

HUMAN COMMUNICATION, SPEECH- LANGUAGE DEVELOPMENT AND DISORDERS

History and development of the profession:

- History and development of the profession of Speech- Language Pathology (SLP) specifically in Nepal, neighboring countries and abroad.
- Major work activities of the SLP.
- Various settings of speech – language therapy service delivery.
- Professions concerned with communication disorders.

Human communication:

- Definitions and components.
- Interdependency and interrelation between communication, speech & language.
- Modes of communication (Verbal & Non-Verbal).
- Characteristics of good speech.

Interactive bases of communication:

- Social bases of communication.
- Cognitive bases of communication.
- Psychological bases of communication.
- Explain speech as an overlaid function.

Specific causes leading to developmental delay:

- RH incompatibility, infantile jaundice, Kernicterus, perinatal causes of brain damage.
- APGAR score.
- Inborn errors of metabolism.

Mechanism of speech and language production

- Different models of Speech production.
- Developmental stages of speech and language.
- Highlight prerequisites for Speech-language development; state the importance of prerequisites.
- Bases of pitch and loudness mechanism.

Definition, etiology, characteristics, classification and impact of:

- Hearing Impairment
- Mental Retardation
- Cerebral palsy
- Seizure disorders
- Assessment procedures, differential diagnosis and management in brief for above mentioned disorders.

Definition, etiology, characteristics and classification of:

- Autism Spectrum Disorders/ Pervasive Developmental Disorders.
- Attention Deficit Disorder/ Attention Deficit Hyperactivity Disorder.
- Multiple disabilities
- Assessment procedures, differential diagnosis and management in brief for above mentioned disorders.

Definition, etiology, characteristics, classification and impact of:

- Specific language Impairment
- Learning Disability
- Acquired aphasia in childhood
- Traumatic Brain Injury in childhood
- Assessment procedures, differential diagnosis and management in brief for above mentioned disorders.

INTRODUCTION TO AUDIOLOGY

Historical Aspects

- Origin of Audiology, its growth & development (since World war II)
- History, growth & development of Audiology in Nepal, Neighboring countries and abroad
- Scope of Audiology and branches of audiology
- Take history in detail related with audiology
- Physical and Psychophysical scales, Equal loudness contours, Frequency weighting curves, combined sources, Pitch and Timbre. Fourier analysis of complex tones.
- power and pressure formulae: zero dB reference for pressure and power.
- Calculate actual SPL, reference and dB values with any two given values.
- Calculate overall dB when two signals are superimposed, hearing level and sensation level.
- Depict relationship between phones and sones.
- Know use of phone and sone.
- Know use of phone and sonograph.
- Compute relative loudness of two given sounds using these graphs of phone and sone.
- Define frequency and intensity.
- Psychological correlates of frequency and intensity.
- Calculate and plot DL for frequency and Intensity.
- Theories of hearing.
- Conceptualize advantages of binaural hearing.
- The effects of Head Shadow and Pinna Shadow.
- special role of hearing in visual impaired.
- Curve for threshold of hearing MAP and MAF.

Tuning fork tests

- Perform different tuning fork tests such as Rinne, Weber, Bing, Schwabach and Absolute Bone Conduction.
- Interpret different tuning fork tests
- Understand merit & demerits of each tests
- Perform audiometric version of Weber and Bing tests.

Pure Tone Audiometry and Orientation to speech audiometry

- the need and scope, instrumentation, historical developments of audiometer.
- skill regarding classification of audiometer.
- parts of an audiometer.
- Different types of transducers.
- Familiarize with noise levels permissible in audiometric rooms.
- ASA, ISO, ANSI and ISI norms.
- precautions to be taken while testing.
- factors affecting AC and BC thresholds, Build concept of theories of bone conduction.
- basic concepts of AC & BC testing procedures (methods of obtaining pure tone thresholds through air and bone conduction).
- concept of sound field and close field testing.
- Familiarized with screening Vs diagnostic pure tone testing.
- Familiarized with different pattern of audiograms and their importance.
- Interpret audiograms.
- Classify audiograms.
- Build concept of calibration (biological and instrumental for AC & BC transducer).
- Be familiarized with speech audiometry and its importance in brief.

Masking

- Define masking.
- Identifv condition required for masking.

- The concept and use of white noise and narrow band noise.
- Critical band concept.
- Familiarized with terminology related to masking (Test ear, non-test ear, masker, maskee, crossover, cross hearing and shadow curve, AB gap).
- Build concept of inter-aural attenuation (IA), factors affecting IA.
- State the importance of effective masking level.
- Relate application of masking in clinical audiometry.
- Demonstrate know ways of Clinical masking of the non-test ear.
- Identify criteria for masking during AC and BC testing.
- Understand concept of cross hearing and interaural attenuation.
- Know how much to mask.
- Outline concepts of minimum necessary masking.
- Identify factors determining the amount of masking noise.
- Describe concept of occlusion effect, air bone gap in the masked ear.
- Identify masking dilemma in bilateral symmetrical conductive hearing loss cases.
- FIT

BASIC MEDICAL SCIENCES RELATED TO SPEECH & HEARING

General Anatomy and physiology

- Coronal / saggital plane, anatomy, morphology, physiology, histology, embryology, cell and organelles, tissue, organ system, specialized tissues like nervous tissue, vascular tissue, muscle and bone tissue.
- Define neuron, synapse, reflex action, bioelectrical phenomena, action potential, depolarization, nerve fibers and synapses.
- Explain division and functions of the nervous system.
- Normal anatomy of the brain, its divisions, general lobes, Broadmann's areas and vascular supply of brain.
- Reticular formations, basal ganglia, cerebellum, circle of Willis, spinal cord and its structure.
- Blood brain barrier.
- Describe Cerebrospinal fluid – formation & flow.
- List the cranial nerves, their origin, nuclei, functional components and distributions with special references to II, IV, V, VII, IX, X and XII.
- Explain reflex action and common reflexes.
- Identify congenital cerebral and cranial defects.
- Define capillaries, arteries, veins, cardiac cycle, and aneurysm.
- Vascular shock – its reference to aphasia / speech disorders.
- Bones of the skull; describe in detail the parts of a temporal bone.
- Properties of muscles. List the muscles of the neck, face and tongue.
- Anatomy & physiology of respiratory system in detail.
- Mechanism of respiration – internal and external influence, nervous control – vital capacity – tidal volume, residual air, efficiency tests of respiration, artificial respiration (in brief).
- Types of breathing. Explain hypoxia, asphyxia and cyanosis.

Embryology:

- The development of branchial arches and pouches and their derivatives.
- The development of face and its developmental anomalies.
- The development of palate and correlate with cleft lip and cleft palate.
- The development of tongue and thyroid gland and correlate with developmental anomalies.
- The development of external ear, middle ear and inner ear and correlate with developmental anomalies.

Endocrinology:

- Define hormone and elicit functions of thyroid hormone, growth hormone, androgen and

- Describe regulation of secretion of hormone and its influence in voice disorder.
- Enumerate hormonal controls and changes at puberty.
- Explain hypothyroidism and its effect on voice.

General Pathology, Genetics & immunology :

- Define inflammation, infection, tumor – benign & malignant, tissue healing.
- Describe the normal structure of chromosome and define karyotyping.
- Enumerate the structural and numerical aberrations of chromosome with appropriate examples.
- Outline the Mendelian Inheritance; define Mendelian trait, autosomal dominant, autosomal recessive, sex linked dominant and recessive diseases.
- Outline pedigree symbols and pedigree lines; build pedigree charting.
- Define genetics and describe significance of medical genetic, its importance in diagnosis and management of Speech & Hearing disorders.
- General outline of immunology related with speech and hearing.

