

MASTER OF AUDIOLOGY & SPEECH  
LANGUAGE PATHOLOGY (MASLP)

**REVISED SYLLABUS : 2010-2011**

(ANNUAL SCHEME)

REGULATIONS, NORMS, SCHEME OF EXAM  
AND CURRICULUM

REHABILITATION COUNCIL OF INDIA

(Statutory body under Ministry of Social Justice & Empowerment)

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2009

## RULES REGULAION AND NORMS FOR MASLP

- 1.0 **Nomenclature:** Master of Audiology and Speech Language Pathology [MASLP]  
Revised Syllabus 2010.
- 2.0 **Admission criteria:** BASLP/B.Sc (Sp & Hg)/ B.Sc. (HLS) degree or equivalent (including internship) from any recognized University in India with minimum pass percentage required as per University or RCI norms.
- 3.0 **Medium of instruction:** English.
- 4.0 **Duration of the Course:** Two academic years.
- 5.0 **Course work:** Student to pursue the course as given in the enclosed course curriculum.
- 6.0 **Award of Degree:** The respective University on successful completion of the requirements will award the degree.
- 7.0 **Criteria of passing :** Minimum marks for pass in each paper and practicum will be 50%.
- 8.0 **Attendance:** Each year shall be taken as a unit for purpose of calculating attendance and a student shall be considered to have put in required attendance for the year, if he/she has attended not less than 80% of the number of working periods (lectures, seminars) and 90% of clinics during each year. Failure to put in / meet the required attendance by any student render him / her disqualified to appear in the University examination. The candidate who will not be able to take the examination for want of attendance will be declared as Failed and will have to repeat the exam subsequently by putting in required attendance. Shortage of attendance can be condoned in genuine cases of absenteeism as per rule and guidelines of respective University.
- 9.0 **Appearance for the Examination:** A candidate shall apply for all papers of a year when he/she appears for the examination of that year for the first time.

If candidate is failing one or more subject (s), he/she will be appearing for respective subjects (s) only (Theory/Practical Subject)

## **10.0 Scheme of Examination**

- 10.1 There shall be a University examination at the end of each year. The duration of the theory exam is 03 hours.
- 10.2 Every theory question paper shall ordinarily consist of five questions with one question for each unit, subject to the concerned universities regulation.
- 10.3 In case of theory papers the continuous evaluation (IA) will be for 20 marks. This covers a maximum of 5 marks for attendance & 15 marks for tests, seminars, assignments etc.
- 10.4 For clinical practicum, continuous evaluation (IA) will be based on performance of the candidate during the year. Examination for clinical practicum will be held along with theory papers by the university.
- 10.5 The concerned department shall notify in the first week of each year, scheme of continuous evaluation (IA) for theory & practical.
- 10.6 At least one week prior to the last working day, continuous evaluation (IA) marks secured by the candidates shall be displayed on the notice board.
- 10.7 The Department or the council may at their discretion decide to give repeat test/seminar to candidates who absented themselves for the same when the council is convinced that the absence of the candidate is on valid grounds/reasons. However, the council can allow the candidate to avail this provision only within the duration of that year.
- 10.8 The statement of continuous evaluation (IA) shall be sent to the Registrar (Evaluation) for both theory and clinical practicum at least one week prior to the commencement of the particular year examination.

## **11.0 Practicals**

At the end of 1<sup>st</sup> and 2<sup>nd</sup> years internal viva voce exam will be carried out for award of internal assessment for clinical work performed throughout the year.

## **12.0 Dissertation**

In the 2<sup>nd</sup> year, student will work on a selected topic of dissertation prepared under supervision and guidance of recognized faculty and will submit the same at the end of the year. This shall be assessed by one internal and one external examiners for 100 marks in which event the average of marks assigned by both the examiner shall be awarded to the candidate or it shall be assessed as accepted or as rejected with no marks carried there of as per concerned University norm. In the event of discrepancy between internal & external examiners the dissertation will be referred to a third examiner and his/her verdict on same will be taken as final.

The candidates shall submit four copies of dissertation before the commencement of the theory examination of that year. Candidates who fail to submit their

dissertation on or before the stipulated date shall not be permitted to appear for the final year examination.

### **13.0 Scheme Of Instruction**

13.1 In each year there shall be seven theory (7) papers. The deled scheme of examination and paper titles are as given in Annexure 1

13.2 Dissertation shall be addition to a theory papers.

13.3 The topic content of each paper shall as far as possible be arranged as five equal units

13.4 Hours of instruction (contact hours) per week

Theory	:	3 hours per subject per week
Practical	:	15 hours per week

### **14.0 Board of Examiners, Valuation**

14.1 There shall be Board of Examiners for scrutinizing and approving the question papers and scheme of valuation

14.2 About 50% of the examiners for scrutinizing and approving the question papers and scheme of valuation shall be from outside the institution/university.

14.3 Double valuation for the theory; dissertation and the average of the marks awarded by the internal and external examiners shall be taken as the final award.

14.4 In case of 20% or more deviation in the marks awarded by the internal and the external valuer, the scripts shall be referred to the third valuer and his evaluation will be final.

14.5 Grace marks to the candidate will be awarded based on University rules.

### **15.0 Classification of Successful Candidates**

15.1 Minimum for a pass in each paper shall be as per the concerned university regulations.

15.2 Grading:	
≥ 40 < 50%	Pass Class
≥ 50 < 60%	Second Class
≥ 60 < 75%	First Class
75% and above	Distinction

OR

As per rules of the respective universities.

15.3 Announcement of result. Classes and ranks for the course as a whole will be as per the concerned university regulations.

## 16.0 Provision for Repeaters

The provision will be as per the concerned university regulations.

## 17.0 Miscellaneous

Any other issue not envisaged above shall be resolved by RCI/ the Vice Chancellor in consultation with the appropriate body of the University which shall be final and binding.

