - Electrophysiology – action potential, generation and properties
    - Stimulus coding, frequency, intensity, time, complex signals, speech
    - Non linearity
2) **Vestibular System**
    - Anatomy and physiology of vestibular structures and vestibular nerve
    - Vestibulo-occular reflex
    - Vestibulo-spinal reflex

UNIT 4 **(15 hrs)**

1) **Brain stem**
    - Anatomy of CN, types of cells distribution
    - Anatomy of SOC, LL, IC, MGB
    - Non classical pathway
    - Tonotopic organization
    - Neurophysiology and Stimulus coding at different levels
    - Neurotransmitters
    - Localization

UNIT 5 **(15 hrs)**

1) **Auditory cortex**
    - Anatomy and tonotopic organization of primary and secondary auditory areas
    - Neurophysiology of auditory areas
    - Stimulus coding – frequency, intensity and time
    - Role of auditory cortex in localization
    - Plasticity

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2) Efferent pathway

- Anatomy and tonotopic organization of efferent pathways.
- Neurotransmitters
- Medial and lateral efferent effect on cochlear physiology, Auditory Nerve and CN plasticity.

LIST OF BOOKS

SH 104 AUDITORY PHYSIOLOGY

1. Berlin C.I; Weyand T.G (Eds) 2003 – The Brain & sensory plasticity: Language acquisition and hearing. Thomson/Delmer Learning
2. Bellies T.J 2003 – Assessment & Management of central auditory processing disorders in the educational setting from science to practice. Singular Publishing Group. USA
3. Ehret G. Romand R (Eds) 1997: The central auditory system. Oxford University Press, New York
4. McPherson D.L 1996 – Late potentials of the auditory system. Singular Publishing Group. Inc
5. Palmer A.R; Rees A; Summerfield A Q; Meddis R (Eds) 1998, Psychophysical & Physiological advances in hearing. Whurr Publishers Ltd, London
6. Parks T.N; Rubel E.W; Fay R.R; Popper A.N (Eds) 2004. Plasticity of the auditory system. Springer, New York
7. Popper A.N; Fay R.R (Eds) 1992: The mammalian auditory pathway: Neurophysiology. Springer – Verlay, N.Y.
8. Rerben E.W; Popper A.N; Fay R.R (Eds) 1998. Development of the Auditory System. Springer – Verlay, N.Y.
9. Sahley T.L; Nodar R.H; Musiek F.E 1997, Efferent auditory system structure and function - Singular Publishing Group. USA
10. Syka. J(Ed) 1997 – Acoustical signal processing in the central auditory system Plenum Press
11. Wada. H; Tukasade T; Ikeda. K; Ohyama K; Koiki T (Eds) 2000. Recent developments in auditory machines World Scientific Publishing Co.

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12. Webster D.B; Popper A.N; Fay R.R (Eds) 1992. The Mammalian Auditory Pathway – Neuroanatomy Springer – Verlag, N.Y
13. Auw. W.L., Popper.A.N. Fay.R.R (Ed) 2000: Hearing by whales & Dolphins. Springer- Venlag, New York, USA.
14. Berlin.C.I. (Ed) 1996: Hair cells & Hearing aids, Singular Publishing group. Inc., USA.
15. Bekesy.G.V. (1960): Experiments in hearing McGraw-Hill Book Company.
16. Dallos.P. Popper.A.W., Fry.R.R (Ed) 1996: The Cochlea, Springer-Venlag, New
17. York, USA.
18. Davis (1990): Hearing, Washington University.
19. Durant, J.D &Lovrinic.J.H (1977): Bases of hearing Sciences. Williams & Wilkins.

SH 105 PSYCHOPHYSICS OF AUDITION [75 hrs]

Objectives

1. To equip the student with acoustical and psycho Physical parameters of hearing
2. To familiarize the students on psycho Physical approaches to measurement and analysis.

UNIT 1 (15 hrs)

- Introduction to psychoacoustics, Psychophysical Methods – Classical and Adaptive methods.
- Theory of signal detection- Basic concepts - application of signal detection theory/neural Networks and ROC.
- Loudness: Introduction, Absolute Threshold of Hearing (MAP & MAF in air and water). Loudness level, Loudness scaling - ordinal (Phon) and ratio (Sone), Equal loudness contours- Need, applications (calibration, SLM etc).
- Parameters of loudness, Factors affecting loudness, Models of loudness (Loudness of complex sounds/tones).
- Psychophysical power laws: Fechner's Law, Steven's Power Law and their derivation.

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- Differential sensitivity for intensity, absolute and relative DL, methods to study, clinical applications.
- Loudness perception in pathological ears, recruitment, dynamic range, loudness adaptation, Florentine theory of softness imperceptions, Relevance in clinical Audiology.

UNIT 2 **(15 hrs)**

- Critical band concept, Critical Band Vs Critical ratio. Methods of measurement of critical band.
- Masking –types (temporal masking, ipsilateral, contralateral, central masking, informational masking)
- Concept of auditory filters, frequency resolution. Masking and excitation pattern, estimation of the shape of auditory filters.
- Two-tone suppression and pulsation threshold.
- Profile analysis, MDI
- Clinical application

UNIT 3 **(15 hrs)**

- Temporal perception
- Temporal aspects of hearing - Temporal acuity, temporal DL, temporal order.
- Gap detection (in broad band noise, in narrow band noise, sinusoid)
- Temporal integration, Duration discrimination
- Temporal modulation transfer function.
- Factors affecting temporal perception.
- Clinical applications
- Adaptation- Definition, Adaptation Vs Fatigue
- Methods to study adaptation
- Parameters affecting adaptation
- Neuro-physiological process in adaptation
- Clinical applications

UNIT 4 **(15hrs)**

- Pitch perception- Introduction, Factors affecting pitch perception

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- Pitch scales (ordinal and ratio). Equal pitch contours. Pitch of complex tones, Effects of phase on the pitch of complex sounds, Pitch of missing fundamental and periodicity pitch.
- Ohm's acoustical law, beats, aural harmonics and combination tones, consonance and dissonance.
- Theories and models of pitch perception.
- Pitch perception in pathological ears.
- Differential sensitivity for frequency, Absolute and relative DLF's, Methods to study.
- Timbre perception - Factors affecting.
- Object perception – Object identification, auditory scene analysis,
- Clinical application

UNIT 5 **(15hrs)**

- Binaural hearing
- Localization - Cues for localization, factors affecting localization, Neurophysiological process of localization.
- Lateralization, binaural integration, binaural advantage.
- Concepts related to binaural hearing- Cone of confusion, beats, rotating tones, time separation pitch, time intensity trade, stereophonic effect, squelch, jnd for dichotic phase, binaural DLF, DLI, DLT.
- MLD- Durlach and Jeffress models
- Clinical applications

LIST OF BOOKS

SH 105 PSYCHO PHYSICS OF AUDITION

1.