Ear

- Describe anatomy & physiology of external, middle & inner ear.
- Describe ascending and descending auditory pathways, vestibular pathway.
- Describe mechanism of hearing: peripheral and central.
- Explain the functions of utricle, saccule and vestibular apparatus in relation to posture and equilibrium.
- Enumerate tests for posture and equilibrium.
- Describe and identify diseases of the external middle and inner ear leading to hearing loss: congenital malformations, traumatic lesions, infections, neoplasm, Keratosis obturans, Foreign bodies, wax, etc.
- Describe and diagnose diseases of the middle ear – different types of otitis media namely acute otitis media, otitis media with effusion and its sequelae, chronic otitis media & complications, otosclerosis, neoplasms, eustachian tube disorders and their management.
- Describe and diagnose diseases of the inner ear such as labyrinthitis, Meniere's disease, prebyacusis, ototoxicity, noise induced hearing loss, sudden SNHL, BPPV, vestibular neuronitis, differential diagnosis of vertigo and their management.
- List out other causes of hearing loss – tumors of the cerebello- pontine angle, vestibular schwannoma.
- Causes and management of tinnitus.

Nose, Oral cavity & Pharynx

- Describe anatomy & physiology nose, paranasal sinuses.
- Describe congenital diseases of nose – cleft lip, cleft palate, choanal atresia.
- Describe rhinolalia, rhinosinusitis, deviated nasal septum, sinonasal polyposis.
- Describe anatomy & physiology of oral cavity, oropharynx, nasopharynx, laryngopharynx.
- Explain disorders of oral cavity, nasopharynx, oropharynx, and laryngopharynx and their effect to causes of speech disorders.
- Describe and diagnose diseases of the tonsils and adenoids.
- Describe in brief the normal structure and function of esophagus.
- Explain the mechanism of swallowing.
- Describe esophageal conditions: Gastroesophageal reflux disorder, congenital abnormality – atresia, Tracheo-oesophageal fistula, Stenosis, short oesophagus.
- Describe in detail the muscles of palate in terms of their origin, insertion, actions, blood supply and innervations.

Larynx

- Describe the anatomy & physiology of larynx, muscles of larynx in relation to their attachments, actions and innervations; mention the blood supply of larynx.
- Describe the structure and function of vocal cords and physiology of phonation.
- Elicit difference between an infant and an adult larynx

- Describe disorders of laryngeal structure – laryngomalacia, laryngeal web, subglottic stenosis, posterior laryngeal cleft, tumors and cysts.
- Describe laryngitis: acute laryngitis, acute laryngotracheobronchitis, acute epiglottitis, laryngotracheal diphtheria, specific laryngitis.
- Explain the causes, management of chronic laryngitis.
- Identify Vocal cord polyps, Reinke’s Edema, Vocal nodules.
- Describe neuromuscular dysfunctions of the larynx – vocal cord palsy, spastic dysphonia.
- Differential diagnosis of hoarseness.
- Describe laryngectomy, oesophageal speech, tracheo oesophageal puncture, artificial larynx.

INTRODUCTION TO LINGUISTICS

Introduction to Linguistics, Language and Communication

At the end of the course students will be able to

- Define Linguistic and describe branches and scope of linguistics.
- Define language and describe nature, properties and functions of language.
- List out differences between human language and animal communication systems.
- Describe sub-systems of language.
- Explain relation between language and society.
- Define communication and describe nature and types of communication.

Phonetics and Fundamentals of acoustic phonetics

- Define of phonetics and describe branches of phonetics: articulatory, acoustics and auditory phonetics.
- Explain speech production process: Initiation, phonation, articulation.
- Describe initiation and direction of airflow, Phonation types, Articulation.
- Classify speech sounds: segmentals and suprasegmentals.
 - A. Segmentals : consonants and vowels
 - a. Classify consonants based on place, manner and voicing.
 - b. Classify vowels: Height, backness and rounding.
 - c. Describe & classify semivowels and diphthongs.
 - d. Develop concept of cardinal vowel system.
 - B. Describe suprasegmentals: Stress, pitch, tone and intonation.
- Explain Source-filter theory of speech production.
- Differentiate acoustic properties of vowels and consonants.
- Outline the use of computer software in acoustic analysis.

Phonology and Morphology

- Outline the sounds of Nepali language.
- Describe development of phonology.
- Describe phonetics and phonology, phone, phoneme and allophone.
- List out distribution of sounds and explain principles of phonemic analysis with reference to Nepalese languages.
- Outline distinctive features and its application in articulatory disorders.
- Describe the syllables: Structure and types.
- Explain role of syllables in defining vowels, consonants, diphthongs and semivowels.
- Define morphology, morph, morpheme and allomorph.
- Explain morphemes: free and bound.
- Describe morphological analysis: inflection and derivation.
- Define word and mention its types.
- Describe processes of word formation.

Semantics, Syntax and Pragmatics

- Define semantics and describe development of semantics.
- Explain the concept of meaning and different types of meanings.
- Distinguish lexical relations: synonymy, homonymy, homophony, antonymy and polysemy.
- Describe levels of meaning: lexical, sentence and utterance meaning.
- Identify semantic ambiguity.
- Define syntax and describe development of syntax.
- Perform Immediate Constituent (I.C.) analysis.
- Describe phrase structure and transformational grammar.
- List out grammatical functions.
- Relate acceptability and grammaticality of sentences.
- Define pragmatics and describe development of Pragmatics.
- Role of presuppositions, deixis and discourse to the interpretation of meaning.

Psycholinguistics, neurolinguistics and application of linguistics

At the end of the course students will be able to

- Define psycholinguistics and explain nature and scope of psycholinguistics.
- Define neurolinguistics and explain nature and scope of neurolinguistics.
- Distinguish between competence and performance.
- Deliberate major theories concerning language acquisition in children.
- Specify application of linguistics to the field of speech –language pathology with special reference to testing.
- Discuss phonological, morphological, semantic, syntactic and pragmatic aspects of Nepalese languages.
- Explain IPA chart: Transcription, identification, reproduction.
- Describe cardinal vowels: Transcription, identification, articulation.
- Perform phonological and morphological analysis: Identification of phonemes and morphemes and their distribution.
- Perform acoustic analysis of speech sounds.

BASIC ACOUSTICS AND ELECTRONICS

Basic Acoustics

Vibrating systems, Waves and Resonance of a mass-spring vibrator

- Conceptualize Simple Harmonic Motion, Simple vibrating systems, systems with two or more masses, systems with many modes of vibration, Complex vibrations, Vibration spectra
- Develop concept regarding what is a wave? different types of wave such as Progressive Waves and Sound waves, Wave propagation, Doppler effect, Reflection, Refraction, Diffraction, Interference, Absorption
- Describe standing waves, Partial, harmonics and overtones, Acoustic impedance, Helmholtz resonator, sympathetic vibrations and Couplers

Sound Pressure, Power and Loudness, Pitch, Timbre and Acoustics of Rooms

- Explain Physical and psycho-physical scales, Critical bands – combined sources
- Describe Physical and psycho-physical scales
- Perform Fourier analysis of complex tones
- Build concept regarding Sound propagation in outdoors and indoors – Direct, early and reverberant sound
- Calculate reverberation time, Air absorption
- Measure Background noise

- Detect the Acoustics of small rooms – sound images and multiple sources
- Explain sound field in listening rooms, Quadraphonic sound, listening with earphones.

Basic Electronics

Basics of electricity and Electronics-

- Describe concept of dc (direct current) and ac(alternating current),voltage, electrical energy and power.
- Describe safety and precautions from electric hazards, grounding concept.