## 18.0 Norms for Minimum Infrastructural Facilities:

1.	Faculty/ Personnel	BASLP (20 Seats)	BASLP (20+20 Seats)	BASLP + MASLP (20+10 Seats)	BASLP + MASLP/(Aud ) /M.Sc. (SLP) (40+15 Seats)	M.Sc (Aud.)/M.Sc. (SLP) as addition to BASLP (40 Seats) & MASLP (15) with 10 seats for each specialized M.Sc
		(Column 1)	(Column 2)	(Column 3)	(Column 4)	(Column 5)
a.	Full time					
	Professor			1 Professor or 2Reader	1 Professor or 3 Reader	1 Professor or 1 Reader in each PG specialization in addition to that given in Column 4
	Reader or equivalent	1	1	1	1	1
	Lecturer	3	3+1	5	6	+2 in addition to that given in Column 4
	Speech Pathologist/Au diologist (Grade I) (Clinical supervisor)	1	1+2	4	6	+2 in addition to that given in Column 4
	Speech Pathologist/Au diologist (Grade II)	2	2+1	2	4	4
	Lecturer in Clinical psychology- part time	1	1	1	1	1
	One Medical faculty as per requirement of the paper – Part Time	1	1	1	1	1
	Lecturer in Linguistics– part time	1	1	1	1	1
	Electronic Engineer	1	1	1	1	1

	Ear Mould Technician	1	1	1	1	1
	Librarian/Staff	1+1	1+1	1+1	1+1	1+1
b.	Visiting faculty for Anatomy and Physiology	1	1	1	1	1

**NOTE :**

1. Minimum of 2 faculty members in core areas will be required for giving recognition for the first year.
2. Before the commencement of second academic year one more lecturer must be appointed.
3. Before the commencement of third academic year one Reader must be appointed.
4. Only on completion of three batches of BASLP, an Institution becomes eligible to increase the intake provided infrastructure is increased as per laid down norms of RCI. Institute will be eligible to apply for starting MASLP course after the 1<sup>st</sup> batch of BASLP passes out, i.e.; after 4 years of starting BASLP course subject to recommendation of Inspection Team/Visiting Expert.
5. In case of Professor not being available, 2 Readers are appointed to accommodate research guidance and administrative work.
6. All reservations in admission will apply as per Govt. rules for aided and Govt. institutions. The infrastructure will have to be enhanced as per the the seats getting increased under reservation policy.

Designation	Qualification		Experience		Publications
	Essential	Desirable	Essential	Desirable	
Professor		Ph. D (Sp. & Hg)	10 Years teaching experience in the field		Essential
Reader/ Associate Professor	Ph. D (Sp & Hg) or M.Sc. (Sp & Hg) with equivalent work by publication and research	Ph.D (Sp & Hg)	5 Year of teaching / research/clinical experience with graduate/ post graduate courses		Essential
Lecturer / Associate Professor	M.Sc. (Sp & Hg)	Ph. D. (Sp & Hg)	2 years clinical / research experience	Teaching experience	
Speech Pathologist /Audiologist Grade I	M.Sc. (Sp & Hg)				
Speech Pathologist/ Audiologist Grade II	B.Sc (Sp & Hg)	M.Sc. (Sp & Hg)			

### **18.1. Clinical Facilities**

Facilities for diagnostic evaluation of speech, language, voice, hearing and associated disorders, both functional and organically based. Clients of all age groups with hearing impairment and clients with speech and language disorders.

Load and variety of clients should be commensurate with number of courses conducted and also to meet the clinical practicum requirement of each year of the course.

### **18.2. Library Facilities:**

Library should accommodate at least, 30% of the institution's students and staff total strength. Library should have internet and photocopying facilities.

- a) **Reading room** : Two reading rooms should be there
  - (i) Reference room with CBTIV and internet provisions
  - (ii) General Reading room
- b) **No. of books:** Books listed for each paper under "essential" should be available.

c) **No. of Journals:** There should be at least 5 most essential journals (2 each in Speech & Audiology and 1 general) for BASLP and 8 at MASLP levels (4 each for Speech & Audiology).

d) **Staff :**

(i) Library and Information Officer – One No.

Qualifications: B.Lib with two years of experience in handling technical library using Information Technology

(ii) Library Assistants: One

Qualifications: SSLC + Diploma in Library Sciences or SSLC + JOC in Library Sciences.

All the facilities may be increased to meet the requirements in a phased manner

**18.3. Audiovisual Instruments:** Appropriate instruments as per No. and level of course should be provided.

**18.4. Space:**

Sr. No.		Size (Sq.Ft.)	Graduate	Graduate and PG
a)	Class Rooms	Size Shold be adequate to accomodagte (9 sq. ft.per student)	Half the No. of total batches/course (Min.2 class room)	Half the No. of total batches/course (Additional 1 room for each PG course)
b)	Room for reception where patients are registered.			
c)	Room for case history, Speech Diagnostic Room and Interviews	(6 × 6)	5 for 20 intake and 8 for 40 intake	With one PG course 12 and with each additional PG 2 extra
d)	Speech Lab (Quiet Room) for diagnostic purposes.	(15 × 20)	1	1+1
e)	Recording room (Sound Proof)	(10 × 10)	1	1
f)	Speech Therapy Room/Cabhins	(6 × 6)	12 *to accommodate 50% of the student)	12
g)	-Single sound treated room. -Two Room Audiometric suite	(10 × 18)	For 20 Intake one room and for 40-two rooms	For each of PG program i.e. MASLP –one room extra
h)	Room for hearing aid trial combination purpose.	(10 × 15)	1	1+1
i)	Earmould Lab	(15 × 20)	1	1
j)	Staff Room	As per staff strength (min size 15 × 20)	1	-
k)	Individual work space (with provision for storage facilities)	(10 × 10)		



L)	Hearing aid repair lab	(10 × 10)		
m)	Principal's Office room	(12 × 16)		
n)	Sanitary facilities	As per requirement separate facilities for girl and boy students and staff		
o)	Hostels for Men and Women to accommodate at least 50% of the student population			
p)	Administrative staff room.			