2. Yost, W. A., & Neilson, D. W. (1977). "Fundamentals of Hearing" Holt Rinehart & Winston
3. Yost; W.A Popper A. N, Fay R.R (1993)– "Human Psychophysics" , Springer Verlag

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4. Gelfand. S A (1990 & 1981) “Hearing, An Introduction to Psychological & Physiological acoustics” Marcel Dekker Inc.
5. Pickles, J.O (1984). “An Introduction to the physiology of hearing” Academic Press London,
6. Zwicker E. Fastl H. (1999). “Psychoacoustics – Facts & Models” Springer
7. Durrant – Lovrinic (1997) “Basics of Hearing Sciences” – Williams & Wilkins 3rd Edition
8. Maore B C J (1995). Hearing (Eds), Academic Press, San Diego
9. Gullick W.C (1971). Hearing Physiology & Psychophysics, Oxford University Press N.Y
10. Gullick W.C (1971). Hearing Physiology & Psychophysics, Oxford University Press N.Y
11. Palmer A.R., Rees, A. (1998). Summerfield AQ Meddis K “Psychophysical and physiological advances in hearing – Whurr Publication
12. Syka Joel (1997). “Acoustical Signal Processing in the Central Auditory System” Plenum Press
13. BekersyG.Von (1960). “Experiments in Hearing” McGraw Hill
14. HanghtonPiter (2002) “Acoustics for Audiologists” Academic Press
15. Warren R.M (1999). Auditory Perception-A new Analysis and synthesis U
16. Rosenthal DF &Okiano H G (1998). “Computational Auditory Scene Analysis” Lawrence Erlbaun Associates, Publishers.
17. Hawkins H L, Mc Muller TA, Popper A N, Fay R R (1996). “Auditory Computation” Springer Verlag.
18. Yost (2000) “Directional Hearing” – Wiley
19. Hirsh S K, Eldredge DH, Hirsh F J & Silverman R. (1976). “Hearing & Davis”. Washington University Press K: Cambridge University Press, U.K.

SH 106 VOICE AND FLUENCY DISORDERS [75 hrs]

Objectives

1. To equip the student to understand the characteristics, diagnosis and rehabilitation aspects of voice and related disorders.

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2. To equip the student to understand the characteristics, diagnosis and rehabilitation aspects of fluency disorders

UNIT 1 **(15 hrs)**

Recent advances in measurement, assessment and management of voice and its disorders

- Voice Evaluation; perceptual and instrumental.
- Aerodynamic tests - vital capacity, mean airflow rate, maximum duration of sustained blowing.
- Tests for assessing functions of the resonatory system; acoustic analysis, psychoacoustic evaluation and tests for laryngeal measurements (model frequency, frequency range, F0 perturbation, intensity, intensity range, Amplitude perturbation, glottogram, harmonic analysis) and other measures (LTAS, nasality measurements etc using instruments)
- Measurement of vocal fold vibration - invasive procedures - stroboscopy, videokymography; noninvasive procedures - EGG, inverse filtering.

UNIT 2 **(15 hrs)**

- Neuroanatomy and neurophysiology of larynx
- Acoustic, aerodynamic, perceptual and physiological aspects of pathological voices
- Paediatric voice disorders
- Effects of ageing in voice
- Neurogenic voice disorders- Differential diagnosis
- Endocrinal voice disorders and voice disorders related to transsexuals.
- Issues related to professional voice and its care
- Recent advances in voice therapy including instrumentation

UNIT 3 **(15 hrs)**

- Laryngectomy & different types of alaryngeal speech
- Treatment-medical, surgical and therapeutic (including radiation therapy, chemo therapy, pre-postoperative counseling)

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- Rehabilitation team of laryngectomee: Considerations in rehabilitation – adjustment to disability, reaction to alaryngeal speech etc
- Acoustical, perceptual and physiological aspects of alaryngeal speech
- Factors influencing intelligibility of alaryngeal speech

UNIT 4 **(15 hrs)**

- Dimensions of fluent speech- review of recent advances and findings regarding:
  - Development, 2 theories
  - Neuro anatomical, neurophysiological and neuropsychological aspects of fluency disorders.
  - Current linguistic theories of fluency disorders
- Different perspectives of stuttering
  - Linguistic aspects of stuttering
  - Auditory processing in stutterers
  - Auditory feedback and stuttering
  - Motor processes in stuttering
  - Laryngeal behaviors in stutterers (VOT, VRT, VTT, STT, Laryngeal muscle activity)
  - Stuttering as a motor speech disorder
  - Articulatory dynamics of stutterers
  - Stuttering as a prosodic disorder
  - Stuttering as temporal processing disorder
  - Respiratory function in stutterers
  - Stuttering and anxiety
  - Nature, characteristics, differential diagnosis, and current status of:
    - Normal Non fluency
    - Cluttering
    - Neurogenic stuttering
    - Drug-Induced stuttering

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UNIT 5 **(15 hrs)**

- Assessment and diagnosis of fluency disorders in children and adults
- Prevention, relapse of stuttering, recovery, naturalness, QOL and related issues
- Recent advances in management of stuttering (Group therapy, Psychotherapy, Drug therapy, Behavior therapy)
- Evidence based management of Fluency disorders
- Efficacy and outcome measures of stuttering therapy

LIST OF BOOKS

SH 106: VOICE AND FLUNECY DISORDERS

1. **VOICE DISORDERS**
2. Casper, J. K., & Colton, R. H. (1993). Clinical Manual for Laryngectomy and Head and Neck Cancer, Rehabilitation California: Singular Publishing Group, Inc.
3. Baken, R. J. (1996). Clinical Measurement of Speech and Voice California: Singular Publishing Group, Inc.
4. Boone, D. R., McFarlane, S. C., & Von Berg S. L., (2005). Voice and Voice Therapy (7^{th}Eds), Boston: Allyn and Bacon.
5. Hirano, M., Kirchner, J. A., & Bless, D. M. (1991). Neurolaryngology: Recent Advances {Eds] California: Singular Publishing Group, Inc.
6. Johnson, A. F., & Jacobson, B. H. (1998). Medical Speech-Language Pathology – A Practioner's Guide NY: Thieme, Inc.
7. Koschkee, D. L., &Rammage, L. (1997). Vocal Care in Medical Setting California: Plural Publishing Group, Inc.
8. Rubin, J. S., Sataloff, R. T., Korovin, G. S., & Gould, W. J. (1995). Diagnosis and Treatment of Voice Disorders, NY: IGAKU-SHOIN, Medical Publishiers, Inc.
9. Sataloff, R. T. (1991). Professional Voice – The Science and Art of Clinical Care NY: Raven Press.

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10. Sataloff. R. T., & Eller, R. T., &Hawkshaw, M. (2007). Atlas of Laryngoscopy. California: Plural Publishing, Inc.

11. Satalof, R. T. & Mandel, S., Abaza, M. (2006). Laryngeal Electromyography California: Plural Publishing, Inc.

12. Titze, I. R. (1993). Vocal Fold Physiology – Frontiers in Basic Science, San Diego: Singular Publishing Group, Inc.

13. Titze, I. R. (1994). Principles of Voice Production, NJ: Prentice Hall, Inc.

2. FLUENCY DISORDERS

Bloodstein, O.(1993), Stuttering, Allyn and Bacon, Boston.

Curlee& Perkins., (1995), Nature and treatment of shuttering: New directions

Curlee (1993). Stuttering and related disorders of fluency, Thieme Medical Publishers, New York.

Curlee, R. F. & Siegel, G.M. (2 Edn) (1996). Nature and treatment of stuttering. Allyn and Bacon, Boston.

Fawcus, M., (1995), Stuttering. Whurr Publishers, London.

Lass, N.J. (Ed) (1979). Speech and Language advances in basic research and practice. Academic Press, New York, Vol 1-9.

Perkins, W.L. (1992). Stuttering prevented. Whurr Publishers, London.

Schwartz, H.D. (1999). A primer for stuttering therapy. Allyn and Bacon, Boston.

Starkweather, D., (1987). Fluency and stuttering. Prentice-Hall, New Jersey

Weiss (1964). Cluttering. Prentice-Hall, New Jersey.

