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Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

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Check all appropriate lines and complete all information. Use a separate cover sheet for each course proposal and/or program proposal.

1. Course Proposals (check all that apply)

New Course Course Prefix Change Course Deletion
 Course Revision Course Number and/or Title Change Catalog Description Change

Current course prefix, number and full title: **SPLP 342, Speech Science II**

Proposed course prefix, number and full title, if changing: **SPLP 342 Speech Science II: Neuroscience**

2. Liberal Studies Course Designations, as appropriate
This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)

Learning Skills Knowledge Area Global and Multicultural Awareness Writing Across the Curriculum (W Course)

Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)

Global Citizenship Information Literacy Oral Communication
 Quantitative Reasoning Scientific Literacy Technological Literacy

3. Other Designations, as appropriate

Honors College Course Other: (e.g. Women's Studies, Pan African)

4. Program Proposals

Catalog Description Change Program Revision Program Title Change New Track
 New Degree Program New Minor Program Liberal Studies Requirement Changes Other

Current program name: _____

Proposed program name, if changing: _____

5. Approvals

	Signature	Date
Department Curriculum Committee Chair(s)	<i>[Signature]</i>	12-5-11
Department Chairperson(s)	<i>[Signature]</i>	11/17/2011
College Curriculum Committee Chair	<i>Edel Reilly TECC Curr. Chair</i>	2/27/12
College Dean	<i>ATB</i>	3/1/12
Director of Liberal Studies (as needed)		
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs	<i>Garf S Sechrist</i>	3/22/12

Received

MAR 2 2012

Liberal Studies

Course Revision

SPLP 342 Speech Science II: Neuroscience
(3c-0l-3cr)

1. Syllabus

Find attached the proposed course syllabus.

2. Summary of the proposed revision:

Changes are being made to the course title, course catalog description, course objectives, and course content. Speech Science I and II were originally devised as basic and advanced courses in the psychoacoustic and physiologic bases of human communication and swallowing functions. Over the past decade, the speech and voice science faculty teaching these courses have increasingly concentrated content related the psychophysical fundamentals and instrumental measurement of same in SPLP242: Speech Science I, while concentrating on the neurologic and neurophysiologic fundamentals of language, cognition, speech, and swallowing in Speech Science II. This course revision reflects the reality of that drift. The prerequisite of a 3.0 GPA has been removed and SPLE Major, Admission to teacher certification have both been added.

3. Justification/rationale for the revision:

Pre-service training of speech-language pathologists requires a strong background in the neurological functions described above, as a substantial aspect of the scope of practice of the profession relates to neurologic disease and dysfunction in both children and adults. Concentration of said content better prepares speech-language pathology undergraduates for graduate study of such disorders by giving them a more focused presentation of relevant nervous system functions. Previously, this information was presented in a more diffuse manner, and thus a less robust manner. The prerequisite of SPLE major was added to ensure that only students who have been admitted to the major may enroll. Admission to teacher certification ensures that students can pass the basic requirements into teacher education, which is required in order to graduate from the program.

4. Old syllabus of record – Please find attached the old course syllabus of record.

Syllabus of Record

I. Catalog Description:

SPLP 342: Speech Science II: Neuroscience

3 class hours
0 lab hours
3 credits

Prerequisites: SPLE Major, Admission to teacher certification

(3c-01-3cr)
SpEd hours: 0
ELL hours: 0

An overview of the basic anatomy of the central nervous system and its control of human swallowing and communication. This will include the biological science principles of speech and language processing and neurogenic communication and swallowing disorders in children and adults.

II. Course Outcomes:

The student will be able to demonstrate knowledge of the following:

1. The neurological bases of human communication and deglutition.
2. Neurological mechanisms and processes that control peripheral structures and muscle systems used during swallowing and communication functions.
3. Central system functions that subserve human language: pragmatics, lexical semantics, phonology, morphology, syntax, and grammar, and other aspects of cognition.
4. Biological science principles and basic human communication and swallowing processes as they relate to communication and swallowing disorders.