### 18.5. Equipment (Minimum Requirement):

Sr. No.		Graduate	Graduate and PG
<b>Audiology</b>			
a)	2 channel Diagnostic Audiometer with Accessories such as earphone, ear cushion combination with adjustable headband, B.C. vibrator, transducers like microphone and matching loud speakers	1	1+1 and for Audiology specialization course one extra
b)	Portable Audiometer with provision of A.C. and B.C. testing : desirable screening audiometer	1 for each batch	1 + 1
c)	Clinical Immittance Audiometer (Desk model) with accessories.	2 instruments essential preferably one with screening type for field work. For 40 – three are required	1 more for MASLP and extra one for M.Sc. (Audio.)
d)	Portable/Screening impedance, audiometer	1	1 + 2
e)	Clinical BSEAR	1	1 + 1 (For M.Sc. [Audio.] stacked ABR and VEMP) are additions]
f)	Otoacoustic emission	1	1 more (one screening and two table models)
g)	Calibration equipment for AC, BC and free field (by possession or access)		
h)	Different types of Hearing Aids of mild moderate and strong categories body level and ear level, canal and spectacle hearing aid (1 each), FM, Digital, Programmable aids, ILS Assistive listening devices.	A representative sample of hearing aids and assistive devices	Software programs for HAT
i)	IGO and HAT for hearing aid trial and making electroacoustic measurements.	1	1
j)	Stop watch	2	2 more
k)	Oto scope	2	2 more

<b>l)</b>	Proformae		
<b>m)</b>	Auditory training and Screening material		
<b>n)</b>	Ear Mould Lab-fully equipped	UV Labs for Soft mould for PG course	

<b>Speech Pathology</b>			
<b>a)</b>	Speech and Language Tests (Tests for differential diagnosis) (English and local language)	As per course requirement	As per course requirement
<b>b)</b>	Proformae		
<b>c)</b>	Speech Therapy material (Indian, Language and English)		
<b>d)</b>	Toys and Book		
<b>e)</b>	Mirrors – Size 2'×3'	4	6
<b>f)</b>	Speech Trainer	1	2
<b>g)</b>	Portable and Digital tape recorders	4	6
<b>h)</b>	Hi-Fi Ampli Deck with speakers and good microphone	1	2
<b>i)</b>	Exporopgraph/Aerophone	1	1+1 (for M.sc-SLP)
<b>j)</b>	Computer PC-AT with VGA Color Monitor	1	3
<b>K)</b>	Software for diagnostic/therapeutic use	1	1
<b>l)</b>	Endostroboscope	-	One for M.Sc (SLP)
<b>m)</b>	EKG	1	1
<b>n)</b>	Stop Watch	2	4
<b>o)</b>	Audio cassettes for training/CDs		
<b>p)</b>	Pitch pipe		
<b>q)</b>	Tongue depressors	3	5

## COURSE CONTENT

### 1 Year

Code no.	Paper Title	Theory Hrs/wk	Total (Theory+ IA)
SH 101	Statistics & Research Methods	03 Hrs	80 + 20
SH 102	Clinical Linguistics	03 Hrs	80 + 20
SH 103	Speech Science and Production	03 Hrs	80 + 20
SH 104	Speech & Language Processing	03 Hrs	80 + 20
SH 105	Voice and Fluency Disorders	03 Hrs	80 + 20
SH 106	PsychoPhysics	03 Hrs	80 + 20
SH 107	Auditory Physiology	03 Hrs	80 + 20
SH 108	Clinical Practicum (Speech- Language)	15 Hrs	- + 100
SH 109	Clinical Practicum (Audiology)		- + 100
SH 110	1) Clinical Practicum Examination- Audiology		50
	2) Clinical Practicum Exam – Speech Language & Pathology		50
	Grand Total		1000

### II Year

Code no.	Paper Title	Theory Hrs/wk	Total (Theory+ IA)
SH 201	Language Acquisition and Language Disorders in children	04 Hrs	80 + 20
SH 202	Adult Language Disorders	04 Hrs	80 + 20
SH 203	Clinical Phonology and Motor Speech Disorders	04 Hrs	80 + 20
SH 204	Speech Perception and its Disorders	04 Hrs	80 + 20
SH 205	Diagnostic Audiology	04 Hrs	80 + 20
SH 206	Hearing Devices	04 Hrs	80 + 20
SH 207	Advances in Management of Persons with Hearing Disorders	04 Hrs	80 + 20
SH 208	Dissertation	04 Hrs	Accept/Reject
SH 209	Clinical Practicum (Speech- Language)	15 Hrs	- + 100
SH 210	Clinical Practicum (Audiology)		- + 100
SH 211	1) Clinical Practicum Examination- Audiology		50
	2) Clinical Practicum Exam – Speech Language & Pathology		50
	Grand Total		1000

\* Dissertation will be assessed by two examiners (internal and external examiners).  
Dissertation will carry no marks and will be judged for acceptance.

## I Year Course Content

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.*
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.

- 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.
- 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.

## LIST OF BOOKS

### SH 101

### STATISTICS AND RESEARCH METHODS

Hegde, M. N. (2006). Clinical Research in Communicative Disorders [2<sup>nd</sup> Edition] Principles and strategies. Singular Publishing.

Mary & Grace. Introduction to Clinical Research in Communication Disorders.

Pannbacker, M. H., & Middleton, G. F. (1994). Introduction to Clinical Research in Communication Disorders, San Diego: Singular Publishing.

Maxwell, D. L., & Satake, E. (1997). Research and Statistical Methods in communicative disorders. Baltimore: Williams and Wilkins.

Stein, F., & Cutler, S. K. (1996). Clinical Research in Allied Health and Special Education. San Diego: Singular Publishing Group Inc.

Portney, L.G. and Walkins, M. P. (1993). Foundations of Clinical Research. Connection: Appleton and Lange. ISBN 0-8385-1065-5

Woods, A. Fletcher, P and Hughes, a (1986). Statistics in Language studies. Cambridge: University Press ISBN 0-521-253268.

**Objectives**

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

**UNIT 1**

(15 hrs)

- Language acquisition, semantics, syntax pragmatics, theoretical issues, 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- ad 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.



## LIST OF BOOKS

### SH 102: CLINICAL LINGUISTICS

Crystal, D., (1981). *Clinical Linguistics*. Wien, Springer-verlag.

Geoffrey Finch (1997) *How to study Linguistics*. Palgrave Macmillan

Grundy, K (1981.) *Linguistics in Clinical practice*. Whurr Publishers Ltd. London.

Grunwell, O., (1975). *The phonological Analysis of Articulation Disorders*. BJDC, 10, 31-42.

Lawrence D Shriberg & Raymond D Kent (2003). *Clinical phonet*. Pearson Education Inc.

Perkins, M, & Howards, S., (ED) (1995). *Case Studies In Clinical Linguistics*. Whurr Publishers Ltd. London.

Reni Dirven & Marjolijn Verspoar. *Cognitive Exploration of language & Linguistics* (2004). John Benjamin Publishing Company.

Ziegler, W., & Dger, K., (1998). *Clinical Phonetics and Linguistics*. Wherr Publishers Ltd. London.

Whitaker, A>H> & mmer, B., (Ed) (1998) *Handbook of Neurolinguistics*. Academic Press, US.