SH 107 SPEECH & LANGUAGE PROCESSING [75 hours]

Objectives

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- *To equip the student to understand the basics of various aspects of speech and language processing.*

UNIT 1 **(15 hrs)**

Phonetic perception

- Perception of vowels - formants, F0, band width, duration, factors affecting vowel perception, static and dynamic cues, effect of co articulation.
- Consonant perception, cues for different consonants, static and dynamic cues, factors affecting consonant perception, effect of co articulation.

UNIT 2 **(15 hrs)**

- Spoken word recognition- Word under noise, filtered, truncated words, lexical decision, word spotting, phoneme triggered lexical decision, speeded repetition of words, continuous speech, tokens embedded in words and non words, rhyme monitoring, word monitoring, cross modal priming Issues

UNIT 3 **(15 hrs)**

- Stages and word recognition -lexical concept, lexical access, phonological encoding, production.
- The input to the lexicon-lexical access from spectra, constraints of temporal structure- Cohort models, interactive models of spoken word recognition – Logogen model lexical and phonetic processing-phonetic characterization task, phoneme restoration studies, phoneme monitoring task, sentence and word processing, Neighbourhood activation model.

UNIT 4 **(15 hrs)**

- Visual word recognition - models and theories; word and non word naming, acquired dyslexia and role of phonology in word recognition.
- Sentence comprehension and processing of components of language - parallel and serial models of processing, modularity and information sources, accounts

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of parsing, parsing issues, ambiguity in parsing, strategies for disambiguation. Reference and anaphora. Discourse comprehension and expression.

UNIT 5 **(15 hrs)**

- Sentence processing – basic capacities for perceiving phonetic contrasts - native language contrasts, foreign language contrasts, coping with variability in speech signal.
- Role of memory and attention
- Prosodic organization in native language
- Related developments in speech perception
- Processing of phonological, morphological, syntactic, semantic and pragmatic aspects of language.

LIST OF BOOKS

SH 107: SPEECH AND LANGUAGE PROCESSING

1. Arbib, M.A., Caplan, D., & Marshall, J.C., (Ed) (1982). Neural Models of Language Processes, Academic Press, New York.
2. Durrand, J., and Laks, B., (Ed) (1999). Phonetics, Phonology and Cognition. Oxford University press, US.
3. Hardcastle, W.J., & Laver, J., (Ed) (1999). The Handbook of Phonetic Sciences. Blackwell Publishers, Oxford.
4. Kroeger, R.P., (2004). Analyzing Syntax. Cambridge University Press, UK.
5. O' Shaughnessy, D., (2nd Edition) (2001). Speech Communication, Human and Machine. Universities Press, India.
6. Saeed, I.J., (1997). Semantics. Blackwell Publishers, Massachusetts.

SH 108 CLINICAL PRACTICUM- SPEECH LANGUAGE PATHOLOGY

[15 hrs/week]

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Objectives

1. The student should be able to assess, diagnose, plan and execute therapy for children and adults with various communication disorders.
2. To maintain clinical record.

1. Assessment of 10 clients with voice / dysphagic disorders.
2. Use of instrumentation in 10 clients with voice / dysphagic disorders.
3. Plan and execute therapy in 5 clients with voice / dysphagic disorders.
4. Maintain clinical records.

SH 109 CLINICAL PRACTICUM- AUDIOLOGY

[15 hrs/week]

Objectives

1. To give practical bases for interpretation of test results and test battery approach in different conditions and relate it to structural anatomy, physiology and alterations in diseased auditory mechanism.

1. To test a minimum of 10 cochlear hearing loss cases using test battery approach.
2. To test 10 clients of retro cochlear pathology using special and conventional auditory test battery
3. To prescribe and set hearing aid in at least 10 clients (5 children and 5 adults) as per their hearing need.

SECOND YEAR MASLP

SH 201 LANGUAGE ACQUISITION AND LANGUAGE DISORDERS IN CHILDREN

Objectives **[75 hrs]**

1. To equip the student with thorough knowledge of acquisition of language.

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2. To equip the student to differently diagnose various child language disorders.

3. To understand the current advances in assessment and intervention for child language disorders.

Unit 1 **(15 hours)**

- Critical review of current theories of language acquisition and its applications to assessment and intervention.
- Overview of neuroanatomical, neurophysiological and neurochemical correlates of language acquisition.

Unit 2 **(15 hours)**

- Memory in communication and communication disorders. Short term memory, working memory, and their importance in language processing. Serial and long term memory, visuospatial perception, motion perception.
- Attention – types of attention, development of attention.
- Language development in exceptional circumstances: extreme deprivation, bilingual language exposure, twins, visual handicap, Williams syndrome (disassociation between language and cognitive functions), Hearing loss, Dyspraxia, Learning disabilities, Dysphasia, Acquired childhood aphasia.

Unit 3 **(15 hours)**

- Contemporary concepts and issues in Autism, SLI and LLD.

Unit 4 **(15 hours)**

- Cross-cultural considerations in assessment and management of developmental language disorders.
- Specific assessment and intervention approaches for various developmental language disorders.
- Reading, Spelling and Writing Disorders. Neurobiology of reading and writing, Phonological Awareness and Reading. Evaluation and treatment approaches.

Unit 5 **(15 hours)**

- Counseling – meaning, scope – principles of counseling – types of counseling – individual, group and family, parental, vocational, educational, rehabilitative – behavioralcounseling in the context of speech, language disorders.

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LIST OF BOOKS

SH 201 LANGUAGE ACQUISITION AND LANGUAGE DISORDERS IN CHILDREN.

1. Adams, c.,Browns,B and Edwards, M (1999). Development disorders of language (2nd ed.) London: Whurr Publishers Ltd.
2. Bishop, D and Mogord, K. (EDs.) (1993).Language Development in Exceptional Circumstances. U.K.: Erlbaum Associates Ltd., Publishers
3. Boston. Nelson, N.W. (1998). Childhood language disorders in contest – infancy through adolescence. Allyn and Bacon
4. Butler, K.G. (1994). Cross Cultural Perspective in Language Assessment and Intervention. Topics in Language Disorder series. U.S.A.: Aspen Publication.
5. Dodd, B., Campbell. R. and Worrall, L (Eds). (1996).Evaluating Theories of Language - Evidence from disordered communication. London: WhurrPubishers.
6. Intervention Planning for Children with Communication Disorders – A Guide for clinical practicum and professional practice (1994). Prentice – Hall, Inc. New Jersey.
7. Owens, R.E. (Jr.) (1991). Language Disorders: A functional Approach to Assessment and Intervention. U.S.A.: Macmillan Publishing Company
8. Philips, B.J. and Scello, D. (1998). Differential Diagnosis in Speech Language Pathology –Butterworth- Heinimann,

SH 202 SPEECH PERCEPTION AND ITS DISORDERS

Objectives **[75 hrs]**

1. To sensitize the student on normal and abnormal attributes of perception of speech.
2. To familiarize the students on differences in perceptual attributes in clients with auditory disorders.

UNIT 1 **(15 hrs)**

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- Theories and models of speech perception (motor, neurological, auditory, acoustic, analysis by synthesis, quantum and TRACE)
- Basic Issues in speech Perception-linearity, segmentation. Lack of invariance. Variability or perceptual constancy in speech. Invariant feature and cue based approaches.
- Methods used to study speech perception: analysis by synthesis, parametric synthesis, Articulatory synthesis
- Speech processing in the auditory system. Overview of the anatomy of the auditory system, peripheral and central mechanisms in the analysis of speech – place representation, intensity model, multistage representation and categorical perception.