Basic electronic device and its applications

- Diode and its applications-rectification, switching, Varycap, LED, Photodiode, photocell.
- Power supply-Block diagram, circuit diagram, working principle.
- Transistor (BJT) and its application-Amplification, Oscillation, Switching, Logic function.
- FET and MOSFET and its application and advantages.
- Power Electronic devices- DIAC, TRIAC explanation and application
- Microelectronics-Analog and digital integrated circuits, microprocessor, micro computers, micro processors, micro-controllers

Microphones as transducers

- Explain definition, basic characteristics of Microphone
- Describe basic characteristics and application of Moving Coil Microphone-schematic diagram and working principle
- Describe basic characteristics and application of Condenser Microphone-schematic diagram and working principle
- Brief explanations of other types of microphones and its application-crystal microphone, magnetic microphone, ribbon microphone, electrets microphone

Loudspeakers as transducers

- Explain Dynamic loudspeaker(cone type)-Schematic diagram, working principle, characteristics, applications
- Explain Horn speaker-principle, applications
 - Describe Baffles and enclosures; mention its applications
 - Multi-speaker systems-2 and 3 Way speaker network
 - Loudspeaker efficiency, quality

Recording and Reproduction of sound

- Explain concept of Audio Gramophone recording
- Explain Audio Magnetic Recording concept, recording block diagram, working principle and characteristics
- Describe Audio optical recording-compact disc, block diagram, working principle and characteristics
- Explain Audio digital recording-ADC (analog to digital sound conversion), DAC(digital to analog sound conversion), RAM memory
- Explain Sound compression and formats-MPEG-1, MPEG-3, DVD
- Explain stereophonic sound, multi-dimensional sound, HI-FI sound characteristics and HI-FI sound reproduction systems, dynamic sound
- Explain Noise and distortion in sound recording and reduction methods- Dolby

Amplifier and Hearing aid

- Describe Basic single and multistage stage amplifiers: simple circuit, coupling, decoupling function, amplification power, distortion, noise
- Explain Basic power amplifiers and its types: simple circuits and characteristics
- Conceptualize Hearing aids and earphones: simple circuit, working principle, basic factors of designing hearing aid

- Describe analog and digital Multi-meter, Audio generator, Function Generator, Frequency counter meter, Oscilloscope (Demonstration and handling)
- Describe Sound Level Meter, Spectrum Analyzer, Distortion Analyzer, Level Recorder (Demonstration and handling)
- Explain Sound analyzing soft-wares, voice recognizing techniques, digital signal processing(DSP)

PSYCHOLOGY RELATED TO SPEECH & HEARING

Clinical Psychology

- Define clinical psychology
- Describe Historical development, modern history of clinical psychology, its current status and scope as a specialty in health sciences.
- Explain role of clinical psychology in speech and hearing disorders.

Mental Disorders

- Describe concept of normality and abnormality.
- Explain different models of mental disorders, biological, psychological, social models.

Methodology in clinical psychology

- Take case history in detail related with psychology
- Perform clinical interviewing, clinical observation.
- Conduct different types of psychological assessments related to speech and hearing disorders.

Classification of abnormal behavior

- Describe History, need, rationale of classification and present systems DSM and ICD.

Motor development

- Describe early motor development.
- Elicit stages in motor development.
- Explain manipulative behavior, handedness, development of complex motor skills, and motor development during later childhood, and adolescence, decline with age.

Cognitive development

- Explain evolutionary growth of intelligence, growth from early childhood to adolescence, decline with age, and Piaget's theory of cognitive development.

Emotional and social development

- Describe stages of Emotional and Social development of a child

Perform assessment of cognitive functions, personality, interpersonal relationships, diagnosis, and tests used and interpretation of test results.

Learning

- Define learning
- Describe scope and methods of Learning
- Elicit types of learning
- Explain importance of studying psychology of learning in communication disorders.

Experimentation in learning

- Explain human and animal learning, Quantitative assessment of learning, learning curves.

Theories of conditioning

- Describe Classical conditioning by Pavlov and its principles.
- Describe Operant conditioning by Skinner and its principles.

Correlates of Learning

- Describe Biological, Neurochemical, Neurophysiological, and Neuropsychological correlates of learning.

Techniques derived based on operant conditioning

- Learn different techniques derived based on operant conditioning such as shaping, chaining, prompting, time-out, token economy, reinforcement and contingency management, and aversive

BASIC STATISTICS IN AUDIOLOGY AND SPEECH LANGUAGE PATHOLOGY

Introduction

- Define statistics and explain common statistical terms.
- Enumerate scope and usefulness of statistics in behavioral science.
- List out application of knowledge of statistics in speech and hearing.
- Describe basic concept of variables, types of variables (discrete and continuous variables).
- Explain different scales of measurements (nominal, ordinal, interval and ratio).

Data Collection and its Sources

Describe collection and recording of statistical information on its related fields from primary and secondary sources.

Tabulation

- Carry out processing and presenting of statistical data (classify data into different class such as – class intervals – continuous and discrete measurements).
- Illustrate frequency distribution, and different types of tables (one way, two way and many fold tables).

Diagrammatic and Graphic Presentation of Data

- Draw bar diagram, pie chart, pictogram, cartogram, steam and leaf plot, box plots, histogram, frequency polygon, frequency curve and cumulative frequency curves and interpret inference from graph.

Measures of Central Tendencies

- Describe measures of central tendency -mean, median, mode and its properties with examples.
- Describe partition values with examples (quartile, deciles and percentiles).
- List out merits and demerits of different averages.

Measures of Dispersion (Variability)

- Explain measures of variability -range, quartile deviation, mean deviation, standard deviation, and coefficient of variation with examples.

Probability and Probability Distribution

- Describe concept of set theory, permutation, combination, factorial, definition of probability, addition and multiplicative laws of probability, conditional probability, Bayes' theorem.
- Explain random variable, discrete and continuous probability distribution.
- Define and list out properties of Binomial, Poisson and Normal probability distribution. Illustrate normal distribution – area under the normal probability curve.
- Find out variants from the normal distribution: Skewness, measures of Skewness, Kurtosis, measures of Kurtosis.

Correlation and Regression

- Define correlation, types of correlation, Karl Pearsons' and Spearman's rank correlation coefficients. Explain its significance and properties of correlation coefficient.
- Describe concept of regression, analysis for two variables and compute the regression coefficient for simple linear regression (SLR) model.

Sampling

- Define terms- population, sample, census, sample survey, sampling frame, parameter, and statistics.
- Explain types of sampling techniques (Probability: Simple random, stratified, systematic, cluster, multistage and multiphase and non-probability: Judgement, convenience, quota, and snowball), sampling and non sampling error, sample size estimation

Sampling Distribution and Estimation

- Enumerate sampling distribution of means, application of central limit theorem, standard error, standard error of single and double means, and standard error of single and double proportions.
- Explain estimation (point and interval estimation), confidence limit, and confidence interval with

examples.

Testing of Hypothesis

- Describe concept and significance of hypothesis, null and alternative hypothesis, formulation of statistical hypothesis, degree of freedom, level of significance, type I and type II error.
- Explain- testing of hypothesis (parametric: Z test and t test for one and two samples mean and proportions, Non-parametric: Chi-square test).
- List out advantages and disadvantages of nonparametric tests

SPEECH-LANGUAGE DIAGNOSTICS & THERAPEUTICS

Speech language diagnostics

Basic terminologies and concepts

- Give introduction to diagnostics.
- Explain terminologies in the diagnostic process.
- Describe general principles of diagnosis.
- Explain diagnostic setup and tools.

Diagnostic approaches and methods

- Describe client history- definition, utility and need. Compare adults vs. children's history case, usefulness of client history.
- Describe approaches to diagnosis- importance of diagnosis in client history, essential factors included according to the conditions/disorders. Methods of taking case history.
- Explain principle and techniques.
- Outline concept of self-reports, questionnaire and observations.
- Describe diagnostic models- SLPM, Wepman, Bloom and Lahey.
- Describe types of diagnoses- clinical diagnosis, direct diagnosis, differential diagnosis, diagnosis by observation, diagnosis by exclusion, diagnosis by treatment, instrumental diagnosis, provocative diagnosis, provisional diagnosis; advantages/disadvantages
- Explain Team approaches to diagnosis.
- Outline characteristics of a good clinician as diagnostician.