**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.*

**Physiology of speech and voice****UNIT 1**

(15 hrs)

- Physiology of speech – physiology of respiration, purpose of respiration, description of respiratory movements, types of respiration, methods of respiratory analysis
- Physiology of laryngeal function – muscles of larynx, laryngeal movement.
- Vocal fold physiology, neurophysiology of the larynx, vibratory modes of vocal folds.
- Models of vocal fold vibration – one mass model, two mass model, multiple mass model, EGG Model, simple Unitary mass model, triangular Unitary mass model.
- Development of the vocal fold
- Mechanical properties of the vocal fold vibration (stress strain relation, whip like motion, effects of impact stress).

**UNIT 2**

(15 hrs)

- Neurophysiological bases of speech, Neuromotor mechanism of the articulatory, phonatory and respiratory systems. Neuro-Physiology of larynx and vocal mechanism in relation to production of voice/speech

**UNIT 3**

(15 hrs)

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

## **UNIT 4**

(15 hrs)

- Acoustics of speech – Acoustic theory of speech production, Acoustic phonetics, Basics, acoustics of vowels and consonants, review and state of the art.
- Spectrography – various types of spectrograms, spectrographic cues for vowels and consonants, identification of place, manner, voicing and aspiration using wide band bar type spectrogram.
- Application of spectrography in basic and applied research.

## **UNIT 5**

(15hrs)

### Techniques of speech processing and analysis

- Short time speech analysis techniques, speech coding techniques
- Voice response system
- Speaker recognition system and speech recognition system
- Speech synthesis methods
- Speech analysis in forensic sciences.
- Infant cry – History, 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 103

### SPEECH SCIENCE AND PRODUCTION

- Ainsworth, W.A. (1988). Speech recognition by machine, London Peter Pen prints
- Ainsworth W. A. (Ed.). (1990). Advances in Speech, Hearing and Language Processing Research Annuals: Vol. 1, London, Jaipress
- Baber. C., & Noyes. J. M. (1993). Interactive Speech Technology Human latest technique with Application of Speech input output to computers. London Taylor and Francis
- Haton. J. P. (Eds) (1981) Automatic speech analysis & Recognition. USA. D. Reidel Publishing Company
- Hawley. M. E. (1977) Speech intelligibility & Speaker Recognition. Pennsylvania Dowden Hutchinson & Ross Inc.
- Nakagawa. S & etal (1995) Speech, Hearing and Neural Network Models. Oxford: IOS. Press
- Nolon, F (1983) The phonetic basis of SPeker recognition; Cambridge. Cambridge University Press
- Baer, T et al., (Eds) (1991). Laryngeal function in phonation and respiration. Singular Publishing Group, San Diego.
- Baken, R.J and Daniloff, R.G. (1991). Reading in Clinical spectrography of speech. Singular Publishing Group, San Diego.
- Code, C. & Ball, M. (1984). Experimental Clinical Acoustics. College Hill Press. Houston.
- Kent, R.D., & Read, C. (1992). Acoustic analysis of speech. Singular Publishing Group, San Diego.
- 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
- Kent R.D & Read C 1995. The acoustic analysis of speech, A.I.T.B.S Publishers &
- Lass, N.J (1976). Contemporary issues in experimental phonetics. Academic Press, New York.
- Lieberman, P., & Blustein, S. ( 1988). Speech Physiology, speech perception and Acoustic phonetics. Cambridge University press. Cambridge.
- Murry, T. & Murry, J (1980). Infant communication: Cry and early speech. College – Hill Press, Houston.
- Nolon, F. (1983). The phonetic basis of speaker recognition. Cambridge. University press, Cambridge.
- Potter, R.K., Kopp, G.A., & Green, H.G. (1966). Visible speech. Dover Publications, New York.

**Objectives**

*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 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 104 SPEECH & LANGUAGE PROCESSING

Arbib, M.A. Caplan, D., & Marshall, J.C., (Ed) (1982). Neural Models of Language Processes, Academic Press, New York.

Durrand, and Laks, B., (Ed) (1999). Phonetics, Phonology and Cognition. Oxford University Press, US.

Hardcastle, W.J., & Laver, J., (Ed) (1999). The Handbook of Phonetic Sciences. Blackwell Publishers, Oxford.

Kroeger, R.P. (2004). Analyzing Syntax. Cambridge University Press, UK.

O' Shaughnessy, D., (2<sup>nd</sup> Edition) (2001). Speech Communication, Human and Machine. Universities Press, India.

Saeed, I.J. (1997). Semantics. Blackwell Publishers, Massachusetts.

#### SH 105 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.*
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)

- Pathophysiological changes in different voice disorders.
- Acoustic, aerodynamic and perceptual aspects of pathological voices
- Paediatric voice disorders
- Effects of ageing in voice
- Neurogenic voice disorders- Differential diagnosis and management.
- Endocrinal Voice disorders and voice disorders related to transsexuals.
- Issues related to professional voice and its care

## **UNIT 3**

(15 hrs)

- Laryngectomy & Pathophysiology of larynx
- Treatment-medical, surgical and therapeutic (including radiation therapy, chemotherapy, pre-postoperative counseling)
- 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 –  
1. Development, 2 theories, 3. Spontaneous recovery
- Perspectives in fluency disorders (developmental, childhood and adult)
- Neuro anatomical, neurophysiologic and auditory processing aspects of fluency disorders.
- Current linguistic theories, linguistic and metalinguistic aspects of fluency disorders.

- articulatory dynamics, laryngeal dynamics, prosodic, speech motor control viewpoints in stuttering.
- Nature, characteristics, differential diagnosis, and current status of:
- Normal Non fluency
- Cluttering
- Neurogenic stuttering
- Drug-Induced stuttering

## **UNIT 5**

(15 hrs)

- Assessment and diagnosis.
- Severity of stuttering –theoretical foundations and methods
- Prevention, relapse of stuttering, Naturalness, QOL and related issues
- Review of recent advances of therapy in stuttering.
- Evidence based management of children and adults with stuttering.
- Efficacy and out come measures of stuttering therapy

### **LIST OF BOOKS**

#### **SH 105**

#### **VOICE AND FLUNECY DISORDERS**

Vocal Fold Physiology – Frontiers in Basic Science [1993]. Titze I..R. [ed] San Diego: Singular Publishing Group Inc.

Principles of Voice Production [1994] Titze, I.R. NJ: Prentice Hall Inc.