UNIT 2 **(15 hrs)**

Speech intelligibility and perception of supra-segmentals

- Methods: Subjective (perceptual tests), Objective (Articulation Index, Speech intelligibility index. Speech transmission index)
- Comparison of two methods
- Factors influencing – stimulus based, subject based, transmission based factors
- Clinical application – in evaluation , rehabilitation and research
- Perception of segmental and supra-segmental cues through
    a. The visual modality
    b. The tactile modality

UNIT 3 **(15 hrs)**

- Perception of vowels, semivowels, and diphthongs in individuals with hearing impairment
- Perception of consonants in individuals with a hearing impairment
- Effect of type, degree and audiogram configuration in perception of vowels and consonants
- Effects of co articulation on speech perception.
- Speech perception through hearing aids using signal enhancing features

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- Dichotic listening- Theories, Factor affecting, Clinical application
- Infant Perception, perception of consonants and vowels, suprasegmentals in infants, comparison of adult and infant perception, universality in perception, word perception, lexical neighborhood.

UNIT 4 **(15 hrs)**

- Perception of segmental and suprasegmental cues through cochlear implants
  a. Effect of number of channels,
  b. Effect of coding strategy,
  c. Effect of implant model
  d. Effect of number of electrodes and stimulation rate
- Perception of segmental and suprasegmental cues through auditory brainstem implants
- Perception of segmental and suprasegmental cues through Middle ear implant and BAHA
- Comparison of perception through different devices

UNIT 5 **(15 hrs)**

- Speech perception in noise (Effect of types of noise, different signal-to-noise ratio, different degrees of hearing impairment)
  - Effect on children, adults, geriatrics, peripheral hearing impairment, (C)APD
- Effect of reverberation on speech perception - Effect of different levels of reverberation times, Degrees of hearing impairment.
- Combined effect of noise and reverberation
- Effect of non-native accent on speech perception
- Short term memory and speech perception, stages of memory, theories, perception of consonants and vowels in short term memory, animal perception, consonant and vowel perception,

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- Animal versus human perception.

LIST OF BOOKS

SH 204 SPEECH PERCEPTION AND ITS DISORDERS

1. Ainsworth W. A(1976) Mechanism of Speech Recognition, International series in natural philosophy. Vol. 85, Oxford: Pergamon Press
2. Ainsworth W. A(1990) Advances in Speech, hearing and language processing Vol. 1, London Jai Press Ltd.
3. Berlin C (1984) (Ed.) Hearing Science. San Diego: College-Hill Press
4. Borden G.J and Harris K. S (1980). Speech Science primer: Physiology, acoustics and perception of speech, London: Williams and Wilkins
5. Cohen,A&Nooteboom, S.G (Eds) (1975) Structure and process in speech perception. New York: Springer-Verlag
6. Clark G.M, Cowan R.S C and Richard C D(1997) : Cochlear Implantation for infants and Children –Advances, Singular publishing Group, London.
7. Fant , G; Speech acoustics Phonetics – Klumer Academic Publication 2004
8. Gold & Morgan N "Speech &Audiological Processing. "Wiley & Son Inc. 2000
9. Goodman J.C and Nusbaum(1994) (Eds) The development of speech perception: The transition from speech sounds to spoken words, MIT Press London
10. 3Hardcastle & Laver J. "The Handbook of Phonetic Sciences" Blackwell Publishers Ltd. 1997 (Delgutte)
11. Hish. S.K; Eldredge. D.H. Hish .J; Silveman S.R. & Davis 1976 "Hearing" Washington University Press"
12. Lass N.J (Ed) 1976. Contemporary issues in experimental phonetics. Academic Press N.Y
13. Mendel, L.L., &Danheur, L.J., (Ed) (1997). Audiologic Evaluation and Management and Speech Perception Assessment. Singular Publishing Inc, CA.
14. Nakagawa S Shikanok K, Tohkura. Y (1995) Speech hearing and neural network models. Ohmshia IOS Press Amsterdam
15. Pisoni D 2005 "Handbook of Speech Perception" Blackwell Publishing Ltd U.S.A

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16. Pickett JM, Ravolie SG (1979) Feature Discrimination by persons with sensorineural impairment, in B Lindblom and S. Ohman EDs "Frontiers of Speech Communication Research, AP Londons.
17. Sanders. D.A 1977. Auditory Perception of Speech – An introduction to principle & problems,
18. Schrveda MR "Speech & Speaker Recognition" Karger 1985
19. Schouten MEH 1992. The Auditory processing of speech from sounds to sounds. Morten de Grugter. Berlin
20. Tatham M &Mortin K " Development in Speech Synthesis" Wiley – 1998
21. The XIIIth International congress of phonetic sciences – Stockholm 13 – 19 August 1995, Volumes 1 – 4

SH 203 CLINICAL PHONOLOGY AND MOTOR SPEECH DISORDERS [75 hrs]

Objectives

1. *To equip the student with knowledge as required for therotical and practical understanding of disorders of phonology, specific requirements in different languages and different disorders.*
2. *To train the student in differential diagnosis and management of motor speech disorders.*

UNIT1 [15 hrs]

- Phonological processes- review and recent advances, different types, its analysis, phonological process patterns in various communication disorders.
- Phonological awareness - development, assessment and clinical implications. Recent studies.
- Phonotactics and metalinguistic abilities in phonological disorders.
- Co-articulation – nature, definitions and types.
- Models – feature based, syllabic and allophonic based, target based, phonologically based.
- Physiological studies on co-articulation- effects of co-articulation (position and juncture effect, transition effect, direction effect)
- Co-articulation in Speech Disorders, assessment and management.

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UNIT 2 **[15 hrs]**

- Application of phonological theories in evaluation and management of phonological disorders
- Metaphon theory and therapy
  - Overview and recent developments in evaluation of phonology
  - Treatment approaches in phonological disorders
    - Traditional and phonological intervention
    - Motor vs cognitive learning
    - Procedures based on minimal pairs
    - Procedures based on imagery
- Recent research designs in clinical phonology

UNIT-3 **[15 hrs]**

- Neurophysiology and functional development of sensori-motor control
- Sensory motor processing in speech and correlates of oral sensori-motor dynamics
- Review of different types of dysarthria and apraxia
- Neural substrates and findings in dysarthria and apraxia.

UNIT-4 **[15 hrs]**

- Recent advances in diagnosis, assessment and management of Dysarthria
  - Perceptual, acoustic and aerodynamic analysis
  - Formal and informal tests
  - Electromyography and speech imaging
  - Management
- Recent advances in diagnosis, assessment and management of Apraxia
- AAC- application in dysarthria and apraxia

UNIT-5 **[15 hrs]**

- Dysphagia – Anatomical & Maturational considerations, Role of respiration. Physiology of suck- swallow- breath sequence, overview of phases of swallowing, Development of feeding skills, Alternate methods of nutritional intake.

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- Disorders of swallowing in children and adults
- Etiological classification: Medical, GI tract, respiratory, CNS/PNS damage, cardiac effects, structural, abnormalities and iatrogenic.
- Assessment – Clinical examination, subjective evaluation of swallow function, feeding skills, GERD. Objective methods - Radiological and Instrumental evaluation
- Multidisciplinary management of dysphagia - Issues and concerns, Medical and Non-medical treatment.

