Instructor: William R. Culbertson, Ph.D.
Office: Room 231-B
Phone: 523-7440
Office Hours: Posted and By Appointment
Email: bill.culbertson@nau.edu
Time/Place: 09:10 - 10:00 M-W-F / HP 320

Course Prerequisites: SST 251: Anatomy and Physiology for Speech Language Pathologists or Equivalent

Course Description: Application of the principles of neuroanatomy and neurophysiology to the study of normal human communication.

Learner (Course) Objectives:

COURSE GOALS:

1. Students will apply the principles involved in the study of normal human neural functions to human communication systems.

2. Students will synthesize an integrated concept of communicative functions from knowledge about the form and function of the human nervous system.

3. Students will relate key facts about the function of the neuron, including action potential, excitability, conductivity, and pooling to communicative processes.

4. Each student will perform a cranial nerve screening under observation and verbally describe its application to the evaluation of upper and lower motor neuron function in evaluation of communicative functions.

Outcome Measures:

1. Students will respond to section test items with 70% or greater accuracy.

2. Students will perform, under observation, a successful cranial nerve screening on fellow classmates.

3. Students will apply screening responses of their fellow classmates to communication evaluation by responding accurately to randomly posed questions presented by the observer.
4. Students will formulate written questions which apply articles in the supplemental reading list to the study of human nervous system functions in communication.

Course Structure/approach: SST 405 is oriented to application of instruction, demonstration and display to problem solving about human neural processes involved in communication. Material will be presented through lectures and readings, with concepts developed through classroom discussion and demonstrations. All students are encouraged and expected to participate in the classroom discussions.


CURRENT LITERATURE REVIEW LIST:

Students are responsible for reading selected current literature. Copies of the following articles are available on line by accessing the course Vista site at Cline Library.

Please see directions for completing the literature review in this syllabus.

REQUIRED READING:


RECOMMENDED:


**Evaluation Methods and Deadlines**

Evaluation of students will be based on students’ assimilation of material and its application to neurological problem solving.

**Final Grade:** The final grade will be based on the average of the section test scores and the literature review score, mitigated by the practical examination Pass/Fail score. Each test score and the literature review score will count equally in the final grade. Letter grades will be assigned as follows:

- 90-100% = A
- 80 - 89% = B
- 60-69% = D
- 70 - 79% = C
- (Below 60 = Failure)

**Section Examinations:** The course is divided into four sections: General Neurology and Gross Neuroanatomy; Microanatomy and Developmental Anatomy; Afferent Systems; Efferent Systems. The first section will be divided into two parts for testing purposes.

**Practical Examinations:** Students will perform a cranial nerve screening and describe its implications for motor speech evaluation. This is a competency evaluation, and will
receive a "Pass" or "Fail" grade. Students must "Pass" this examination to receive a final grade higher than "C".

**Current Literature Review:** Students will read current literature pertinent to neurological foundations and understand them to the extent that they are equipped to ask questions about each article topic. Acceptable questions will count 20 points each for a total literature review score based on 100 points. Unacceptable questions will not count, nor will questions submitted in the improper order or format, or without current APA citation. The literature review score will be equivalent to one section test in computing the final course grade.

**STUDENT EVALUATION PROCESS:**

**Section Examinations:** There will be a section test at the end of each section.

**Practical Examinations:** Students may take their practical examinations any time after the in-class demonstration, contained in the lectures on the cranial nerves. Graduate student volunteers, as available, may be recruited to observe cranial nerve screenings, and their schedules will be posted on Dr. Culbertson's office door.

**Current Literature Review:** Read the selected items on the course reading list printed in this document. For each article, each student submits, typed, one pertinent question concerning the experimental design or the findings or other content matters. The review question submission must have the article's FULL CITATION, written in current A.P.A. style, at the top of the page. **Submissions not including citations in current APA style are not acceptable.**

Review questions MUST be submitted in the order they appear in this syllabus, one at a time.

**COURSE POLICIES**

**Code of Academic Integrity**

Students are expected to adhere to the Code of Academic Integrity. Read the full Code at: [http://jan.ucc.nau.edu/academicadmin/plcystmt.html](http://jan.ucc.nau.edu/academicadmin/plcystmt.html)

**Northern Arizona University Policy Statements**

**Safe Environment Policy**

NAU’s Safe Working and Learning Environment Policy seeks to prohibit discrimination and promote the safety of all individuals within the university. The goal of this policy is to prevent the occurrence of discrimination on the basis of sex, race, color, age, national origin, religion, sexual
You may obtain a copy of this policy from the college dean’s office. If you have concerns about this policy, it is important that you contact the departmental chair, dean’s office, the Office of Student Life (523-5181), the academic ombudsperson (523-9368), or NAU’s Office of Affirmative Action (523-3312).