Neurolaryngology: Recent Advances [1991] Hirano, M. Kirchner, J. A. and Bless, D. M. {Eds} California: Singular Publishing Group, Inc.

Diagnosis and Treatment of Voice Disorders [1995], Rubin J. S. Sataloff R. T. Korovin, G. S and Gould, W. J. NY:IGAKU-SHOIN Medical Publishiers, Inc.

Medical Speech-Language Pathology – A Practioner’s Guide [1998] Johnson, A. F. and Jacobson, B H NY: Thieme, Inc.

Clinical Measurement of Speech and Voice [1996] Baken, R J California: Singular Publishing Group, Inc.



Professional Voice – The Science and Art of Clinical Care [1991] Sataloff, R T NY: Raven Press.

Clinical Manual for Laryngectomy and Head and Neck Cancer Rehabilitation [1993]. Casper, J. K. and Colton, R. H. California: Singular Publishing Group, Inc.

Atlas of Laryngoscopy [2007]. Sataloff. R. T. Eller, R. T. and Hawkshaw, M. California: Plural Publishing, Inc.

Voice and Voice Therapy [2005] Boone, D R Mc Farlane S C and Von Berg S. L Boston: Allyn and Bacon.

Laryngeal Electromyography [2006] Satalof, R. T. Mandel S, Abaza, M California: Plural Publishing, Inc.

Vocal Care in Medical Setting [1997] Koschkee, D. L. Rammage, L. California: Plural Publishing Group, Inc.

## **FLUENCY DISORDERS**

Bloodstain, 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.

**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**

(15hrs)

- Theory of signal detection,
- Concept and application including ROC
- Methods in psycho Physics classical & adaptive
- MAP & MAF underwater hearing, relation to calibration Loudness perception, equal loudness level contours loudness and loudness level, scaling
- Factors affecting loudness, Theories, models of loudness
- Weber's Law, Differential sensitivity for intensity, absolute and relative DL,
- 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,
- equivalent rectangular band concept,
- frequency resolution, excitation pattern,
- Masking, PTC, using simultaneous and non simultaneous maskers, central masking, pulsation threshold, profile analysis, MDI
- Clinical application

**UNIT 3**

(15 hrs)

- Temporal perception,
- 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 application.

- Adaptation and fatigue,
- Levels of adaptation & physiology
- Methods to study
- Parameters affecting
- Clinical applications
- Path physiology of fatigue

#### **UNIT4**

(15 hrs)

- Pitch perception, factors affecting
- Ohm's law, Neurophysiologic basis
- Theories and models, consonance
- Dissonance, pitch of complex tones
- 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
- MLD
- Lateralization, binaural integration, binaural advantage
- Binaural DLF,DLI, DLT, squelch, beats, rotating tones
- Time intensity trade
- Durlach and Jeffress models
- Clinical application
- Space perception
- Localization
- Minimal audible angle
- Role of pinna
- Cone of confusion
- Monaural localization
- Clinical application

## LIST OF BOOKS

SH 106

## PSYCHO Physics

Yost WA & Neilson DW -"Fundamentals of Hearing" Holt Rinehart & Winston 1977

Yost; W.A. Popper A.N. Fay R.R – Human Psychophysics" - Springer Verlag \_1993

Gelfand. SA "Hearing,An Introduction to Psychological & Physiological acoustics

"Marcel Dekker Inc. 1990 & 1981.

Pickles, J. O. "An Introduction to the Physiology of hearing" Academic Press London, 1984

Zwicker E. Fastl H. "Psychoacoustics - Facts & Models" Springer -1999

Durrant – Lovrinic 1997 "Basics of Hearing Sciences" – Williams & Wilkins 3<sup>rd</sup> Edition

Maore B C J (Eds) 1995 Hearing – Academic Press, San Diego

Gullick W. C 1971. Hearing Physiology & Psychophyscis, Oxford University Press N.Y.

Palmer A.R. Rees A, Summerfield AQ Meddis K"Psychophysical and Physiological Advances in hearing – Whurr Puablication 1998

Syka Joel." Acoustical Signal Processing in the central Auditory System" Plenum Press 1997.

Bekersy G.Von "Experiments in Hearings" Mc Graw Hill 1960

Hanghton Piter "Acoustics for Audiologists" Academic Press 2002

Warren R.M. 1999. Auditory Perception-A new Analysis and synthesis U

Rosenthal DF & Okiano H G "Computational Auditory Scene Analysis" Lawrence Erlbaun Associates, Publishers 1998.

Hawkins H L, Mc Muller TA, Popper A N, Fay R R "Auditory Computation" Springer Verlag 1996.

Yost "Directional Hearing" – Wiley 2000

Hirsh S K, Eldredge DH, Hirsh F J & Silverman R. "Hearing & Davis" Washington University Press 1976. K: Cambridge University Press, U.K.

**Objectives**

1. *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**

(15 hours)

## 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 external ear
- Developmental changes
- Application to clinical audiology
- 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- Cochlea: Anatomy in lower animals and humans**

(15 hours)

- Macro & Microanatomy
- Blood supply
- 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
- Proteins in the cochlea
- Pathophysiology & perception
- Repair, regeneration, protection in the cochlea
- Theories of hearing
  - Historical aspects
  - Place theory – resonance & non-resonance
  - Frequency theory
  - Travelling wave theory
  - Other recent advance motor theory etc

### **UNIT 3 – Auditory nerve**

(15 hrs)

- 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

### **Vestibular System**

- Anatomy and physiology of vestibular structures and vestibular nerve
- Integration of senses in balance
- Vestibule ocular reflex
- Vestibule spinal reflex

### **UNIT 4 - Brain stem**

(15 hrs)

- Anatomy of CN, types of cells distribution
- Anatomy of SOC, LL,IC,MGB
- Non classical pathway
- Tonotopic organization
- Neurophysiology at different levels

- Localization
- Stimulus coding, neurotransmitters
- Medial and lateral efferent effect on cochlear physiology ,Auditory Nerve and CN
- Plasticity

**UNIT 5 – Auditory cortex**

(15 hrs)

- Anatomy and tonotopic organization of primary and secondary auditory areas and efferent pathways, neurotransmitters
- Neurobiological relationship between auditory cortex and other areas
- Neurophysiology of auditory areas
- Stimulus coding – frequency, intensity and time
- Role of auditory cortex in localization
- Plasticity