LIST OF BOOKS

SH 203 - CLINICAL PHONOLOGY AND MOTOR SPEECH DISORDERS

1. Cannito, M.P., Yorkston, K.M. and Beukelman, D.R. (1998). Neuromotor speech disorders – nature, assessment and management.
2. Caruso. F.J. and Strand, E.A (1999) Clinical management of motor speech disorders in children. New York: Thieme.
3. Duffy, J.R. (1995). Motor speech disorders: substrates, Differential diagnosis and management. St. Louis: Mosby
4. Dworkin, P.J. St. Louis: (1991). Motor speech disorders – A treatment guide. (1991). Dworkin, P.J. St. Louis: Mosby Year Book. Inc
5. Elbert, M Dinnsen, D.A. and Weismer, G. (1984). Phonological theory and the misarticulation child. ASHA monographs..(number 22 Ed).
6. Hodson, B.W and Edwards, M.L. Mayland (1997). Perspectives in applied phonology. : An Aspen Publication.
7. Ingram. Cole and WhurrLimited . (1989) Phonological disability in children (2nd edition) studies in disorders of communication.
8. Johns, D.E. Boston . (1985). Clinical management of Neurogenic communication disorder.: Allyn Bacon.
9. Johnson A.F. and Jacobson, (1998). Medical Speech Language Pathology: a practitioner's Guide.
10. B.H. NY: Thieme
11. Klein, E.S. (1996). Clinical phonology. Assessment of articulation disorders in children and adults. California: singular publishing group Inc.
12. Logemann, J. (1983). Evaluation and treatment of swallowing disorders.

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DYSPHAGIA

Bruce E Murdoch, Deborah G Theodoros, 2001, Traumatic Brain Injury: Associated Speech Language and Swallowing Disorders, Singular Publishers.

Michael E Groher, 1992, Dysphagia: Diagnosis and Management, 2nd Edition, Butterworth Heincmann, USA.

Kim Coxbin – Lewis, Julie M Liss, Kellie L, Sciortino 2005, Clinical Anatomy and Physiology of the swallow mechanism, Thomson Delmar Learning, USA.

SH 204 DIAGNOSITIC AUDIOLOGY [75 hrs]

Objectives

1. *To familiarise the student on auditory manifestations of different disorders and clinical features exhibited.*
2. *To give theoretical rationale for various auditory tests and their findings in different auditory pathology, correlating different auditory and non auditory findings in different disorders.*

UNIT 1: **Biomedical signals and signal processing (15 hrs)**

1. Principles of generation and calibration of acoustic stimuli
    - Pure tone, tone bursts, clicks, filtered clicks and warble tones
    - Acoustic / physical characteristics of all stimuli
    - Generation, gating and filtering of stimuli
2. Electrodes and transducers
    - Signal acquisition technique from electrodes and transducers
    - Signal processing techniques such as differential amplification
    - Common mode rejections, artifact rejection, filtering, signal averaging, etc.
    - Addition and subtraction of waves
3. Installation and calibration Audiological diagnostic instruments

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UNIT-2 **(15 hrs)**

1. Hearing screening
    - Cost benefit analysis
    - Sensitivity vs specificity,
    - Efforts of WHO and Govt. of India,
    - Genetic counseling,
    - Public awareness programs
2. OAE
    - Origin, classification, principles in recording of OAEs,
    - Protocols for infants, protocols for cochlear pathology
    - Contralateral suppression
    - Interpretation
    - Factors affecting
    - Clinical application

UNIT-3 **(15 hrs)**

Immittance

- Principle and instrumentation
- Tympanometry – low and high frequency tympanometry, Single and multi component, Multiple frequency tympanometry, Variables affecting tympanometry
- Reflexometry – Auditory reflexes (AR), non-auditory reflexes, adaptation of auditory reflexes, ARLT, reflex averaging, reflex sensitization, temporal summation of acoustic reflex, binaural summation of AR
- Factors affecting measurement,
- Application of Immittance
- Acoustic reflectometry- principles and application

UNIT-4: **(15 hrs)**

1. Early AEP – ECOCHG, ABR, SN 10, FFR, ASSR
    - Generators
    - Principles of recording
    - Factors affecting recording / interpretation
    - Correlation with FMRI, PET

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- Electrical ABR
- Clinical disorders

2. MLR and LLRs, MMN, P300, N400, T complex
    - Generators
    - Principles of recording
    - Factors affecting recording/interpretation including PAM and applications
    - Correlation with FMRI, PET
    - Electrical LLR
    - Clinical disorders
3. Evaluation of patients with vestibular disorders, ENG and other Vestibular testing procedures

UNIT-5 **(15 hrs)**

1. Pathophysiological and Audiological findings in different pathologies related to
    - External and middle ear diseases
    - Blast, barotraumas, NIHL
    - Meniere's disease
    - Acoustic neuroma
    - Auditory dysynchrony
    - Ototoxicity,
2. Tests to evaluate tinnitus and hyperacusis
3. Nonaudiological tests in diagnosis of auditory disorders
4. Auditory disorders in those with multiple problems,
5. (C)APD –theoretical basis,classifications,conditions in which CAPD exist in adults and in children, behavioral tests, objective tests
6. Comprehensive report writing
7. Audiologist as a witness, medico-legal aspects legislations related to field of audiology
8. Audiological practice in rural areas ,Audiological practice in ENT, Neurological set-ups

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LIST OF BOOKS

SH 204 DIAGNOSITIC AUDIOLOGY

1. Berlin C. I (Ed) 1996 – Hair cells & hearing aids. Singular Publishing group, London
2. Hood.L. J (1998). Clinical applications of the auditory brainstem response Singular Publishing group Inc. U.S.A
3. Hall J. W III (1992). Handbook of Auditory evoked responses. Allyn & Bacon U.S.A
4. Jacobson J.T (Ed) 1994. Principles & Applications in Auditory evoked potentials Allyn & Bacon U.S.A
5. Katz J (Ed) Volume I – V Handbook of clinical audiology, Lippincott, Williams, Wielkins U.S.A
6. MsPhenson L.D 1995 – Late potentials of the auditory system Singular publishing group
7. Rintelman W.F 1991 – Hearing Assesment, Allyn & Bacon U.S.A
8. Robinette M.S, Glatlke T.J (Eds) 1997. Otoacoustic emissions; Clinical Applications. Thieme N.Y
9. Sahley T.L Nodar R.H; Musiek F.F 1997: Efferent Auditory system: Structure& function. Singular Publishing group Inc.
10. Wiley T.L Fowler C.G 1997; Acoustic Immittance measures in clinical audiology: A primer Singular Publishing group Inc

SH 205 HEARING DEVICES [75 hrs]

Objectives

1. To familiarise the students on various types of devices and advances in technology with respect to amplificatory and implantable devices.
2. To sensitize students in selection strategies and tuning, critically review appropriateness of selected device for the client.

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UNIT 1: **Fundamentals of Digital Signal processing and communication system (15 hrs)**

1. Analogue and digital systems
    - Analogue signal and digital signals
    - Analogue to digital and digital to analogue converters
    - Need and advantages of digital systems and digital signal processing
2. Principles of digital signal processing
    - Digital signal processor – how it works?
    - Basics of IIR and FIR filters and their applications in speech and hearing
3. Fundamentals of communication systems
    - AM transmission and reception and its application in diagnostic equipments
    - FM transmission and reception and its application in FM hearing aids
    - Digital modulation techniques such as delta modulation, PCM,PPM, PWM and their application in speech analysis
    - Satellite communication and its application in tele-rehabilitation

UNIT 2: **Advances in Technology of hearing aids (15hrs)**

1. Principles and working of
    a. Analog, programmable and DSP based hearing aids.
    b. Technology of channel separation
    c. Techniques of non linear amplification and their implementation in hearing aids
    d. Noise reduction using microphone technology
2. Evaluation of hearing aids
    - Electro acoustic characteristics
    - National and international standards
    - Hearing aid evaluation systems and recent advances

UNIT-3 (15 hrs)

1. Selection of special features in hearing aids with reference to specific clients
2. Tinnitus maskers and their utility
3. ALDs:
    - Types: Auditory based, Visual based and Tactile based ALDs

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- Recent advances

UNIT-4 **(15 hrs)**

Cochlear implant

- Description, types, designs and features
- Surgical procedure and biological safety in brief
- Speech processing strategies
- Assessment strategies
- Post operative measurement – NRT, ESRT, EABR
- Mapping
- Outcomes

UNIT-5 **(15 hrs)**

1. Middle ear implant, BAHA, Brainstem implant
   - Description
   - Selection
   - Assessment
   - Management
   - Outcome.