Speech Therapeutics

Basic concepts of therapeutics

- Explain terminologies in speech therapeutics.
- Describe general principles of speech and language therapy.
- Describe speech therapy set-up.
- Explain types of speech and language therapy.
- Explain individual and group therapy.
- Explain integrated and inclusive education.
- Describe approaches to speech and language therapy- formal, informal and eclectic approaches.
- Plan for speech and language therapy- goals, steps, procedures and activities.
- Describe various techniques for speech and language therapy for various disorders.
- Explain importance of reinforcement principles and strategies in speech and language therapy, types and schedules of rewards and punishment.
- Outline AAC.
- Maintain documentation of diagnostic, clinical and referral reports.
- Conduct parent counseling, facilitate parent participation and transfer of skills, follow-up.
- Evaluate therapy outcomes.
- Understand ethics in diagnosis and speech and language therapy.
- Outline self-assessment and characteristics of a clinician

ARTICULATION AND PHONOLOGICAL DISORDERS

- Review of phonological development and articulatory mechanism.
- Learn Fundamentals of articulatory phonetics.
- Definition and types of co-articulation.

- Transcription requirement related to perceptual analysis.
- Phonological processes- types, language specific issues, identification and classification of errors.
- Elicit distinctive features- types, language specific issues, identification of errors and analysis.
- Describe Acoustic aspects of production and perception of speech sounds; use of spectrograms.
- Describe factors related to articulation and phonological disorders. Explain Structural, Cognitive - linguistic and psychosocial factors.
- Perform types of assessment (including phonological assessment), sampling procedures, and scoring procedures.
- Learn criteria for selection of assessment instruments, commercial instruments.
- Assess the oral peripheral mechanism, speech sound discrimination, and stimulability and oral stereognosis.
- Analyze and interpret the test data in terms of intelligibility and severity judgments.
- Compare with normative data.
- Classify the error patterns.
- Characteristics of disordered phonology and differential diagnosis.
- Describe stages of treatment and measuring improvement.
- Make long-term goals, short-term goals and activities for achieving goals in cases with misarticulation.
- Learn issues in maintenance and generalization.
- Learn team approach and professional communication (Inter, intra professional and client oriented).
- Treat the articulation disorders by different suitable approaches such as Motokinesthetic, Traditional (Van Riper), Integral stimulation, Phonological, Distinctive feature, Minimal contrast therapy, Learning theories, Programmed, Paired-stimuli and Computerized intervention packages.

Oral Anaomalies: Cleft lip and palate

- Describe etiological factors.
- Identify syndromes such as - Pierre - Robin's, Treacher- Collin's, Crouzon's disease.
- Explain the velopharyngeal mechanism - muscles and functions.
- Differentiate type of cleft lip and cleft palate.
- Elicit different classification systems.
- Able to perform team management- composition, responsibilities, co-coordinator.
- Diagnose speech and language problems of individuals with cleft.
- Detect associated problems of individuals with cleft - hearing, dental, psychosocial, and physical.
- Explain diagnostic procedures and instruments used in assessment of speech.
- Describe treatment concepts - Surgical repair of cleft lip, palate and velopharynx (Outline).
- Describe treatment procedures for speech.
- Explain prosthetic speech appliances with cleft palate.
- Rule out effect of partial and total glossectomy on speech.
- List characteristics of glossectomee's speech.
- Rehabilitate speech of glossectomee.
- Perform prosthetic fitting, design, and assessment.
- Elicit effects of glossectomy on swallowing.
- Explain rehabilitation of swallowing problem in glossectomees.

VOICE AND LARYNGECTOMY

- Define voice.
- Elicit characteristics of normal voice. Physiological, acoustical, and Aerodynamic correlates of voice.
- Describe development of voice: birth to senescence.
- Explain theories of phonation.
- Define abnormal voice; Elicit Causes and classification of abnormal voice.

- Explain voice problems in individuals with hearing impairment.
- Voice problems in geriatrics.

Explain etiology, incidence, prevalence, signs and symptoms of:

- Organic voice disorders including laryngeal cancer.
- Non-organic voice disorders.
- Congenital voice disorders.
- Neurological voice disorders.

Evaluate and compare normal and abnormal voice using different instruments and procedures

- Non-invasive procedures (acoustic, perceptual, aerodynamic, electroglottogram, inverse filtering procedures).
- Invasive procedures (endoscopic procedures).
- Explain medical/surgical procedures in the treatment of voice disorders.
- Describe voice therapy- various techniques.
- Manage problems of professional voice users.
- List out vocal hygiene and explain its importance.

Laryngectomy

- Define laryngectomy.
- Elicit causes and symptoms of laryngeal cancer.
- Explain types and characteristics of laryngectomy surgery.
- List associated problems of Laryngectomees.
- Carry out Assessment of laryngectomee.
- Describe esophageal speech (anatomy, candidacy, and different types of air intake procedures, speech characteristics in esophageal speech).
- Explain tracheo-esophageal speech (anatomy, candidacy, and different types of TEP, judge fitting of prosthesis, speech characteristics, and complications in TEP).
- Describe artificial larynx (different types, selection of artificial larynx, speech characteristics).
- Elicit pharyngeal speech, buccal speech, ASAI speech, gastric speech.
- Able to carry out pre and post-operative counseling.

DIAGNOSTIC AUDIOLOGY

Speech Audiometry

- Describe Historical perspectives of different speech audiometry tests.
- Perform Speech Awareness Threshold (SAT), Speech Recognition Threshold (SRT), Speech identification Score (SIS), Most Comfortable Level (MCL), Uncomfortable Level (UCL) and Dynamic Range (DR).
- Develop Materials for each of these tests.
- Elicit test material available material in Nepali, Indian and Western language.
- List instrumentation required.
- Perform Administration of tests, recording and interpretation of test results.
- Describe role of Masking for SRT and SIS.
- Elicit factors affecting the test results.
- Explain role of Speech Audiometry in differential diagnosis.
- List merits and demerits of Speech Audiometry.

Audiological Tests to Differentiate Site of Lesion

Test, which use pure tone stimuli :

- Describe Historical perspectives and usefulness of Difference Limen Tests, Bekesy Audiometry, Short Increment Sensitivity Index (SISI), Loudness Balance Tests - ABLB, MLB, Tone Decay Test, STAT.
- List Advantages and Disadvantages of different procedures.

Tests, which use Speech Stimulus

Automatic Audiometry

- Explain Relevance of automatic audiometry for Group Hearing test & its procedures.
- Carry out mass hearing screening in Adult.

Immittance Audiometry

- Describe terminology and principle of Immittance Audiometry and Instrumentation.
- Carry out Tympanometry – multi frequency and multi component.
- Measure Acoustic Reflex.
- Perform Eustachian tube function test.
- Use of Immittance Audiometry in Clinical Population in order to
 - detect middle ear pathology, differentiate between cochlear and retrocochlear pathology.
 - identify brain stem lesion, 7th Nerve lesion, pseudohypocacusis
 - predict thresholds.

Vestibular Function Tests

Assess the vestibular system using tests such as -

- a. Caloric Test,
- b. Behavioral test and
- c. Electronystagmograph

Describe instrumentation and, test procedure for ENG, and interpret the results of tests and artifacts.