## LIST OF BOOKS

### SH 107 Auditory Physiology

- Berlin C.I; Weyand T.G (Eds) 2003 – The Brain & sensory plasticity: Language acquisition and hearing. Thomson/Delmer Learning
- Bellies T.J 2003 – Assessment & Management of central auditory processing disorders in the educational setting from science to practice. Singular Publishing Group. USA
- Ehret G. Romand R (Eds) 1997: The central auditory system. Oxford University Press, New York
- McPherson D.L 1996 – Late potentials of the auditory system. Singular Publishing Group. Inc
- Palmer A.R; Rees A; Summerfield A Q; Meddis R (Eds) 1998, Psychophysical & Physiological advances in hearing. Whurr Publishers Ltd, London
- Parks T.N; Rubel E.W; Fay R.R; Popper A.N (Eds) 2004. Plasticity of the auditory system. Springer, New York
- Popper A.N; Fay R.R (Eds) 1992: The mammalian auditory pathway: Neurophysiology. Springer – Verlay, N.Y.
- Rerben E.W; Popper A.N; Fay R.R (Eds) 1998. Development of the Auditory System. Springer – Verlay, N.Y.
- Sahley T.L; Nodar R.H; Musiek F.E 1997, Efferent auditory system structure and function - Singular Publishing Group. USA
- Syka. J(Ed) 1997 – Acoustical signal processing in the central auditory system Plenum Press
- Wada. H; Tukasade T; Ikeda. K; Ohyama K; Koiki T (Eds) 2000. Recent developments in auditory machines World Scientific Publishing Co.
- Webster D.B; Popper A.N; Fay R.R (Eds) 1992. The Mammalian Auditory Pathway – Neuroanatomy Springer – Verlag, N.Y
- Auw. W.L., Popper.A.N. Fay.R.R (Ed) 2000: Hearing by whales & Dolphins. Springer- Venlag, New York, USA.
- Berlin.C.I. (Ed) 1996: Hair cells & Hearing aids, Singular Publishing group. Inc., USA.
- Bekesy.G.V. (1960): Experiments in hearing McGraw-Hill Book Company.
- Dallos.P. Popper.A.W., Fry.R.R (Ed) 1996: The Cochlea, Springer-Venlag, New York, USA.
- Davis (1990): Hearing, Washington University.
- Durant, J.D & Lovrinic.J.H (1977): Bases of hearing Sciences. Williams & Wilkins.



**SH 108 CLINICAL PRACTICUM- SPEECH LANGUAGE PATHOLOGY [15 hrs/week]**

**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.

## II Year

### SH 201 LANGUAGE ACQUISITION AND LANGUAGE DISORDERS IN CHILDREN

[75 hrs]

#### **Objectives**

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

Critical review of current theories of language acquisition and its applications to assessment and intervention. Overview of genetic, neuro anatomical and neurophysiological correlates of language development.

#### **UNIT 2**

[15 hrs]

Language development in exceptional circumstances extreme deprivation, bilingual language acquisition, visual handicap, Mental retardation, Williams's syndrome, hearing loss, language learning disabilities and dysphasia and acquired childhood aphasia.

#### **UNIT 3**

[15 hrs]

Contemporary concept and issues in Autism Spectrum disorders, SLI, and LD.

#### **UNIT 4**

[15 hrs]

- Cross cultural consideration in assessment and management of developmental language disorders
- Specific assessment and intervention approaches for various developmental language disorders

#### **UNIT 5**

[15 hrs]

Dyslexia, Neurobiology of reading and writing, Metalinguistics - Phonological awareness, reading etc. Evaluation and treatment approaches.

## LIST OF BOOKS

### SH 201 LANGUAGE ACQUISITION AND LANGUAGE DISORDERS IN CHILDREN.

Intervention Planning for Children with Communication Disorders – A Guide for clinical practicum and professional practice (1994). Prentice – Hall, Inc. New Jersey.

Cross Cultural Perspective in Language Assessment and Intervention. Topics in Language Disorder series. Butler, K.G. (1994). U.S.A.: Aspen Publication.

Differential Diagnosis in Speech Language Pathology – Philips, B.J. and Scello, D. (1998). Butterworth- Heinemann,

Language Development in Exceptional Circumstances. Bishop, D and Mogord, K. (EDs.) (1993). U.K.: Erlbaum Associates Ltd., Publishers

Language Disorders: A functional Approach to Assessment and Intervention. Owens, R.E. (Jr.) (1991). U.S.A.: Macmillan Publishing Company

Development disorders of language (2<sup>nd</sup> ed.) Adams, c., Browns, B and Edwards, M (1999). London: Whurr Publishers Ltd.

Evaluating Theories of Language - Evidence from disordered communication. Dodd, B., Campbell. R. and Worrall, L (Eds). (1996). London: Whurr Publishers.

Childhood language disorders in contest – infancy through adolescence. Allyn and Bacon, Boston. Nelson, N.W. (1998).

**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) in human beings and animals.
- 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]

- 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, cognitive etc), pragmatics. Aspects of bilingual aphasia in illiterates and sign language users.

### **UNIT 3**

[15 hrs]

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

### **UNIT 4: Neurobiology of Ageing and neurocognition**

(15 hrs)

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

### **UNIT 5**

[15hrs]

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.

Other adult language disorders (characteristic assessment, intervention and issue in primary progressive aphasia, sub cortical aphasia, schizophrenia and RHD).

## **LIST OF BOOKS**

**SH 202**

### **ADULT LANGUAGE DISORDERS**

An Introduction to Neurogenic Communication Disorders (4<sup>th</sup> Ed.) (1992). Brookshire, R.H. St.Louis: Mosby Year Book. ISBN 0-8151-1295-5

Aphasia (1988). Rose, F.C. Whurr, R. and Wyke, M.A.(Eds.) London : Whurr. ISBN 1-870332-66-0

Medical Speech-Language Pathology: A Practitioner's Guide. (1998). Johnson, A.F. and Jacobson, B.H. NY:Thieme. ISBN 0-86577-688-1

Aspects of Bilingual Aphasia (1995). Paradis,M.(Ed)Great Yarmouth; Galliard (Printers) Ltd. ISBN 0-08-425704

Pragmatics in Neurogenic Communication Disorders. (1998). Paradis,M.(Ed)Great Yarmouth; Galliard (Printers) Ltd. ISBN 0-08-043065-1

Linguistic Intervention in Aphasia. (2<sup>nd</sup> Ed.) (1969). Lesser, R.London; Whurr. ISBN 1-870332-77-6

Right hemisphere Communication Disorders: Theory and Management (1995). Tompkins,C.A California: Singular Publishing Group, Inc. ISBN 1-56593-176-9

Dementia – A Clinical Approach. (2<sup>nd</sup> Ed.)(1992). Cummins, J.L. and Benson: Whurr. ISBN 1-870332-94-6

**Objectives**

- 1. To equip the student with knowledge as required for theoretical 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.*

**UNIT 1**

[15 hrs]

- Phonological processes- review and recent advances, different types, its analysis, phonological process patterns in various communication disorders, International Phonetic Alphabet transcription.
- Phonological awareness - development, assessment and clinical implications. Recent studies.
- Phonotactics and metalinguistic abilities in phonological disorders.
- Co-articulation – nature, definitions and kinds. 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.