**STUDENTS WITH DISABILITIES**

If you have a documented disability, you can arrange for accommodations by contacting the office of Disability Support Services (DSS) at 523-8773 (voice), 523-6906 (TTY). In order for your individual needs to be met, you are required to provide DSS with disability related documentation and are encouraged to provide it at least eight weeks prior to the time you wish to receive accommodations. You must register with DSS each semester you are enrolled at NAU and wish to use accommodations. Faculty are not authorized to provide a student with disability related accommodations without prior approval from DSS. Students who have registered with DSS are encouraged to notify their instructors a minimum of two weeks in advance to ensure accommodations. Otherwise, the provision of accommodations may be delayed.

Concerns or questions regarding disability related accommodations can be brought to the attention of DSS or the Affirmative Action Office.

**INSTITUTIONAL REVIEW BOARD**

Any study involving observation of or interaction with human subjects that originates at NAU, including a course project, report, or research paper, must be reviewed and approved by the Institutional Review Board (IRB) for the protection of human subjects in research and research-related activities.

The IRB meets once each month. Proposals must be submitted for review at least fifteen working days before the monthly meeting. You should consult with your course instructor early in the course to ascertain if your project needs to be reviewed by the IRB and/or to secure information or appropriate forms and procedures for the IRB review. Your instructor and department chair or college dean must sign the application for approval by the IRB. The IRB categorizes projects into three levels depending on the nature of the project: exempt from further review, expedited review, or full board review. If the IRB certifies that a project is exempt from further review, you need not resubmit the project for continuing IRB review as long as there are no modifications in the exempted procedures.

A copy of the IRB Policy and Procedures Manual is available in each department’s administrative office and each college dean’s office. If you have questions, contact Carey Conover, Office of Grant and Contract Services, at 523-4889.

**ACADEMIC INTEGRITY**

The university takes an extremely serious view of violations of academic integrity. As members of the academic community, NAU’s administration, faculty, staff and students are dedicated to promoting an atmosphere of honesty and are committed to maintaining the academic integrity essential to the education process. Inherent in this commitment is the belief that academic dishonesty in all forms violates the basic principles of integrity and impedes learning. Students are therefore responsible for conducting themselves in an academically honest manner.

Individual students and faculty members are responsible for identifying instances of academic dishonesty. Faculty members then recommend penalties to the department chair or college dean in keeping with the severity of the violation. The complete policy on academic integrity is in Appendix F of NAU’s Student Handbook.
The Arizona Board of Regents Academic Contact Hour Policy (ABOR Handbook, 2-206, Academic Credit) states: 3 an hour of work is the equivalent of 50 minutes of class time at least 15 contact hours or recitation, lecture, discussion, testing or evaluation, seminar, or colloquium as well as a minimum of 30 hours of student homework is required for each unit of credit.

The reasonable interpretation of this policy is that for every credit hour, a student should expect, on average, to do a minimum of two additional hours of work per week; e.g., preparation, homework, studying.
### Learner Outcomes

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<tr>
<th>Assessment Method</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<th>Professional Credentials</th>
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<tr>
<td>Students will respond to section test items with 70% or greater accuracy.</td>
<td>Section Test</td>
<td>X</td>
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<td>Students will perform a cranial nerve screening on fellow classmates.</td>
<td>Practical Test</td>
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<td>Students will formulate written questions which apply articles in the supplemental reading list to the study of human nervous system functions in communication.</td>
<td>Written Assignment</td>
<td>X</td>
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</table>
I. Principles and Applications of Neuroscience to Speech-Language Pathology and Audiology.