Tests to detect Pseudo-hypocacusis:

- Describe Terminologies,
- List causes of Pseudohypocacusis in adults,
- Describe incidence of Pseudohypocacusis,
- Explain importance of case history to rule out Pseudohypocacusis,
- Identify indications for behavioral tests
- Describe in brief about Delayed auditory feedback test, Lip reading test and Story test.
- Carry out Stenger Test - Pure Tone & Speech, Lombard Test
- Explain Doerfler - Stewart Test & Electrophysiological Tests
- Interpret and do reporting the test result,
- Identify the condition to Refer

AMPLIFICATION AND ASSISTIVE DEVICES FOR THE HEARING IMPAIRED

Hearing impaired & development of technologies

- Know problem faced by Hearing impaired
 - a. Decreased Dynamic Range
 - b. Decreased Frequency resolution
 - c. Decreased Temporal Resolution
- Describe historical development of hearing aids Non-electrical hearing aids, Electric hearing aids.
 - a. Acoustic Era
 - b. Vacuum Tube Era
 - c. Transistor and Integrated circuit Ear
 - d. Digital Ear
- List out hearing aid components and their function:
 - a. Microphone
 - b. Amplifier
 - c. Receiver
 - d. Digital Circuits
 - e. Tone Controls and Filters
 - f. Telecoils
 - g. Bone Conductors

- i. Batteries

Types and Classification

Classification and type of hearing aids

- List types of hearing aids
- Describe advantages and limitations of :
 - a. Body level, ear level (BTE, ITE, ITC, CIC, IIC), Spectacle (AC/BC),
 - b. Explain importance of Monaural Vs Binaural Vs Pseudobinaural.
 - c. Rule out use and importance of Directional hearing aids, modular hearing aids
- Carry out Extended low frequency amplification, frequency transposition
- Describe Classroom amplification devices; Group amplification systems– hard wired, induction loop, FM, infrared rays. List the Merits and demerits of each.
- Build up concept regarding Routing of signals, head shadow/baffle/diffraction effects.
 - a. Do Output limiting: Peak clipping, compression.
 - b. Describe Programmable hearing aids, bone anchored hearing aid,
 - c. Signal processing – BILL, TILL, PILL
 - d. Digital hearing aids, Master hearing aids.
- Know Signal enhancing technology

Electro-acoustic Characteristics & measurements for hearing aids

- Describe types, and effect of acoustic coupler on the characteristics of output of hearing aid List Instrument required
- Analyze and interpret the analysis result of electro-acoustic characteristics of all types of hearing aids.
- Describe standard measurement procedures & specifications of electro-acoustic characteristics of hearing aids according to ISI, IEC and ANSI

Hearing Aid selection

- Assess the Candidacy for Hearing Aids based on
 - a. Degree of Hearing loss and Audiometric Configuration
 - b. Speech Identification Scores
 - c. Listening needs and Expectations
 - d. Age & Personality
 - e. Cosmetic Concern
 - f. Medical related Contra-indications to Hearing aid
- Prescribing Hearing Aid Performance
 - a. Introduction to Prescription of Hearing aids
 - b. Gain and Frequency response for linear hearing aids
 - c. Gain, Frequency Response, and Input-out function for non-linear hearing aids
- Assessing out-comes of Hearing Rehabilitations
 - a. Speech assessment
 - b. Self-report Questioners
- Functional gain & insertion gain methods: Instrumentation, prescription formulae,
- Explain Articulation Index, Speech-spectrum (banana). List merit & demerits of each.
- Select suitable Hearing aids for conductive hearing loss, congenital malformation, chronic middle ear disorders
- Select appropriate Hearing aids for infants/ children/multiple handicapped.
- Decide Hearing aids for elderly.
- Procure hearing aids under various schemes of the Government of Nepal
- Counsel for users & parents – importance of harness, BTE loops.
- Tips to facilitate acceptance of hearing aids, battery life, and battery charger.
- Counseling for geriatric population,
- Trouble shooting of hearing aids

Ear Mold

- Describe Importance of Ear Molds
- Explain Ear mold and ear shell physical styles types (hard, soft) and procedure of making each type of ear mold.
- ITE, ITC and CIC ear shell styles
- Identify criteria for modification of acoustics of Ear mold and Ear shell
 - a. Venting
 - b. Dampers
 - c. Horn effects

Hearing devices other than Hearing aid

- **Assistive listening devices :**
 - Describe TV listening aid, Alarm devices, Telephone listening aids, Vibro-tactile aids
- **Cochlear implant :**
 - Describe Historical review, parts and working of cochlear implant,
 - Decide regarding Candidacy for the cochlear implant (changing criteria),
 - Explain team members and their roles for rehabilitation after cochlear implant,
 - Carry out pre implant evaluations,
 - Describe surgical procedure, post- Surgical management, complications,
 - Explain mapping the implant, rehabilitation after implant,
 - List merits and demerits of cochlear the implant,
 - Elicit current trend outside and in Nepal.

EDUCATIONAL AUDIOLOGY

- Define aural rehabilitation
- List out goals in aural rehabilitation
- Classify hearing handicap
- Describe methods of early identification and its importance in aural rehabilitation
- Compare Unisensory Vs Multisensory approach.
- Explain Acoupedic approach.
- Compare Manual Vs oral form of communication.
- Describe manual communication: Systems that parallel English, (Manual alphabet); interactive systems (cued speech: Rochester method): Those alternative to English (ASL), Nepali Sign Language; Contrived system (SEE-I, SEE-II, Signed English).
- Describe and use of Total Communication.
- List out methods of teaching language to the hearing impaired.
- Natural method (maternal reflective method).
- Structured method (grammatical method): Fitzgerald key, box technique, others.
- Computer aided method.
- Recommend appropriate Educational placement for hearing impaired children (Preschool training, Integration, Partial integration, Segregation :Day school Vs Residential school).
- Elicit Criteria for recommending the various educational placements.
- List out the Factors affecting their outcome.
- Describe Educational problems of hard of hearing in Nepal.
- Counsel the parents and teachers regarding the education of the hearing handicapped.
- Set up class rooms for the hearing handicapped.
- Demonstrate Home training – need, preparation of lessons, correspondence programs, follow up.
- Recommend Classroom acoustics, preferential seating and adequate illumination necessary for hearing handicapped.
- Select and advise Classroom amplification devices for hearing handicapped.

RESEARCH METHODS IN AUDIOLOGY AND SPEECH LANGUAGE PATHOLOGY

- Describe science and common sense – methods of knowing science and its functions.
- List Aims of science understanding.
- Classify and predict scientific approach – observation and inference analysis and synthesis, imagination and analogy.
- Describe methods of sampling – use of sampling – use of sampling method in various situations, types of sampling inference.
- Describe hypothesis. Explain need for hypothesis.
- Develop hypothesis.
- Explain characteristics of hypothesis, its conditions and verifiability.
- Describe Methods of experimentation – variables –dependent and independent variables
- Explain concept of casualty in experimentation – methods of identifying causes – methods of agreement, difference – joint method, concomitant variation, and methods of residue –their values and limitations – methods of inference.
- Describe Nature of bias and control – general types of bias – need for controls.
- Point out ways of handling bias.
- Explain Need for research in Audiology and Speech - Language Pathology.
- Choose the research problems – stating the problems –questions stating the hypothesis.

CLINICAL PRACTICUM IN SPEECH-LANGUAGE PATHOLOGY

Carry out informal and formal procedures for assessment of following aspects of speech and language: -

- Pre-linguistic skills
- Child directed speech
- Semantics
- Morphology
- Syntax
- Pragmatics
- Non-verbal communication
- Velopharyngeal competency
- Phonological processes
- Intelligibility
- Reading, Writing and Spelling.
- Phonological analysis of disordered speech

Analyze and interpret information obtained during assessment to arrive at a provisional diagnosis.

Make differential diagnosis of

- a) Childhood communication disorders
- b) Articulation and phonological disorders.

Plan and execute intervention programs for

- a) Delayed speech and language development.
- b) Deviant speech and language development.
- c) Deficient speech and language skills.
- d) Misarticulations.
- e) Cleft lip and palate.
- f) Phonological disorders.

- **Compile a comprehensive report for appropriate referral of clients.**
- **Communicate relevant test findings to clients and significant others in a professional manner.**
- **Obtain information about different types of set-ups dealing with communication disorders.**

Clinical Practicum Work:

- **Complete informal and formal assessment of all aspects of speech and language in children and adults (emphasis on childhood communication disorder and articulation and phonological disorders), under supervision.**

Familiarization with checklists, tests, scales such as:

- Clinical evaluation of language function (CELF) 58
- Program for Acquisition of language for the severely impaired (PALS)
- Test of language development (TOLD)
- Bankson's language screening test (BLST)
- Screening Speech Articulation Test (SSAT)
- Northwestern Syntax Screening Test (NSST)
- Checklist for Autism Assessment
- Pragmatic Assessment Protocols.
- Boder Test of Reading - Spelling Patterns.