**UNIT 2**

(15 hrs)

- Application of phonological theories in evaluation and management of phonological disorders
- Metaphon theory and therapy
- Management of co-articulation in speech disorders and remediation.

**UNIT 3**

(15 hrs)

- Neurophysiology and functional development of sensori-motor control
- Sensory motor processing in speech / correlates of oral sensori-motor dynamics –  
(a) Neural substrates and findings in dysarthria and apraxia.

## **UNIT 4**

[15 hrs]

- Recent advances in diagnosis, assessment and management of Dysarthria
- Recent advances in diagnosis, assessment and management of 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.
- 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**

Perspectives in applied phonology. (1997). Hodson, B.W and Edwards, M.L. Mayland: An Aspen Publication.

Clinical phonology. Assessment of articulation disorders in children and adults. (1996) Klein, E.S. California: singular publishing group Inc.

Phonological theory and the misarticulation child. ASHA monographs. (1984). ( number 22 Ed) Elbert, M Dinnsen, D.A. and Weismer, G.

Phonological disability in children (2<sup>nd</sup> edition) studies in disorders of communication. (1989) Ingram. Cole and Whurr Limited.

Clinical management of motor speech disorders in children. (1999). Caruso. F.J. and Strand, E.A. New York: Thieme.

Motor speech disorders – A treatment guide. (1991). Dworkin, P.J. St. Louis: Mosby Year Book. Inc.

Clinical management of Neurogenic communication disorder. (1985). Johns, D.E. Boston: Allyn Bacon.

Motor speech disorders: substrates, Differential diagnosis and management. (1995). Duffy, J.R. St. Louis: Mosby

Neuromotor speech disorders – nature, assessment and management. (1998). Cannito, M.P., Yorkston, K.M. and Beukelman, D.R.

Evaluation and treatment of swallowing disorders. (1983). Logemann, J.

Medical Speech Language Pathology: a practitioner's Guide. (1998). Johnson, A.F. and Jacobson, B.H. NY: Thieme

### **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, 2<sup>nd</sup> Edition, Butterworth – Heinemann, USA.

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

**Objectives**

- 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)

- Theories and models of speech perception (motor, neurological, auditory, acoustic, analysis by synthesis and TRACE)
- Basic Issues in speech Perception-linearity, segmentation. Lack of invariance. Variability or perceptual constancy in speech. Invariant feature and cue based approaches.
- 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

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

### **UNIT 3**

**(15 hrs)**

1. Perception of vowels, semivowels, and diphthongs in individuals with hearing impairment
2. Perception of consonants in individuals with a hearing impairment
3. Effect of type, degree and audiogram configuration in perception of vowels and consonants
4. Speech perception through hearing aids using signal enhancing features
5. Dichotic listening- Theories, Factor affecting, Clinical application
6. Infant Perception, perception of consonants and vowels, suprasegmentals in infants, comparison of adult and infant perception, universality in perception, word perception, lexical neighbourhood.

### **UNIT 4**

**(15 hrs)**

1. 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
2. Perception of segmental and suprasegmental cues through auditory brainstem implants
3. Perception of segmental and suprasegmental cues through Middle ear implant and BAHA
4. Comparison of perception through different devices

### **UNIT 5**

**(15 hrs)**

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

## LIST OF BOOKS

**SH 204**

### **SPEECH PERCEPTION AND ITS DISORDERS**

Ainsworth W.A. (1976) Mechanism of Speech Recognition, International series in natural philosophy. Vol.85, Oxford: Pergamon Press

Ainsworth W.A. (1990) Advances in Speech, Hearing and language processing Vol. 1, London Jai Press Ltd.

Berlin C(1984) (Ed.) Hearing Science. San Diego: College-Hill Press

Borden G.J. and Harris K.S(1980). Speech Science primer: physiology, acoustics and perception of speech, London: Williams and Wilkins

Cohen, A & Nooterboom, S.G. (Eds) (1975) structure and process in speech perception. New York : Springer-Verlag

Clark G.M. Cowan R.S C and Richard C D (1997): Cochlear Implantation for infants and Children-Advances, Singular publishing Group, London.

Fant, G; Speeech acoustics Phonetics - Klumer Academic Publication 2004

Gold & Morgan N "Speech & Audiological Processing". Wiley & Son Inc. 2000

Goodman J.C. and Nusbaum (1994) (Eds) The development of speech perception: the transition from speech sounds to spoken words, MIT Press London.

Harcastle & Laver J. "The Handbook of Phonetic Sciences" Blackwell Publishers Ltd. 1997 (Delgutte)

Hish. S.K; Eldredge. D.H. Hish. J; Silveman S.R. & davis 1976 "Hearing" Wasingaton University Press"

Lass N.J.(Ed) 1976. Contemporary issues in experimental phonetics academic Press N.Y

Menden, L.L., & Danheur, L.J., (Ed).Audiologic Evaluation and Management and Speech Perception Assessment. Singular Pu.blishing Inc, CA.

Nakagawa S Shikanok K, Tohkura. Y91995) Speech hearing and neural network models. Ohmshia IOS Press Amsterdam.

Pisoni D 2005 "Handbook of Speech Perception" Blackwell Publishing Ltd. U.S.A.

Pickett JM, Ravolie SG (1997) Feature Discrimination by persons with sensorineural impairment, in B Lindblom and S. Ohman EDs "Frontiers of Speech Communication Research, AP Londons.