LIST OF BOOKS

SH 205 - Hearing Devices

1. Clark G.M; Cowan B.S; Dowel R.C. (1997). Cochlear Implantation for infants and children: Advances Singular Publishing group Inc
2. Mueller H.G; Hawkins D; Northern C.J (1992). Probe microphone measurements; Hearing aid selection and assessment Singular Publishing group Inc
3. Hersh M.A; Johnson M.A. (2003) – Assistive technology for the hearing impaired, Deaf and deaf blind, Springer, London
4. Sandlin E.R (Ed) 1995, Handbook of hearing aid amplifications. Volume 1. Theoretical & technical considerations Singular Publishing group Inc, London

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5. Sandlin E.R (Ed) (1995) Handbook of hearing aid amplifications. Volume II. Clinical considerations and fitting practices. Singular Publishing group Inc, London
6. Studenbaker G.A; Hochberg I (1993). Acoustical factors affecting hearing aid performance. 2nd edition Allyn & Bacon U.S.A
7. Velente M (1994) Strategies for selecting and verifying hearing aid fittings Thieme N. Y
8. Velente M (1996) Hearing aids standards, options and limitations, Thieme N.Y

SH 206 ADULT LANGUAGE DISORDERS [75 hrs]

Objectives

1. *To equip the student to understand advances in brain and language relationship*
2. *To familiarize the student with respect to advances in assessment and management of various language disorders in adults.*

UNIT- 1: Neuroanatomical and Neurophysiological correlates (15 hrs)

- Anatomy of the Central Nervous system
- Focus on speech, language and hearing related areas; cerebral hemispheres, cerebellum, cranial nerves, brainstem, spinal cord (surface as well as deep structures) and circuits, pathways and blood supply to Central Nervous system.
- Neuronal organization- area as well as function
- Concepts and studies related to : Hemispheric lateralization, Hemispheric Asymmetry
- (Structural + Functional) cerebral plasticity, cerebral maturation & its significance in development.
- Physiology of nerve conduction, Types of synapses, Types of neurotransmitters, Synthesis and activation of neurotransmitters; neurotransmitters in normal and disordered population.
- Neuroanatomical organization in bilinguals and multilingual

UNIT-2 [15 hrs]

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- Neurophysiology of aphasia and related disorders. Language and cerebral dominance. Connectionist explanation of aphasia. Lesion size, lesion location and localization syndromes. Speech language and the brain
- Assessment and diagnosis in Neuro communication disorders. General principle. Testing of verbal comprehension, non verbal skills, verbal expression, and functional communication. Test interpretation, testing right hemisphere function and assessing the bilingual client,
- Different perspectives on aphasia
    - Linguistic, neurological, and cognitive aspects of aphasia
    - Pragmatics aspects of aphasia
    - Aspects of bilingual aphasia
    - Aspects of aphasia in illiterates and sign language users.

UNIT-3 **[15 hrs]**

- Advances in aphasia rehabilitation, (psychological sociolinguistic and pragmatic approaches)
- Assessment of treatment efficacy in aphasia
- Acquired reading and writing disorders

UNIT 4: Neurobiology of Ageing and neurocognition(15 hrs)

- **Neurobiology of Ageing**
    - Neuroanatomical changes with aging, structural changes, morphological changes, microscopic anatomic changes, neurochemical changes.
    - Neurophysiological changes with aging: cerebral blood flow, EEG changes, Evoked Potential changes, Sleep studies.
- **Neurocognition**

    - Neurocognitive models
    - Role of attention and memory – STM, LTM
    - Other processes – Abstraction, Reasoning, Logical aspects, organization, planning and executive processes

UNIT-5 **[15hrs]**

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- Dementia and communication. causes, types and language changes, assessment treatment and long term management
- Traumatic brain injury, consequences of TBI, cognitive-linguistic issues in communication assessment, rehabilitation outcomes.
- Characteristics, assessment, intervention and issues in primary progressive aphasias, sub cortical aphasia, schizophasia and RHD.

LIST OF BOOKS

SH 206 ADULT LANGUAGE DISORDERS

1. Brookshore, R.H. (1992). An Introduction to Neurogenic Communication Disorders (4th Ed.) St. Louis: Mosby Year Book. ISBN 0-8151-1295-5
2. Rose, F.C., Whurr, R. &Wyke, M. A. (1988). Aphasia .(Eds.) London : Whurr. ISBN 1-870332-66-0
3. Johnson, A. F., & Jacobson, (1998). Medical Speech-Language Pathology: A Practioner's Guide. B.H. NY: Theime. ISBN 0-86577-688-1
4. Paradis, M. (1995). Aspects of Bilingual Aphasia.(Ed) Great Yarmouth; Galliard (Printers) Ltd. ISBN 0-08-425704
5. Paradis, M. (1998). Pragmatics in Neurogenic Communication Disorders(Ed), Great Yarmouth; Galliard (Printers) Ltd. ISBN 0-08-043065-1
6. Lesser, R. (1969). Linguistic Intervention in Aphasia. (2nd Ed.)London; Whurr. ISBN 1-870332-77-6
7. Tompkins,C. A. (1995). Right hemisphere Communication Disorders: Theory and Management, California: Singular Publishing Grou, Inc. ISBN 1-56593-176-9
8. Cummins, J. L. & Benson, (1992). Dementia – A Clinical Approach. (2nd Ed.): Whurr. ISBN 1-870332-94-6

SH 207 ADVANCES IN THE MANAGEMENT OF PERSONS WITH HEARING DISORDERS

[75 hrs]

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Objectives

1. To train the student to evaluate and learn specific needs of the client, need for amplificatory / assistive devices, educational, vocational and psychosocial and communicative demands.

2. To prepare the student for programs and intervention strategies as per the different needs of the clients.

3. To equip the student to critically review application of task analysis, program learning techniques wherever required in management of the clients.

UNIT 1 **(15 hrs)**

1. Habilitation of infants and children with hearing impairment
   - Early intervention programs
   - Importance (effect of auditory deprivation and role of auditory plasticity), rationale, Role of care givers
   - Process of informed decisions regarding: selection of method of rehabilitation, choice of amplification, language issue, selection of educational options
   - Alternate modes of intervention: CBR, correspondence programs, distance mode intervention, telepractices
   - Outcome measures
   - Audit of facilities in India
   - Formal education: Pre-school, School, College and vocational training programs
   - Role of audiologist in formal education
   - Technological needs in formal education
   - Tele-rehabilitation

UNIT 2 **(15 hrs)**

1. Management of special groups in respect to amplification / implantable devices, placements and role of caregivers
   - Children and adults with multiple handicap (deaf-blind, neuro-motor, cognition problems, reading-writing problems)
   - Outcome measures

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- Management of children, adults, and geriatrics in respect to amplification/implantable devices, needs of the hearing impaired, role of caregivers.
- Auditory training, preauditory training assessment- speech perception tests.
- Mild-to-moderate hearing loss, unilateral hearing loss
- Sudden hearing loss, progressive hearing loss, fluctuating hearing loss
- Psychosocial measures, Assertiveness training
- Communication strategies
- Outcome measures

UNIT 3 **(15 hrs)**

1. Management of tinnitus
   - Application of audiological findings in management of tinnitus
   - Neurophysiological model
   - Techniques of management including tinnitus retraining therapy
   - Amplification and maskers
   - Counselling
2. Management of hyperacusis
   - Application of audiological findings in management of tinnitus
   - Neurophysiological model
   - Techniques of management including tinnitus retraining therapy
   - Counselling

UNIT 4 **(15 hrs)**

1. Legislations related to education issues of persons with hearing impairment
   - International declarations (such as Biwako millennium framework, Salamanca statement)
   - National acts / policies / schemes (such as PWD act, National Trust Act, SarvaShikshaAbhiyan, DPEP scheme, ADIP scheme)
   - Measures to implement legislations, schemes, policies
   - Role of audiologist

UNIT 5 **(15 hrs)**

1. Management of CAPD cases:

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- Choice of management based on audiological test results,
- Environmental modifications,
- Devices.
- Auditory perceptual training,
- Communications strategies,
- Cognitive\language management,
- Measuring outcomes.