Using available instruments for: -

- Fo and Intensity information for sentences produced with different suprasegmentals.
- Measuring AMR and SMR using any two methods of measurement.
- Measuring s/z ratio, MPD using any two methods of measurement.
- Comparing the performance of hearing impaired subjects on a task of auditory discrimination using a hearing aid and a tactile aid.
- Analyzing different types of spectrograms.
- Obtaining Nasalance measures for standard stimuli for normal subjects.

Planning and executing intervention programs (including children and adults) for at least 5 sessions each.

- Carry out and report baseline evaluation.
- Develop proficiency in using various therapy techniques appropriately.
- Develop proficiency in adopting various reinforcement strategies.
- Provide guidelines for home-based intervention.
- Report progress in therapy appropriately.
- Participate in case discussion with supervisor.
- Participate in parent counseling meeting.
- Make appropriate referrals, where necessary.

Familiarization with general guidelines about counseling clients with communication disorders and significant others.

Visits to centers such as

- a) School for the HI
- b) School for the MR
- c) School for the LD
- d) District Rehabilitation Centre
- e) Centre for the Cerebral Palsied
- f) Centre for laryngectomee and head-neck cancer rehabilitation.
- g) Centre for the autistic
- h) School for deaf-blind.

CLINICAL PRACTICUM IN AUDIOLOGY

Familiarization of instrumentation for speech audiometry, immittance audiometry, sounds field- testing.

- a. Complete pure tone audiometry (with AC/BC, unmasked/masked), interpretation of audiograms, identifying indicators for special/further diagnostic testing, writing case review (25 cases).
- b. Speech Audiometry: familiarizing with speech test material in at least 2 languages, mastering live voice presentation/recorded presentation, administering SAT, SRT, WRS. MCL, UCL, PI/PB Function Test.
- c. Collection of Speech Audiometry Test material in Indian languages.
- d. Speech Audiometry on normal subjects (5 cases), and cases with conductive hearing loss, S.N. Hearing Loss and Functional Hearing Loss. Interpretation of speech audiometry results. (20 cases)
- e. Immittance Audiometry: - PVT, Tympanometry, Acoustic Reflex Testing (ipsi & contra). Interpretation of the findings taking into consideration the ENT reports.

Pediatric Audiological Assessment:

1. Informal screening - purpose, material used noisemakers, their spectral characteristic, and procedures.
2. Sound field testing: BOA, VRA, Play Audiometry

HEARING AID TRIAL POSTING:

1. Hearing aid trial: pre-selection of hearing aids: style, EAC, other issues, inspection of ear moulds. Functional gain method
Concept of Speech banana, aided audiogram
2. Observing Real Ear Insertion Gain measurement.
3. Counseling patients/care-givers regarding hearing aid: Care, maintenance, adjustments, tips to the caregiver regarding acceptance of hearing aid.
4. Electro acoustic evaluation of hearing aids (body level & ear level), with and without ear moulds. Equipment for analysis. Calibration of hearing aid analyzer.
5. Models makes available in the market, their EAC, cost of hearing aid its suitability to different contours of audiograms, age, etc.
6. Specification sheets - BIS, ANSI, and IEC with respect to hearing aid.

Posting in Electronic Lab:

1. Types of microphone, amplifiers, receivers and batteries used with different hearing aids.
2. Parts of hearing aids: of different types, makes and models.
3. Familiarization with group hearing aid system used in institutions/schools. Available makes and models, their cost, etc.; Assistive listening devices, FM System.
4. Hearing Aid trouble shooting, using multi-meter and other simple methods.

Ear mould:

1. Types of ear moulds, indication for each type with respect to style of hearing aid, amplification requirement. Inspection of different types of prepared moulds. Indications for Ear-mould modification - venting and plumbing.
2. Material used at each stage of preparation.
3. Equipment required at each stage.
4. Procedure for the preparation of the mould. (One pair of mould has to be prepared)

FLUENCY & ITS DISORDERS

- Define fluency , explain development of fluency and list factors influencing the development
- Define intonation, stress and rhythm
- Outline development of intonation, rhythm, stress- their implications to therapy
- Outline measures of fluency and other prosodic aspects
- Define stuttering
- Describe nature, Loci of stuttering, adaptation effect and consistency effect
- Explain facts- incidence and prevalence, onset, heredity, speech language development in individuals with stuttering, role of imitation, socio-economic status and cultural factors. Factors which reduce stuttering and factors which increase it.
- Describe Normal non-fluency; primary stuttering; secondary stuttering.
- Explain development of stuttering- Van Riper's Tracks and Starkweather and Guitar's five developmental levels.
- Describe theories of stuttering: organic Vs. functional; cerebral dominance; diagenetic and learning theories; demand- capacity model
- Define cluttering; outline characteristics, differential diagnosis, associated problems & assessment procedure, therapeutic consideration.
- Explain neurogenic stuttering, outline characteristics, etiology, and differential diagnosis & management issues.
- Assess stuttering & associated problems.
- Differential diagnosis of developmental stuttering from neurogenic stuttering, cluttering, and normal non fluency.
- Explain prevention of early stuttering.
- Describe rationale & demonstrate prolongation, shadowing, habit rehearsal techniques, DAF, masking, shock therapy, desensitization, timeout-airflow & modified air flow, Group therapy
- Sequence of therapy procedures.
- Describe MIDVAS, transfer & maintenance.
- Explain relapse & recovery from stuttering, measurement of therapy progress, naturalness rating.

NEUROGENIC LANGUAGE DISORDERS IN ADULTS

- Explain Neuroanatomical basis and neurophysiological basis for language function (cerebral blood supply, Hemispheric functions, cerebral dominance, models of language processing).
- Outline Pathophysiology of neurological lesions affecting speech, language and hearing; concepts of recovery, reorganization and relearning.
- Explain Theoretical considerations in neurocommunication disorders: Competence vs performance, loss Vs interference, regression hypothesis, multi-lingualisms, unidimensional vs multidimensional break down.
- Define aphasia.
- Describe etiology of aphasia.
- Classify aphasia based on anatomical, linguistic and psycholinguistic aspects.
- Explain clinical features (linguistic, psycho social and neuro-behavioral).
- Define, classify, and explain clinical features, assessment & management of associated problems in aphasia: a) agnosia b) Alexia c) agraphia.

General and specific neurological examination procedures:

- Describe higher functions, cranial nerves, motor and sensory systems, reflexes and fundus examination

Neurological investigations:

- Outline electrophysiological investigations (EEG, Evoked potentials) and imaging (CT and MRI).

Assessment of speech, language and cognitive behavior:

- Describe Informal and Formal procedures (Western Aphasia Battery, Boston Diagnostic Aphasia Examination, Boston Naming Test, Minnesota Test for Differential Diagnosis of Aphasia, Porch Index of Communicative abilities, Functional Communication Profile, Token Test, Revised Token

Describe etiology, clinical profile, assessment and management of other language disorders in adults:

- Right hemisphere language disorders
- Traumatic Brain Injury
- Primary Progressive Aphasia
- Language disorders in Dementia
- Differential diagnosis of Adult Neurogenic Language Disorders
- Outline Intervention: Prognostic indicators, spontaneous recovery, General principles of therapy, specific techniques (Melodic Intonation Therapy, Visual Action Therapy, Schuell's Auditory stimulation, Thematic language stimulation), developing functional communication and others.
- Team approach; Group therapy.
- Counseling: counseling regarding role of family, individual counseling, spouse and family counseling.
- AAC.

NEUROMOTOR SPEECH DISORDERS

Neuroanatomical correlates of speech

- Describe neuromotor organization and sensorimotor control of speech
- Explain motor areas in cerebral cortex, motor control by subcortical structures, brainstem, cerebellum and spinal cord
- Describe central nervous system and peripheral nervous system in speech motor control
- Describe centrifugal pathways and motor control
- Explain sensorimotor integration

Childhood motor speech disorders

Cerebral Palsy

- Recall definition and etiology.
- Illustrate specific classification.
- Explain primitive postural and oropharyngeal reflexes.
- Know associated problems and communication of problems, cerebral palsy.
- Outline communication problems and assess communication skills.
- Outline intervention, early communication development, speech language therapy & neuro-development approaches (Bobath's, Phelps's, Temple-Fay's) AAC and inter and trans disciplinary approaches.