   A. Afferent Modalities
   B. Efferent Modalities

III. General Organization of the Human Nervous System.
   A. Central Nervous System
      1. Brain
      2. Spinal Cord
   B. Peripheral Nervous System
      1. Cranial Nerves and Spinal Nerves
      2. Autonomic Nervous System
         a. Parasympathetic Division
         b. Sympathetic Division
   C. Differences and Similarities

IV. Gross Anatomy of Nervous System Structures Related to Communication
   A. The Central Nervous System
      1. The Brain
         a. Telencephalon
            (1) Cerebral Hemispheres
            (2) Cerebral Cortex
(a) General Structure

(b) Lobes of the Cerebral Cortex

(3) Subcortical Structures

(4) Cerebral Dominance

(5) Inter- and Intra-Hemispheric Communication

b. Diencephalon

(1) Thalamus

(2) Hypothalamus

c. Brainstem

(1) Midbrain

(2) Pons

(3) Medulla Oblongata

d. Cerebellum

2. The Spinal Cord

a. Cross Sections

b. Ascending and Descending Tracts


a. Arterial Supply

(1) Carotid Supply

(2) Vertebral Supply

(3) Circle of Willis
b. Venous Drainage
   (1) Sinuses
   (2) Veins
4. Cerebrospinal Fluid
5. Meninges

B. The Peripheral Nervous System
   1. Cranial Nerves and Motor Speech functions
   2. Cranial Nerve Screening (Demonstration)

(* PRACTICAL EXAMINATIONS MAY BEGIN AT THIS POINT.)
3. Spinal Nerves
   a. Respiratory Function
   b. Extremity Function
4. The Autonomic Nervous System

TEST 1: GENERAL NEUROLOGY AND NEUROANATOMY

V. Microanatomy and Development of the Human Nervous System
   A. Neural Tissue
      1. Characteristics of Neural Tissue
      2. Action Potential
   B. General Anatomy of the Neuron
      1. Cell Body
      2. Axon
C. Types of Neurons

1. Unipolar
2. Bipolar
3. Multipolar

D. Embryology of the Nervous System

1. Neural Tube
2. Neural Tube Vesicles
   a. Prosencephalon
   b. Mesencephalon
   c. Rhombencephalon
3. Derivative Structures of the Neural Tube Vesicles

TEST 2: MICROANATOMY AND DEVELOPMENT OF THE HUMAN NERVOUS SYSTEM

VI. AFFERENT SYSTEMS for COMMUNICATION

A. The Somatosensory System as a Communicative Modality

1. The Role of Somesthesis in Communication.
   a. Gross Touch and Fine Touch
   b. Receptors
2. Conscious and Unconscious Proprioception
3. Somatosensory Anatomy
   a. Three-Neuron Organization
b. Posterior (Dorsal) Column Medial Lemniscal System

c. Spinothalamic Tracts

d. Trigeminothalamic Tracts

B. The Visual System as a Communicative Modality

1. The Role of Vision in Communication

   a. Visual Reception

   b. Visual Perception

   c. Reception, Perception and Interpretation of Graphic and Gestural Language

2. Anatomy and Physiology of the Visual System

   a. The Peripheral Visual System and Its role in the Visual Motor Modality

      (1) Eyeball
      (2) Extraocular Muscles
      (3) Retina
      (4) The Optic Nerve (Tract)
      (5) Refraction
      (6) Accommodation
      (7) Light Reflex
      (8) Convergence

   b. The Central Visual Mechanism and Interpretation of Gestural and Graphic Language.

      (1) Visual Field
      (2) Visual Pathways
      (3) Visual Cortex

C. The Auditory and Vestibular Systems

1. The Auditory System and Reception of Spoken Language

2. The Peripheral Auditory System
College of Health and Human Services
Department of Health Sciences
Program in Speech-Language Sciences and Technology

SST 405: NEUROLOGICAL FOUNDATIONS OF SPEECH, LANGUAGE AND HEARING

a. The Cochlea
b. The Auditory Nerve

3. The Central Auditory System
   a. Auditory Pathways
   b. Auditory Cortex
   c. Reception, Perception and Interpretation of Spoken Language

4. The Vestibular System
   a. The Peripheral Vestibular System
      (1) Semicircular Canals
      (2) Vestibular Sacs
      (3) Vestibular Nerve
   b. The Projections of the Vestibular System
   c. The Physiology of Equilibrium

TEST 3: AFFERENT SYSTEMS FOR COMMUNICATION

VII. AFFERENT SYSTEMS for COMMUNICATION

A. The Motor System for Communication: Darley, Aaronson and Brown:
   Hierarchy of Motor Function

B. Major Voluntary Motor Tracts.
   1. Corticospinal Tracts: Anterior and Lateral
   2. Corticobulbar tracts: #1 and #2
   3. Extrapyramidal Tracts

C. Motor Neuron Function in Speech
1. Alpha Motor Neurons
2. Gamma Motor System
3. Myoneural Junction
4. Muscle Spindles
5. Spinal Reflexes

TEST 4: EFFERENT SYSTEMS FOR COMMUNICATION