LIST OF BOOKS

SH 207 ADVANCES IN MANAGEMENT OF PERSONS WITH HEARING DISORDERS

1. Alpiner J.G (Ed) 1982 – Handbook of Adult Rehabilitative Audiology – 2nd Edition. William & Welkins U.S.A
2. Alpiner J.G; McCarthy P.A(Ed) 1993 – Rehabilitative Audiology Children & Adults William & Welkins U.S.A, William & Welkins 2000, 3rd Edition
3. Hull R.H (Ed) 2001 – Aural Rehabilitation – serving children and adults, 4th edition, Singular Publishing Group Inc
4. Luxon L.M (Ed) 2001 – Davies R.A (Eds) 1997 – Handbook of vestibular rehabilitation, Whurr Publisher Ltd, London
5. Sanders D.A 1971 – Aural Rehabilitation Prentice Hall, Inc, U.S.A
6. Tye Murray. N 1998 – Foundations of Aural Rehabilitation Singular Publishing Group , Inc, U.S.A
7. Tye Murray. N 2005 – Foundations of Aural Rehabilitation in Children and Adults & their family members (2nd edition) Thomson Delmar Learning Newyork
8. Vernon J.A; Moller A.R (Ed) 1995: Mechanisms of tinnitus, Allyn & Bacon, U.S.A
9. tinnitus, Allyn & Bacon, U.S.A

SH-208- DISSERTATION

SH 209 CLINICAL PRACTICUM- SPEECH LANGUAGE PATHOLOGY

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Objectives

- Should be able to diagnose and manage various communication disorders

1. Should assess 10 clients with childhood language disorders / Adult language disorders/Fluency disorders / Motor speech disorders.
2. Should offer speech language therapy for at least 10 clients with childhood language disorders / Adult language disorders / Fluency disorders/ Motor speech disorders.

SH 210 CLINICAL PRACTICUM- AUDIOLOGY

Objectives

- Should be able to diagnose and manage individuals having auditory disorders

Carry out:

1. Appropriate tests on at least 10 clients having cochlear / retro cochlear / auditory dyssynchrony
2. (C)APD tests on at least 5 clients
3. Multi frequency tympanometry on at least 5 clients
4. ASSR on at least 5 clients
5. MMN / LLR on at least 2 clients
6. Calibration of immittance and ABR
7. Selection of digital / programmable hearing aids for at least 10 clients
8. Rehabilitation programs for clients having tinnitus and hyperacusis

Students should also be exposed to cochlear implant mapping.

2.11. No: of hours per subject

As given under clause “Content of each subject in each year “

2.12. Practical training

As given under clause “Content of each subject in each year “

2.13. Records :

To be maintained for all Practical Work

2.14. Dissertation:

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Synopsis should be submitted to the University within six months of joining the course. Dissertation should be submitted three months before the commencement of second year university Examination. Board of Examinations shall appoint two Faculties for the valuation of Dissertation and the valuation form shall mention "Accepted / Accepted with modification /Rejected." If it is accepted with modifications, candidate will be given 45 days for correction and resubmission through proper channel. If it is rejected it will be send to another external expert for second valuation. If it is again rejected the candidate will not be permitted to appear for the examination. He/she should then redo the work and submit with in a period of six months. Such dissertations will be valued in the examination center itself at the time of practical/clinical examination.

Standard format of dissertation

The dissertation should be submitted in the APA format. The APA format is given in the annexure.

Change of dissertation topic/Guide

As per KUHS Regulations.

Student Teacher Ratio

Student-Guide ratio: 3:1. One teacher can take a maximum of 3 students in each academic year.

2.15. Speciality training if any:

According to the Institution

2.16. Project work to be done if any:

Not Applicable

2.17. Any other requirements [CME, Paper Publishing etc.]

As per council guidelines

2.18. Prescribed/recommended textbooks for each subject

As per syllabus

2.19. Reference books:

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As per syllabus

2.20. Journals

LIST OF JOURNALS FOR REFERENCE IN SUBJECTS RELATED TO SPEECH – LANGUAGE PATHOLOGY

1. Asia pacific Journal of Speech, Language &Hearing
2. Brain
3. Brain andLanguage
4. The cleft palate – Craniofacialjournal
5. Cortex
6. Education &Training in MR & DevelopmentalDisabilities
7. Folia Phoniatrica etLogopaedica
8. International Journal of Lang & CommunicationDisorders
9. Journal of Acoustical Society ofAmerica
10. Journal of Childlanguage
11. Journal of CommunicationDisorders
12. Journal of LearningDisabilities
13. Journal of Speech, Language and HearingResearch
14. Journal ofVoice
15. Language Learning – A journal of research in languagestudies.
16. Language, Speech and Hearing Service inSchool
17. Linguistics and language BehaviourAbstract
18. Otolaryngologic Clinics of NorthAmerica
19. Phonetica
20. Seminars in Speech &Language
21. SpeechCommunication
22. Journal of Medical Speech LanguagePathology

LIST OF JOURNALS FOR REFERENCE IN SUBJECTS RELATED TO AUDIOLOGY

1. JASA (Journal of the Acoustical Society ofAmerica)
2. Ear andHearing
3. Trends inAmplification
4. ScandinavianAudiology
5. American Journal ofAudiology

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6. Audiology and Otoneurology
7. HearingResearch
8. Journal of Speech and HearingResearch
9. Seminars inHearing
10. Archives ofOtolaryngology
11. Voltareview
12. Journal of American Academy ofAudiology
13. The HearingJournal
14. Annals of Otology, Rhinology &Laryngology
15. Journal of Speech and HearingDisorders

2.21. Logbook

To be maintained for all academic work and shall be countersigned by the concerned HOD

3. EXAMINATIONS

3.1. Eligibility to appear for exams

a. Attendance, conduct and condonation option:

Each candidate should put in at least 80% of attendance in Theory class & 80% attendance in Clinical Practicum in each academic year. Failures to put in /meet the required attendance by any student render him/her disqualified to appear in the University exams.

b. Internal Assessment

Theory: It shall be based on periodical assessment, evaluation of student assignment,class presentation etc. Regular examination should be conducted

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throughout the course. Weightage for internal assessment shall be 20% of the total marks in each subject. There shall be three examinations and the third one is University pattern and mandatory to appear. The average of the highest two marks will be taken as 50% of the internal assessment. The remaining 50% of the internal assessment will be based on day to day assessment.