Other neuromotor developmental disorders

- Explain other neuromotor developmental disorders such as Gilles de la Tourette syndrome muscular dystrophy, Worster-Drought syndrome etc.

Developmental dyspraxia

- Recall definitions, etiology, classification and characteristics.
- Explain informal and formal assessment.
- Specify differential diagnosis of dysarthria, aphasia and apraxia.
- Select intervention approaches (General and specific techniques, AAC, team approaches)

Adult motor speech disorders

Dysarthria

- Recall definitions, etiology, classification
- List clinical features of dysarthrias associated with LMN lesions, UMN lesions, cerebral lesions, extra pyramidal lesion
- Define lesions in two or more of the above (ALS, multiple Sclerosis, Wilson disease etc)
- Describe assessment of dysarthria- perceptual and instrumental
- Choose intervention- General and specific techniques

Acquired apraxia

- Recall definitions, etiology, classification and characteristics
- Select formal and informal assessment for acquired apraxia

Swallowing disorders

- Recall definition and phases of normal swallowing
- Explain development of feeding.
- Identify etiology, abnormal patterns of swallow
- Describe assessment and choose intervention approaches.
- Define Alternative and Augmentative communication (AAC). Application of AAC in dysarthria and apraxia of speech.
- Describe symbol selection, techniques for communication, assessment for AAC candidacy; choose appropriate system and technique, effective use of AAC.

REHABILITATIVE AUDIOLOGY

Manage hearing impaired children with special needs

- Manage Multi Handicapped Hearing Impaired Children (MHHI)
- Manage children with central auditory processing problems

Speech reading

- Define speech reading
- Elicit Need of speech reading for hearing handicapped -
 - For those with hearing aids; tactile devices; cochlear implants.
 - For those without sensory aid.
 - For children.
 - For adults
- Compare & Contrast Audiovisual perception Vs Visual perception.
- List importance of Visual perception of speech by the hard of hearing.
- Describe Tests for speech reading ability such as
 - Denver Quick test of lip reading ability
 - John Tracy clinic test
 - Utlay test
 - Helen test
 - Mason multiple choice test
- List Factors influencing speech reading in terms of -
 - speech reader
 - speaker
 - environment
- Methods of training: Compare and contrast Analytical Vs Synthetic; (including speech tracking)
- Carry out Individual and group training
 - Elicit Purpose
 - Point out Requirement for each – i.e. space, number, selection of participants
 - Explain Other consideration

Auditory learning

- Define auditory learning and describe historical background.
- Elicit Role of audition in speech and language development in normal children and its application in education of the hearing impaired.
- List Factors in auditory training such as Motivation of the case, intelligence, age, knowledge of progress, etc.
- Describe Methods of auditory training.
- Compare & contrast Individual Vs Group auditory training
- State different Communication strategies such as -
 - Anticipated strategies.
 - Repair strategies.
 - Perform Speech reading activities

- For adults and children.
- For individual Vs Group activities.
- Carry out Auditory training activities
 - For patients of different age groups.
 - In patients with congenital and acquired hearing losses.
 - Verbal Vs Nonverbal material.
 - For individual Vs Group activities
- Conduct Rehabilitation activities for hearing impaired especially elderly population.

NOISE MEASUREMENT AND HEARING CONSERVATION

Describe Noise in the environment in term of

- Types - continuous, impulse, intermittent
- Sources - Community, Industrial, Traffic and others.

Describe Effects of Noise

- a. Noise - induced Hearing Loss (NIHL) Acoustic Trauma: Incidence/prevalence, Audiological and Otological characteristics.
- b. Explain auditory effects:
 - Historical aspects
 - Acute over pressure
 - Chronic noise injury
 - TTS and recovery patterns
 - Injury to the middle ear
 - Damage to the organ of Corti and resulting symptoms.
 - Histopathological changes
 - Effects of noise on communication, SIL
 - PTS
- c. Explain Non-Auditory Effects:
 - Semantic responses; stress and health; sleep; audio- analgesia; effects on CNS and other senses.
 - Effects of noise on performance.
 - Annoyance: NQY, PNDB, PNL, EPNL, NC curves

Describe & interpret Audiometry in NIHL

- Calibration - subjective calibration - real ear method - loudness balance method. Artificial ear methods - use of hearing aid analyser and 2cc coupler. Calibration of BC vibrator, various methods of BC calibration. NBS 9A coupler - performance of different types of earphones - WF 705, TDH - 39, PDR permoflux - ear cushions.
- Pure tone audiometry, high frequency audiometry; brief tone audiometry; base line and periodic monitoring tests.
- Instrumentation: Manual audiometry, automatic audiometry.
- Speech Audiometry; Speech discrimination tests with and without the presence of noise, filtered speech tests, time compressed speech tests.
- Immitance audiometry.
- ERA
- Tests for susceptibility, OAE measurements.
- Correction for presbycusis

Perform & interpret Noise Measurement

- Instruments: Sound Level Meter (SLM) - types, parts and functioning, Digital, Non-digital, portable, system settings for different types of measurements. Transducers, Noise Dose Meters, Analyzers, recorders, read-out devices. Purpose, utility and requirements.
- Instrumentation and procedure for indoor and outdoor measurements of ambient noise, traffic noise, air-craft noise, community noise, and industrial noise.

Describe Ear Protective Devices (EPDs)

- Properties of EPDs: Attenuation, Comfort, Durability.
- Evaluation of attenuation characteristics of EPDs.
- Implementation for effective use of EPDs.

Conduct Hearing Conservation

- Educate the patients with respect to hazardous effects of noise, need for hearing conservation programs; measurement of noise considered hazardous, steps in noise control.

Familiarize with Legislations related to noise

- DRC - Definition: historical aspects; Use of TTS and PTS: Information in establishing DRC, CHABA; AFR 160-3 AAOO, ASA Z. Damage Risk contours Walsh - Healy Act. OSHA, Noise Control Act. DRC for impulse noise.
- Claims for hearing loss: Fletcher point eight formula; 1947, AMA method; AAOO AMA formula, California variation of AAOO formula. Factors in claim evaluation, variations in laws and regulations, date of Injury, evaluation of loss. No. of tests.
- Acts and regulations with respect to noise in Nepal and India: Motor Vehicles Act , The Cinematograph Act, Noise pollution control regulation rules, Environment protection Act, 1986, The consumer protection Act, .

PAEDIATRIC AUDIOLOGY

Specific Objectives:

Development of Auditory system

1. Describe development of the human auditory system with reference to

- Embryology of the auditory system (Recall from first year learning)
- Relevance of the information with special reference to syndromes.

2. Explain development of auditory behavior at different stages such as (8 hrs.)

- Prenatal hearing
- New born hearing
- Auditory development from 0-2 yrs.

Causes of Hearing loss

- **Classify causes of hearing loss in children based on**
 - a. Genetic: - Congenital
 - Late onset, Progressive
 - Syndromic/Non-syndromic
 - b. Non -Genetic: Congenital / Acquired
 - c. Importance of case history

Behavioral Hearing Tests in Children

Describe need Early Identification of Hearing Loss - with specific reference to –

- Conductive hearing loss
- Sensori-neural hearing loss.

Carry out Screening for hearing loss based on

- Using High risk registers.
- Behavioral Tests: stimuli, procedure, recording of responses, interpretation of result.
- Objective Tests: Immittance Screening, BERA, Otoacoustic Emission (OAE).

Build up Concept of Universal hearing screening Program

Describe Objective Hearing screening for School going children

- a. Objectives screening tests: Immittance, Evoked potentials, OAE, ASSR
- b. School screening: Screening for hearing sensitivity, screening for middle ear effusion.
- c. Need, criteria, instrumentation,
- d. Tests: Individual and Group screening/ Mass Media screening tests.
- e. Importance of follow up.