These outcomes will help you to meet the accreditation and certification standards below:

Course Objective	College Conceptual Framework/Danielson	ASHA Standards	PDE Standards	Performance Indicators
1	1a	III-A, B, C, F	IB, A, C	Exams; abstracts and term paper
2	1a	III-A, B, C, F	IB, A, C	Exams; abstracts and term paper
3	1a	III-A, B, C, F	IB, A, C	Exams; abstracts and term paper
4	1a	III-A, B, C, F	IB, A, C	Exams; abstracts and term paper

III. Course Outline (42 hours total):

Week 1: Overview and gross anatomy of the brain (3 hrs)

Week 2: Nerve cells and blood supply of the brain (3 hrs)

Week 3: Internal organization of the spinal cord and hindbrain (3 hrs)

Week 4: Internal organization of the forebrain (3 hrs) (EXAM 1)

Week 5: Sensory systems and exam one (3 hrs)

Week 6: Vestibular and auditory systems (3 hrs)

Week 7: The organization of language and cognition and exam two (3 hrs)

Week 8: Oral language processing and aphasia (3 hrs) (EXAM 2)

Week 9: Visual language processing and alexia and agraphia (3 hrs)

Week 10: Speech production and praxis, exam three (3 hrs)

Week 11: The basal ganglia and control of movement (3 hrs)

Week 12: The cerebellum and control of muscle coordination and tone (3 hrs) (EXAM 3)

Week 13: The upper and lower motor neuron motor pathways (3 hrs)

Week 14: The biomechanical basics of swallowing (3 hrs)

Finals week: The final (EXAM 4) will take place per the university finals schedule (2 hours)

IV. Evaluation Methods:

1. Four exams, each worth approximately 100 points (400 pts)
2. Abstracts of peer-reviewed original research articles, focusing on the neurogenesis of any language or related sensory or motor function from birth throughout the lifespan, including information that is available on sex, cultural, or racial differences. Each of the five abstracts will be worth ten points. (50 pts)
3. A term paper based upon the topic of one of the abstracts. This will include a review of the topic background, research methods, findings, and conclusions, and your critique of same. The paper must be in current APA format, should be approximately five pages in length, and it is worth 100 points. (100 pts)

V. Example grading scale:

A= 93% - 100%

B= 86% - 92%

C= 76% - 85%

D= 68% - 75%

F= 0% - 67%

Adaptations will be made to accommodate students with special needs, with appropriate documentation. Students with these concerns should confer with the instructor during office hours at the beginning of the semester to discuss accommodations needed. For further information, refer to the Undergraduate Course Catalog on support provided through the Disability Support Services in Pratt Hall (724-357-4067).

VI. Attendance policy:

Attendance in class is expected in accordance with the policy outlined in the university catalog.

VII. Required texts:

Bhatnagar, S.C. (2007). *Neuroscience for the study of communication disorders* (3rd edition).

Baltimore: Lippincott, Williams, and Wilkins.

Seikel, JA, King, DW, & Drumright, DG. (2005). *Anatomy & Physiology for Speech, Language and Hearing* (3rd ed.). Clifton Park, NY: Thomson Delmar.

VII. Special resource requirements: Anatomical models are available in the Speech Science Lab.

IX. Bibliography

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- Deacon, T. (2000). Evolutionary perspectives on language and brain plasticity. *Journal of Communication Disorders*, 33(4), 273-291.
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- Dougherty, R., Ben-Shachar, M., Deutsch, G., Hernandez, A., Fox, G., & Wandell, B. (2007). Temporal-callosal pathway diffusivity predicts phonological skills in children. *Proceedings of the National Academy of Sciences of the United States of America*, 104(20), 8556-8561.
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- Endo, K., Makishita, H., Yanagisawa, N., & Sugishita, M. (1996). Modality specific naming and gesture disturbances: A case with optic aphasia, bilateral tactile aphasia, optic apraxia and tactile apraxia. *Cortex*, 32(1), 3-28.
- Fridriksson, J., Bonilha, L., & Rorden, C. (2008). Severe Broca's aphasia without Broca's area damage. *Behavioural Neurology*, 18(4), 237-238.