Sanders. MR" Speech & Speaker Recognition" Karger 1985

Schouten MEH 1992. The Auditory Processing of speech from sounds to sounds. Morten de Grugter. Berlin

Tatham M&Mortin K"Development in Speech Synthesis" Wiley – 1998

The XIII<sup>th</sup> International Cogress of phonetic sciences – Stockholm 13-19 August 1995, Volumes 1-4.

**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
  - Calibration of pure tones
2. Electrodes and transducers
  - Signal acquisition technique from electrodes and transducers
  - Signal processing techniques such as differential application
  - Common mode rejection, artefact rejection, filtering, signal averaging, etc.
  - Addition and subtraction of waves

Installation and calibration Audiological diagnostic instruments

**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)

1. Immittance
  - Principle and instrumentation
  - Tympanometry – low and high frequency tympanometry, Single and multi component, Multiple frequency tympanometry, Variables effecting 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
  - 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. Vestibular testing and ENG

**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,

## 1. Tests to evaluate tinnitus and hyperacusis

Nonaudiological tests in diagnosis of auditory disorders

Auditory disorders in those with multiple problems, (C)APD

Comprehensive report writing,

Audiologist as a witness, medico-legal aspects legislations related to field of audiology

Audiological practice in rural areas

Audiological practice in ENT, Neurological set-ups

## LIST OF BOOKS

### SH 205

### DIAGNOSTIC AUDIOLOGY

Berlin C. I (Ed) 1996 – Hair cells & hearing aids. Singular Publishing group, London

Hood.L.J (1998) Clinical applications of the auditory brainstem response Singular Publishing group Inc. U.S.A

Hall J. W III (1992) Handbook of Auditory evoked responses. Allyn & Bacon U.S.A

Jacobson J.T (Ed) 1994. Principles & Applications in Auditory evoked potentials Allyn & Bacon U.S.A

Katz J (Ed) Volume I – V Handbook of clinical audiology, Lippincott, Williams, Wielkins U.S.A

Ms Phenson L.D. 1995 – late potentials of the auditory system Singular publishing group

Relman W.F. 1991 – Hearing Assesment, Allyn & Bacon U.S.A.

Katz j (Ed) Volume 1 - V Handbook of clinical audiology, Lippincot, Williams, Wielkins U.S.A.

Ms Phenson L.D. 1995 – Late Potentials of the auditory system Singular Publishing group

Rintelman W.F. 1991 – Hearing Assesmetn, Allyn & Bacon U.S.A.

Robinette M.S. Galte T.J. (Eds) 1997. Otoacoustic emissions; Clinical Application Thieme N. Y.

Sahley T.L. Nodar R.H.Musiek F.F. 1997: Efferent Auditory System: Structure & function. Singular publishing Group Inc.

Wiley T.L. Fowler C.G. 1997; Acoustic Immittance measures in clinical audiology; A prier Singular Publishing group Inc.



*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.*

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

1. Analogue and digital system
  - 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 HR and FIR filters and their applications in speech and hearing
3. Fundamentals of communication systems
  - AM transmission and reception and its application in speech and hearing
  - 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 (15 hrs)

1. Principles and working of
  - Analog, programmable and DSP based hearing aids.
  - Technology of channel separation
  - Techniques of non linear amplification and their implementation in hearing aids.
  - 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
  - Recent advances

### **UNIT-4**

(15 hrs)

1. 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**

(15hrs)

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

## LIST OF BOOKS

SH 206

### Hearing Devices

Clark G.M; Cowan B.S; Dowel R. C1997. Cochlear Implantation for infants and children:

Advances Singular Publishing group Inc

Mueller H.G.; Hawkins D; Northern C.J 1992. Probe microphone measurements; Hearing aid selection and assessment Singular Publishing group Inc

Hersh M.A; Johnson M.A. 2003 - Assistive technology for the hearing impaired, Deaf and deaf blind, springer, London

Sandlin E.R. (Ed) 1995, Handbook of hearing aid amplifications. Volume 1. Theoretical & technical considerations Singular Publishing Group Inc, London.

Sandlin E.R. (Ed) 1995, Handbook of hearing aid amplifications, Volume II. Clinical Consideration and fitting practices. Singular Publishing group Inc, London

Studenbaker G.A.; Hochberg I 1993. Acoustical factors affecting hearing aid performance. 2<sup>nd</sup> edition Allyn & Bacon U.S.A

Velene M 1994 Strategies for selecting and verifying hearing aid fittings Thieme N.Y.

Velente M 1996 Hearing aids standards, option and limitations, Thieme N.Y

# SH 207 ADVANCES IN THE MANAGEMENT OF PERSONS WITH HEARING DISORDERS

[ 75hrs]

## 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

- Management of children, adults, and geriatrics in respect to amplification / implantable devices, role of caregivers
- 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**

(15hrs)

#### 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 Actt, Sarva Shiksha Abhiyan, DPEP scheme, ADIP Scheme)
- Measures to implement legislations, schemes, Policies
- Role of audiologist

## 1. Management of CAPD cases:

- 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**

Alpiner J.G (Ed) 1982 – Handbook of Adult Rehabilitative Audiology – 2<sup>nd</sup> Edition. William & WelKIns U.S.A.

Alpiner J.G; McCarthy P.A(Ed) 1993 – Rehabilitative Audiology Children & Adults William & Welkins U.S.A., William & Welkins 2000, 3 rd Edition

Hull R.H. (Ed) 2001 – Aural Rehabilitation – serving children and adults, 4<sup>th</sup> edition, Singular Publishing Group inc

Luxon L.M (Ed) 2001 – Davies R.A (Eds) 1997 – Handbook of vestibular rehabilitation, Whurr Publisher Ltd, London

Sanders D.A 1971 – Aural Rehabilitation Prentice Hall, Inc, U.S.A

Tye Murray. N 1998 – Foundations of Aural Rehabilitation Singular Publishing Group, Inc. U.S.A.

Tye Murray. N 2005 – Foundations of Aural Rehabilitation in Children and Adults & Their family members (2<sup>nd</sup> edition) Thomson Delmar Learning Newyork

Vernon J.A; Moller A.R (Ed) 1995: Mechanisms of tinnitus, Allyn & Bacon, U.S.A tinnitus, Allyn & Bacpm. U.S.A.

## **SH-208- DISSERTATION**

**Xxxxxxxxxxxxxxxxxx**

### **SH 209 CLINICAL PRACTICUM-SPEECHLANGUAGE PATHOLOGY**

#### **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.