

## Language and Brain (Introduction to Neuroscience for Speech Communication)

Department of Speech-Language-Hearing Sciences  
University of Minnesota

Summer Semester, 2019 (07/1/2019-07/26/2019)

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**Lectures:** Monday, Wednesday, 8:00-12:00; 下院306

**Web:** <http://zhanglab.wikidot.com/language-brain>

### Course Description

This course is adapted from three required courses, SLHS1301, SLHS1402, and SLHS4301, for the undergraduate and graduate major of speech-language-hearing sciences at University of Minnesota. It is intended to provide students with an overview of neuroanatomy, neurophysiology, and neuroscience pertinent to processes of human communication behavior and disorders of communication. Although it is intended for students who are majoring in Speech-Language-Hearing Sciences, students with some science background are welcome. Emphasis is on structural and functional relationships necessary for speech, language, hearing, and cognition although a general knowledge of the nervous system is first required. Topics include: gross anatomy of central and peripheral nervous systems; sensory systems, especially special systems (vision, auditory, gustatory), motor systems, and functional hemisphere and cortical organization. Neuropathology of stroke, progressive diseases, traumatic brain injury and other neurological disorders that result in cognitive or communication disorders are emphasized throughout the course, after an introduction to current diagnostic techniques.

### Course Objectives and Standards

This course fulfills three general student learning outcomes upon its completion.

- Students can identify, define and solve problems.
- Students can communicate effectively.
- Have acquired skills for effective citizenship and life-long learning

At the conclusion of this course, you will be able to

1. Demonstrate knowledge of basic neuroanatomy and neurophysiology mechanisms instrumental to normal speech, language, cognition, and hearing
2. Explain blood supply to the CNS and describe protective mechanisms to the brain
3. Demonstrate understanding of basic brain/behavior correlates; describe functional organization of brain activity during activities such as repeating words, reading words, gesturing, listening and following simply auditory commands, writing a sentence, etc.
4. Explain the neurological basis for common pathologies in neurogenic communication disorders across the life-span.

## ASHA Standards that pertain to SLHS 4301

- **Standard IV-B.** The applicant must have demonstrated knowledge of basic human communication and swallowing processes, including the appropriate biological, neurological, acoustic, psychological, developmental, and linguistic and cultural bases. The applicant must have demonstrated the ability to integrate information pertaining to normal and abnormal human development across the life span.
- **Standard IV-F:** The applicant must have demonstrated knowledge of processes used in research and of the integration of research principles into evidence-based clinical practice.

## Accommodations for students with disabilities

It is university policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Please contact me if you would like to discuss your individual needs for accommodations.

## Student Responsibilities

### Required Textbooks

- Elisabeth Ahlsen, (2006). Introduction to Neurolinguistics. John Benjamins Publishing Company.
- **David Kemmerer. (2015). *Cognitive Neuroscience of Language*. Psychology Press. (1<sup>st</sup> Edition)**
- Bhatnagar, S. (2012). Neuroscience for the Study of Communicative Disorders, 4<sup>th</sup> Edition Revised. Lippincott Williams & Wilkins.(Supplemental materials online)
- There will occasionally be additional materials throughout the semester. We will alert you to these and provide them on course website for you to read and/or download.

### Exam (30% of final grade)

One exam will be given at the end of the 3rd week. The exam is worth 40% your final course grade. The format will include T/F, fill-in, multiple choice, and short answers. The exam covers designated material from labs, lectures, discussions and readings. Make-up exam is allowed if you are ill; please notify the professor prior to the exam and bring a physician's or clinic note to class when you return. If this occurs, the make-up exam must be taken within 1 week.

### In-class activities including attendance (30% of final grade)

There will be in-class activities that cover the materials. Each activity may include T/F, multiple choice, and fill-in-the-blank question formats. THERE ARE NO MAKE-UPS. Attendance is required and will be counted towards grades for in-class activity.

**Labs/Assignments (20% Of final grade)**

There will be take home labs/assignments. Instructions will be provided for you. These assignments are worth 20% of your final grade.

**Final Project Presentation (20% of final grade)**

In groups of three, you will “research” a neurological disorder and give a short, 15 min presentation to the class **at the end of the semester**. We will provide you with a list of disorders you can choose from later in the semester. You will be required to turn in a written version of the powerpoint presentation as well. This project is worth 20% of your final grade. Project information should include the following (more details will be provided later):

- ☒ Incidence and/or prevalence of the disorder
- ☒ Review the neurological bases of the disorder
- ☒ Review the phenotype of the disorder, including any speech, language, cognitive, ~~hearing~~ or balance problems.
- ☒ Describe therapy that is available (surgery, pharmacological, behavioral, etc).
- ☒ Include a list of references where you got your information.
- ☒ Provide web-based resources for those interested in learning more.

**Grading Summary**

The final grade is determined in the following manner:

Exam = 30%; Activities = 30%; Lab = 20%; Final presentation = 20%.

Grade scale is as follows: A = 94 – 100; A- = 90 – 93; B+ = 87 – 89; B = 84 – 86; B- = 80 - 83; C+ = 77 – 79; C = 74 – 76; C- = 70 – 73; D+ = 66 – 69; D = 63 – 65; F = 62 or below.

The grades will be scaled and converted to grade system of Shanghai Jiao Tong University.

**Definition of Grades and Workload**

A – achievement that is outstanding relative to the level necessary to meet course requirements

B – achievement that is significantly above the level necessary to meet course requirements

C - achievement that meets the course requirements in every respect

D – achievement that is worthy of credit even though it fails to meet fully the course requirements

S – achievement that is satisfactory, which is equivalent to a C- or better

F (or N) – represents failure (no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that student would be awarded an I (see also I).

Academic dishonesty in any portion of the academic work for a course shall be grounds for awarding a grade of F or N for the entire course.

I (Incomplete) – assigned at the discretion of the instructor when, due to extraordinary circumstances, e.g., hospitalization, a student is prevented from completing work of the course on time. These require a written agreement between the instructor and student.

For each semester credit the average workload expectation is 1 hour of class and 3 additional hours of preparation. Therefore, a 3-credit course will involve approximately 9 hours of outside class preparation on your part and just under 3 hours of in-class time.

UMN’s policy on Student Conduct and Academic Integrity (<https://oscai.umn.edu/>)

### Weekly Topics (Tentative Schedule)

Week	Lectures	Topics	Reading/Materials
1	Day 1	Introduction to Neurolinguistics; Basic concepts and methods Theories about brain and language	EA Pages 1-54 DK Chapters 1 and 2
	Day 2	Linguistic structures: Phonetics and phonology; Morphology and syntax	EA Pages 55-110 DK Chapters 5,6, 10-12
2	Day 3	Linguistic structures: Semantics and pragmatics	DK Chapters 13-16
	Day 4	Neuroanatomy; Cranial Nerves; Blood Supply; Stroke	Online materials
3	Day 5	Special systems: Hearing & Vision	Online materials
	Day 6	Functional organization of cortex Bilingualism; Sign Language; Take-home Exam	EA Pages 111-128 DK Chapter 8
4	Day 7	Language and Music Sign Language	DK Chapter 9
	Day 8	<u>Final project presentations</u>	Exam due

**Note:** This tentative schedule is subject to change depending on actual progress. See updates on the course web site. Please enroll with the “WECHAT” group for the course and check announcements on WECHAT on a daily basis. For assignment and grading information, please check with the TA first.