Behavioral Observation Audiometry (BOA)

- Conditioning Techniques including CORA, VRA and its modifications,
- TROCA,
- Play audiometry.

Perform Speech Audiometry in Children

- a. Carry out Tests and prepare/gather the materials used to obtain:
 - Speech Detection Threshold (SDT)
 - Speech Recognition Threshold (SRT)
 - Speech Recognition Tests including VASC, WIPI; NuChip, Glendonald Auditory Screening Procedure (GASP), Early Speech Perception Test (EST), Speech tests developed in Nepal and other countries.
 - Response elicitation
- b. Describe factors affecting speech audiometry in children,
- c. Carry out BC speech audiometry

Electrophysiological Tests

. Evoked Response Audiometry

- Define and classify AEPs
- Describe principle of AEPs
- Explain ERA, SN10 Potential, FFR, ECOG, ABR, ACR (MLR, 40 Hz MLR LLR) Endogenous Potentials (P300, MMN, CNV, N 400, P 500, P 600) in terms of instrumentation and test procedure.
- Interpret results and clinical application of ERA.
- List out Factors affecting ERA.

ABR in pediatric population

- List out special precaution required in case of children.
- Explain sedation for pediatric population.
- Describe requirement of modification in test protocol.

Otoacoustic Emission (OAE)

- Describe OAE in terms of origin, types of OAEs, instrumentation.
- Explain measurement procedure of OAE.
- Interpret results
- Explain Clinical application of OAEs
- Interpret findings in pediatric population

Auditory Steady State Response (ASSR)

- Define ASSR and describe generation of ASSR
- Explain advantages of ASSR over ABR,
- Describe ASSR vs Behavioral threshold,
- Describe single frequency ASSR, multi frequency ASSR
- Analyze, Interpret and report.
- List out Clinical application of ASSR,

Tests to detect Central Auditory Processing Disorders in children and Adult

- Define Central auditory dysfunction, terminologies used,
- Describe incidence and causes,
- Identify indications for administration of CAD Tests,
- List Rationale for CAD Tests, Material, Instrumentation,
- Explain in brief about procedures for test such as –
 - Masking level
 - Pitch Pattern Test
 - Filtered Speech Test
 - Dichotic binaural fusion test
 - Time altered speech test

- Speech with alternate masking index
- Staggered spondee word test
- Synthetic sentence identification with ipsilateral competing messages, synthetic sentence identification with contralateral competing message.
- Dichotic digit test
- Dichotic consonant vowel test
- Speech in Noise test.
 - a. Interpret the test findings of above tests
 - b. Identify the condition for Referrals.

COMMUNITY ORIENTED PROFESSIONAL PRACTICES IN SPEECH LANGUAGE PATHOLOGY AND AUDIOLOGY

- Describe epidemiology of Speech, language and hearing disorders.
- Elicit environmental, Social, Economic Implications.
- Educate the public on Preventive aspects of Speech & Hearing disorders.
- Describe different levels of prevention such as Primary, Secondary, and Tertiary.
- Describe survey, prevalence, incidence and its implication in planning health promotion, specific protection, early diagnosis and treatment of a high risk infant, disability limitation, educational and vocational rehabilitation
- Explain different Approaches to service delivery such as
 - Institution based
 - Camp based
 - Community based.
- List Role of NGOs.
- Review the services in Nepal.
- Describe Integration of disabled into the community.
- List Duties and responsibilities of SLP in various settings.
- Elicit and follow Professional ethics for SLPs, Code of Ethics, Right to education Act, employment Act.
- Interact with allied professionals and community health workers
- Plan services for the communication disabled.
- Explain Philosophy, planning, establishment of services for communication disorders.
- Outline required infrastructure, budget, staffing, equipment, and furniture for establishment of services.
- Prepare policy, record-keeping system.
- Write proposal for different purpose, etc.
- Make services user- friendly.
- Describe Legislative support for rehabilitation such as –
 - Act for autism, CP and MR.
 - Environment Act.
 - Right to Information Act.
 - Consumer Protection Act.
 - Schemes and concessions under government.
 - Vocational rehabilitation.
- Explain “The professional as a witness”.
- Keep documentation for legal purposes.
- Handle legal issues.
- Prepare Strategies for awareness, public education and information. (Camps, Print and audiovisual media, Surveys, Radio broadcast, Street plays, etc.
- Empower parents, persons with disabilities and community.

CLINICAL PRACTICUM IN SPEECH-LANGUAGE PATHOLOGY

1. Carry out informal and formal procedures for assessment of :
 - Voice disorders
 - Fluency disorders
 - Neurogenic language disorders
 - Motor speech disorders
 - Alaryngeal speech
 - Swallowing
 - Resonance
 - Breathing and breath support.
2. Analyze and interpret the obtained findings to arrive at a provisional diagnosis.
3. Differential diagnosis of
 - Acquired/neurogenic language disorders.
 - Voice disorders
 - Fluency disorders
 - Neuromotor speech disorders
4. Plan and execute intervention programs for different types of speech and language disorders (emphasis on voice disorders, fluency disorders, neuromotor speech disorders, neurogenic language disorders).
5. Compile a comprehensive diagnostic and intervention report for referral of clients.
6. Counsel and refer clients appropriately.
7. Have information about various centers across the country for rehabilitation of speech and language disorders.
8. Mention legislation pertaining to the speech language disorders.

Clinical Practicum Work:

Complete diagnostic assessment for different types of speech language disorders. (Emphasis on voice disorders, fluency disorders, neurogenic language disorders and motor speech disorders) with minimal supervision.

Familiarize with tests and procedures such as:

- Western Aphasia battery (WAB)
- Revised token test (RTT)
- Illinois test of Psycholinguistic Abilities (ITPA)
- Apraxia Battery for Adults (ABA)
- Frenchay's Dysarthria Assessment (FDA)
- Voice rating scales
- Stuttering Severity Index (SSI)
- Boston Diagnostic Aphasia Examination (BDAE)

Use available instrumentation for

- Acoustic measures such as Fo, intensity, jitter, shimmer. H/N ratio and other related measures for phonation and speech.
- Measures of laryngeal contact for steady phonation.
- Measures of aerodynamic parameters.
- Analysis of dysfluencies.

- Develop proficiency in using various therapy techniques appropriately.
- Develop proficiency in adopting various reinforcement strategies.
- Provide guidelines for home-based intervention.
- Report progress in therapy appropriately.
- Participate in case discussion with supervisor.
- Participate in parent counseling meeting.
- Make appropriate referrals, where necessary.
- Demonstrate production of esophageal speech.
- Be familiar with different AAC approaches and its implementation.

CLINICAL PRACTICUM IN AUDIOLOGY

Familiarization of instrumentation for pure tone and speech special tests, Imminence audiometry.

Holistic audiological assessment for differential diagnosis:

- a) Routine pure tone & speech audiometry
- b) Administering special tests using pure tone: TDT, STAT, SISI, ABLB, MLB, Stenger
- c) Speech: PIPB Function, Stenger, CAD tests.
- d) Noise: SAL, SPIN (20 cases)
- e) Immittance audiometry. Basic tests, Acoustic reflex decay, Eustachian tube function
- f) Compiling the reports for overall case reports.

ABR & OAE testing

- Preparation of the patient. Informing caregiver/patient with respect to preparation. Electrode montage.
- Observing the procedure with respect to test protocol (5 cases each)

Hearing Aid Trial:

a) Functional gain, REIG, other methods with:

- Monaural fitting.
- Binaural fitting

Programmable hearing aid - Analog and Digital

b) Explaining the benefits of the hearing aid to the patient/caregiver.

- c) Counseling for care & maintenance of hearing aid, preparation of harness, cleaning the ear moulds.
- Calibration of pure tone audiometer (AC, BC and Speech).
 - Noise measurement and attenuation measurement of ear protection devices.