

## Audiology Curriculum Post-Foundation Course Topic Summaries

### Speech and Language

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#### **Speech and Language Acquisition – CMSD 5150**

This course acquaints students with current theories of language development, the course of language acquisition, and factors that impact language development. The domains of phonology, semantics, morphology, syntax, and pragmatics are addressed, from infancy through adolescence, in spoken and written modalities. Cultural and linguistic variation is discussed throughout.

- a. Language components (pragmatics, semantics, phonology, morphology, syntax)
- b. Language theories
- c. Language development (infant, toddler, preschool, school-age)
- d. Reading and writing development
- e. Language differences and special populations

#### **Fundamentals of Speech Science – CMSD 5050**

This course is an introduction to speech science. It provides an overview of basic acoustics as well as the structure and function of speech systems. It provides preliminary coverage of theoretical research issues in speech physiology as well as basic topics in speech acoustics such as source-filter theory.

##### ***Acoustics and Sound Science***

- a. Introduction and foundational physical principles
- b. Vibrations and waves
- c. Resonance, frequency, pitch
- d. Sound intensity and loudness perception
- e. Complex waves and wave analyses

##### ***Structure and Function of Speech System***

- a. Respiratory anatomy and physiology
- b. Laryngeal function
- c. Velopharyngeal function
- d. Pharyngeal function

### Diagnostic Audiology

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#### **Hearing Measurement – CMSD 5120**

This course will survey the basic diagnostic techniques and principles in Audiology, as a foundation for practice in Speech-Language Pathology, and as a basis for more advanced study leading to practice in Audiology. The primary purpose of this course is to train future clinicians to understand the meaning and diagnostic significance of audiologic test results, so assignments

and assessments will involve case studies. At the completion of the course, students will be able to perform basic audiometric measures and will have a basic understanding of more advanced procedures. Students will be able to read and interpret audiometric test results and understand their diagnostic significance.

- a. Pure-tone air and bone-conduction measures
- b. Audiometric masking
- c. Speech testing
- d. Pseudohypoacusis
- e. Hearing loss prevention
- f. The immittance battery
- g. Electrophysiologic measures
- h. Otoacoustic emissions
- i. Hearing screening and pediatric assessment
- j. Hearing aids and implants

### **Diagnostic Audiology – CMSD 5220**

This course focuses on the basis and clinical significance of two types of audiometric testing: the acoustic immittance battery and behavioral audiometry. Lectures provide a theoretical foundation for clinical practices, and laboratory exercises support the development of practical skills. Specific course foci include:

- a. Principles and applications of acoustic immittance
  - Tympanometry
  - Acoustic reflex
- b. Pure tone audiometry
  - Air conduction
  - Bone conduction
- c. Clinical masking
  - Theory
  - Plateau techniques
  - Advanced masking
- d. Speech tests
  - Speech reception threshold
  - Word discrimination
  - Context and performance intensity functions
- e. Advanced diagnostic tests

### **Pediatric Audiology – CMSD 6320**

This course focuses on pediatric audiology diagnosis and hearing screening, including test battery design, report writing and caseload management. Specific topic areas are as follows:

- a. Importance of early identification and intervention
- b. Newborn hearing screening
- c. Behavioral assessment
- d. Electrophysiological assessment
  - Multifrequency tympanometry
  - Tone burst ABR
- e. Special Populations
  - Pseudohypoacusis

- Auditory processing disorders
- f. Case history and report writing
- g. Medical management
- h. Children and noise
- i. Caseload management

### **Electrophysiological Audiometric Measures – CMSD 6380**

This course is the complement to CMSD 5220 – Diagnostic Audiology, and focuses on the measurement of auditory evoked responses (acoustic and electrophysiologic) that are used in audiology diagnosis and research. The objective of the course is to ensure that students are prepared to conduct evoked audiometric tests and understand their diagnostic significance. Course material is covered in 5 units:

- a. Basic principles in electrophysiology
  - Principles
  - Sources
  - Recording approaches
- b. Transient responses from the auditory nerve and brainstem
  - The auditory brainstem response
    - o Hearing screening
    - o Threshold estimation in infants
    - o Auditory neuropathy and lesions
- c. Auditory steady state responses
  - The 40 Hz response
  - The 80 Hz response
    - o Hearing threshold estimation
    - o Suprathreshold assessment
- d. Responses from the cochlea
  - Electrocochleography
  - Otoacoustic emissions (transient, distortion-product, spontaneous, and stimulus-frequency)
    - o Principles and recording methods
- e. Transient responses from the cortex
  - Middle-latency response: N0, P0, Na, Pa, Nb, Pb
  - P1, N1, P2, Mismatch negativity, P3, N400

### **Advanced Diagnostic Audiology – CMSD 6420**

This course will build on previous theoretical and clinical work already completed and will present advanced concepts in dealing with measures sensitive to disorders of the central auditory nervous system (CANS) through the lifespan. The course will explore both the evolution and utilization of behavioral & electrophysiological tests utilized in testing the entire auditory system. Concepts such as screening, diagnosis, as well as rehabilitation will be explored. The course will rely heavily on clinical experience and case studies to solidify both theoretical & clinical concepts investigating the continuum of auditory disorders.