Clinical Practicum: The internal assessment for clinical practicum shall be made by the faculty of concerned departments based on the clinical skills in assessment, remediation, clinical case presentation and clinical viva. The weightage of internal assessment for clinical practicum shall be 50 % of the total marks.

The candidate must secure a minimum of 50% marks for internal assessment in a particular subject in order to be eligible to appear in the university examination of the subject.

The class average of internal assessment marks in each subject should not exceed 75% for regular examinations and 80% for supplementary examination both in theory and clinical practicum.

3.2. Schedule of Regular/Supplementary exams

There will be two examinations in a year (regular and supplementary), to be conducted as per notification issued by university from time to time. Supplementary examination shall be conducted by the university for the benefit of unsuccessful candidates. The supplementary examination shall be conducted within six months from the date of Publication of results.

The particulars of the subjects for various examinations and distributions of marks are shown separately in the scheme of examination.

3.3. Scheme of examination showing maximum marks and minimum marks

There shall be two university examinations in each academic year including regular and supplementary examinations for theory and clinical practicum. Duration of each theory paper shall be for 3 hours.

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Clinical Practicum Examination: There shall be a Clinical Practicum Examination for Speech Language Pathology and Audiology which will be conducted by an internal and external examiner for 50 marks.

A) **Scheme of curriculum for firstyear**

CODES/ PAPER NO	PAPER TITLE	TEACHING HOURS (MINIMU	EXAM DURATION	EXAM MARKS		IA MARKS		TOTAL MARKS
				MAX	MIN	MAX	MIN	
SH 101	Statistics and research methods	75	3	80	40	20	10	100
SH 102	Advances in speech sciences	75	3	80	80	20	10	100
SH 103	Clinical Linguistics	75	3	80	80	20	10	100
SH 104	Auditory Physiology	75	3	80	80	20	10	100
SH 105	Psychophysics of audition	75	3	80	80	20	10	100
SH 106	Voice and Fluency Disorders	75	3	80	80	20	10	100
SH 107	Speech and language Processing	75	3	80	80	20	10	100
SH 108	Clinical Practicum- Speech	15 hours/ week		50	25	50	25	100

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	Language Pathology							
SH 109	Clinical Practicum-Audiology	15 hours/ week		50	25	50	25	100
Total Marks								900

B) **Scheme of curriculum for second year**

CODES/ PAPER NO	PAPER TITLE	TEACHING HOURS (MINIMUM	EXAM DURATION	EXAM MARKS		IA MARKS		TOTAL MARKS
				MAX	MIN	MAX	MIN	
SH 201	Language Acquisition and Language Disorders in Children	75	3	80	40	20	10	100
SH 202	Speech Perception and its disorders	75	3	80	40	20	10	100
SH 203	Clinical phonology and motor speech Disorders	75	3	80	40	20	10	100
SH 204	Diagnostic Audiology	75	3	80	40	20	10	100

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SH 205	Hearing Devices	75	3	80	40	20	10	100
SH 206	Adult Language Disorders	75	3	80	40	20	10	100
SH 207	Advances in the managemen t of Persons with Hearing Disorders	75	3	80	40	20	10	100
SH 208	DISSERTATION Accepted/ Accepted with modification/ Rejected							
SH 209	Clinical Practicum-Speech Language Pathology	15 hours/ week		50	25	50	25	100
SH 210	Clinical Practicum-Audiology	15 hours/ week		50	25	50	25	100
Total Marks								900

3.4. Papers in each year:

As given under clause:2.10 “Content of each subject each year “

3.5. Details of theory exams

As given under clause: 2.10 “Content of each subject in each year “

3.6. Model question paper for each subject with question paper pattern

Question paper setting / pattern

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- Maximum mark for each theory paper shall be80.
- Every theory paper shall comprise of five questions carrying 16 marks withinternal divisions of 8 +8, 10 + 6etc.
- The candidate should answer all thequestions.
- Question paper setters shall be appointed from inside and/or outside theState
- Scrutiny of Question papers shall be done by the subject experts in respectivefaculties.

Q.P Code: **Reg. No: .....**

SECOND YEAR MASLP EXAMINATIONS

(Model Question)

SPEECH PERCEPTION AND ITS DISORDES

Time: 3hrs Max marks: 80

- ***Answer all questions***
- ***Draw diagrams wherever necessary***

Essays: **(5x16=80)**

1. Explain the acoustic theory of speech perception. (16)
2. Describe in detail about the factors affecting dichotic listening. (16)
3. Explain briefly about perception of consonants in hard of hearing. (16)
4. Explain about the perception of speech through cochlear implants. (16)
5. Write short notes on (4+4+4+4)

- Co-articulation
- Memory
- Articulatory synthesis
- Visual word recognition

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Q.P Code: **Reg. No: .....**

SECOND YEAR MASLP EXAMINATIONS

(Model Question)

CLINICAL PHONOLOGY AND NEUROMOTOR SPEECH DISORDERS

Time: 3hrs Max marks: 80

- ***Answer all questions***
- ***Draw diagrams wherever necessary***

Essays: **(5x16=80)**

1. Critically evaluate the theories of phonological development. (16)
2. Explain the efficiency of different treatment methods for phonological disorders with the support of literature. (16)
3. Explain about the functional development of motor control. (16)
4. Describe dysarthria and its types (16)
5. Describe the speech and language characteristics of apraxia of speech. (16)

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Q.P Code: **Reg. No: .....**

SECOND YEAR MASLP EXAMINATIONS

(Model Question)

ADULT LANGUAGE DISORDERS

Time: 3hrs Max marks: 80

- ***Answer all questions***
- ***Draw diagrams wherever necessary***

Essays: **(5x16=80)**

1. Explain in detail about the neurophysiology of language. (16)
2. Explain about the linguistic investigation of aphasia. (16)
3. Define RHD. Explain the language, behavioral and cognitive symptoms of RHD (16)
4. Define and classify dementia. Explain the speech and language characteristics in dementia. (2+6+8)
5. Write short notes on (4+4+4+4)
   - TBI
   - Primary progressive aphasia
   - Sub-cortical aphasia
   - Test of verbal communication in aphasia

3.7. Internal assessment component:

- There shall be of best of minimum 3 examinations and final will be University model and mandate examinations and average will be taken as 50% of the internal assessment

Theory: It shall be based on periodical assessment, evaluation of student assignment, class presentation etc. Regular examination should be conducted throughout the course. Weightage for internal assessment shall be 20% of the total

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marks in each subject. The remaining 50% of the internal assessment will be based on day to day assessment.

Clinical Practicum: The internal assessment for clinical practicum shall be made by the faculty of concerned departments based on the clinical skills in assessment, remediation, clinical case presentation and clinical viva. The weightage of internal assessment for clinical practicum shall be 50 % of the total marks.

The candidate must secure a minimum of 50% marks for internal assessment in a particular subject in order to be eligible to appear in the university examination of the subject.

3.8. Details of practical/clinical practicum exams

See clause 3.4

3.9. Number of examiners needed (Internal & External) and their qualifications

TEACHER: Post Graduation with 2 years of teaching/research/ clinical experience in the respective speciality.

EXAMINER: 5 years of teaching experience in the respective speciality after completion of Post-Graduation.

GUIDE: PhD in speech and hearing / 5 years of teaching experience after MASLP / M Sc. Speech & Hearing / MSc Speech Language Pathology / M Sc. Audiology. One guide can supervise maximum of three dissertations.

3.10. Details of viva:

See clause 3.4

4. INTERNSHIP

Not Applicable

5. ANNEXURES

5.1 Check Lists for Monitoring: Log Book, Seminar Assessment etc. to be formulated by the curriculum committee of the concerned Institution

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