- a. Defining advanced vs auditory processing testing
- b. Auditory processes and behavioral tests (screening and diagnostic)
- c. Anatomy of the CANS (including corpus callosum & efferent system)
- d. Advanced behavioral test interpretation (including, acoustic reflexes, OAE's & evoked potentials)

- e. Disorders affecting the CANS
- f. Management of auditory disorders (rehabilitation, formal vs informal)
- g. Auditory processing and hearing loss, central deafness and sudden onset hearing loss
- h. Special populations (auditory neuropathy, demyelinating disorders, stroke, Landau – Kleffner, etc.)
- i. Aging
- j. Challenging Issues in APD

## Rehabilitative Audiology

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### Amplification I – CMSD 6360

This first course on amplification is aimed at familiarizing students with hearing aid components and electroacoustic properties, principles of hearing aid selection and fitting methods, and verification of hearing aid fitting using real-ear measures. Case scenarios are provided during laboratory exercises to give students hands-on experience. Topics include the following:

- a. Limits and benefits of hearing aids
- b. Hearing aid fitting process and candidacy
- c. Binaural issues
- d. Electroacoustics
- e. Hearing aid styles
- f. Hearing aid components
- g. Microphones and directionality
- h. Compression
- i. Troubleshooting
- j. Electroacoustic analysis
- k. Selection of hearing aid options and features
- l. Prescriptive methods and acoustic transforms
- m. Real-ear verification of prescribed targets
- n. Procedural considerations for real-ear measures
- o. Prescription and verification of OSPL90

### Amplification II – CMSD 6560

This course builds on Amplification I (CMSD 6360) and covers advanced hearing aid technology. Emphasis is placed on signal processing, advanced hearing aid features, wireless systems, and selection and verification of technology based on best evidence. Case scenarios are provided during laboratory exercises. Specific topics are as follows:

- a. First-fit versus prescribed fit
- b. Aided speech audibility and SII
- c. Speech-in-noise tests (e.g., ANL, QuickSIN, HINT, LiSN-S-PGA, CST)
- d. Taking ear impressions
- e. Earmolds, tips and shells
- f. Cerumen management
- g. Advanced compression
- h. Digital technology
- i. Advanced signal processing
  - Feedback cancellation
  - Noise reduction systems

- Frequency lowering
- Sound classification
- j. Fine-tuning and verification of signal processing features
- k. Pediatric considerations
- l. CROS and BICROS
- m. Remote microphone technologies
- n. Assistive listening devices

### **Advanced Audiologic Rehabilitation – CMSD 6640**

Advanced Audiologic Rehabilitation follows from the Amplification I and Amplification II courses. It is designed to increase students' knowledge and clinical skills in communication needs assessment, applications of hearing aid technology, rehabilitative approaches post hearing aid fitting, and outcome measures. The focus is placed on aging adults.

The course is organized around the Dalhousie Hearing Aid Assistance Program (DHAAP). Small groups of students are matched with a DHAAP patient. Each group is responsible for assessing their patient, fitting donated hearing aids, and providing post-fitting follow-ups and audiological rehabilitation services, under supervision.

The course also involves meetings/workshops offered by hearing aid manufacturers, which focus on product reviews/updates, and a hearing aid repair workshop.

Specific topics include:

- a. Aging population
- b. Impact of aging conditions (e.g., arthritis, vision loss, dementia) on rehabilitative audiology
- c. Effects of hearing loss on adults and significant others
- d. Hearing aid selection, fitting, verification, and validation
- e. Hearing aid orientation and counseling
- f. Communication intervention/conversation therapy
- g. Auditory training
- h. Speech reading
- i. Aural rehabilitation groups
- j. Self-assessment questionnaires and other outcome measures

### **Aural (Re)habilitation with Children – CMSD 5140**

This course provides an overview of the field of aural (re)habilitation with children presenting with permanent hearing loss. Specific course foci include the following:

- a. Introduction to pediatric aural rehabilitation
- b. Technology and aural rehabilitation
  - Cochlear implants
- c. Auditory skill development
  - Auditory verbal therapy
- d. Assessment & intervention for preschoolers with hearing loss
- e. Assessment & intervention for older children and teens
- f. Speech Reading, speech, voice and resonance parameters
- g. Audibility and speech understanding in children

### **Cochlear Implants and Other Implantable Technologies – CMSD 6630**

This course is designed to address services and technology offered by cochlear implants and other implantable devices such as bone-anchored hearing aids and middle-ear implants in terms of design, engineering, patient candidacy, surgical procedures, outcomes, and potential complications as well as their impact on the deaf and hard-of-hearing community. The main emphasis of the course is on cochlear implants. Specific topics include the following:

- a. Cochlear implant surgery
- b. Cochlear implant technologies
- c. Adult and pediatric issues
- d. Bone-anchored hearing aids
- e. Cochlear implant programming and candidacy
- f. The Cochlear-implant program

### **Special Topics**

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#### **Topics in Audiology Procedures - CMSD 6070**

This course focuses on selected issues relevant to the practice of clinical audiology. There are five main topic areas:

- a. Central auditory plasticity
  - Roles of the central auditory system in hearing loss
  - Disorders initiated by peripheral lesions
- b. Ototoxicity
  - State of knowledge
  - Clinical management
- c. Instrumentation
  - Electronics and electricity
  - Equipment calibration and maintenance
- d. Tinnitus and hyperacusis
  - Evaluation
  - Management
- e. Vestibular function and disorders
  - Videonystagmography/Electronystagmography
  - Computerized Dynamic Posturography
  - Rotary Chair testing
  - Vestibular Evoked Myogenic Potentials
  - Rehabilitation and falls

#### **Noise in Industry and the Community – CMSD 6440**

This course concerns the role of the audiologist in community noise involvement and industrial noise involvement. The course is designed to provide the student with knowledge, skills and practicum experience in all basic aspects of hearing conservation activities in the community and industry. Specific topic areas include the following:

- a. Physics of sound
- b. Noise induced hearing loss
  - Prevention

- Synergistic agents and noise
- c. Noise measurement and analysis
- d. Hearing conservation
- e. Noise control and hearing protectors
- f. Community noise and educational acoustics