- Groszer, M., Keays, D., Deacon, R., de Bono, J., Prasad-Mulcare, S., Gaub, S., et al. (2008). Impaired synaptic plasticity and motor learning in mice with a point mutation implicated in human speech deficits. *Current Biology*, *18*(5), 354-362.
- Heim, S., Eickhoff, S., & Amunts, K. (2008). Specialisation in Broca's region for semantic, phonological, and syntactic fluency. *NeuroImage*, *40*(3), 1362-1368.
- Jancke, L., Siegenthaler, T., Preis, S., & Steinmetz, H. (2007). Decreased white-matter density in a left-sided fronto-temporal network in children with developmental language disorder: Evidence for anatomical anomalies in a motor-language network. *Brain and Language*, *102*(1), 91.
- Kirshner, H. (1992). Apraxia of speech: A linguistic enigma. A neurologist's perspective. *Seminars in Speech and Language*, *13*, 14-24.
- Lausberg, H., Zaidel, E., Cruz, R., & Ptito, A. (2007). Speech-independent production of communicative gestures: evidence from patients with complete callosal disconnection. *Neuropsychologia*, *45*(13), 3092-3104.
- Moore, D. (2007). Auditory processing disorders: Acquisition and treatment. *Journal of Communication Disorders*, *40*(4), 295-304.
- Nishio, M., & Niimi, S. (2004). Relationship between speech and swallowing disorders in patients with neuromuscular disease. *Folia Phoniatrica et Logopaedica*, *56*(5), 291-304.
- Raymer, A., Beeson, P., Holland, A., Kendall, D., Maher, L., Martin, N., et al. (2008). Translational research in aphasia: From neuroscience to neurorehabilitation. *Journal of Speech, Language & Hearing Research*, *51*(1), S259-S275.
- Redcay, E., Haist, F., & Courchesne, E. (2008). Functional neuroimaging of speech perception during a pivotal period in language acquisition. *Developmental Science*, *11*(2), 237-252.
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- Starrfelt, R. (2007). Selective alexia and agraphia sparing numbers: A case study. *Brain and Language*, *102*(1), 52-63.
- Thomas, J., & Sanford, J. (2007). Large acute cerebral hemorrhage presenting with pure alexia. *Annals of Emergency Medicine*, *49*(4), 428-430.
- Thompson, E., Murdoch, B., & Stokes, P. (1995). Tongue function in subjects with upper motor neuron type dysarthria following cerebrovascular accident. *Journal of Medical Speech-Language Pathology*, *3*(1), 27-40.
- Tikofsky, R., & Hellman, R. (1991). Brain single photon emission computed tomography, newer activation and intervention studies. *Seminars in Nuclear Medicine*, *21*, 42-57.

- Tilton, A. (2003). Approach to the rehabilitation of spasticity and neuromuscular disorders in children. *Neurologic Clinics*, 21(4), 853-881.
- Tremblay, S., Houle, G., & Ostry, D. (2008). Specificity of Speech Motor Learning. *Journal of Neuroscience*, 28(10), 2426-2434.
- Utter, A., & Basso, M. (2008). The basal ganglia: An overview of circuits and function. *Neuroscience & Biobehavioral Reviews*, 32(3), 333-342.

COURSE SYLLABUS

CATALOG DESCRIPTION

SH 342 SPEECH SCIENCE II

3c-01-3sh

Physiologic, acoustic and perceptual characteristics of speech with special emphasis on speech monitoring and controls. Major lab instrumentation and research techniques in current use are described and demonstrated. Status of present knowledge is summarized and discussed.

PREREQUISITE: SH 242 Speech Science I

COURSE OBJECTIVES

1. Students will be provided with a working model of speech communication by studying the linguistic, perceptual, physiological, and acoustic levels of speech formulation.
2. Students will become familiar with the experimental equipment and instrumentation used to uncover the encoding and decoding processes within the Speech Chain.
3. Students will be provided with experiences in the use of electronic equipment to study basic speech functions and to elaborate on their use as diagnostic instruments.
4. Students will develop an appreciation and familiarization of the vocabulary and research techniques used in expanding the overall knowledge of speech communication.
5. Students will be presented with the latest research findings dealing with the linguistic, perceptual, physiological, and acoustic levels of speech formulation, including cultural, sex, and age differences.

COURSE OUTLINE

	% Time
A. Introduction to Advanced Speech Science	10 %
1. Speech, Language, and Thought	
Speech	
Language	
Thought	
Development of Language and Speech	

- From Thought to Speech
2. The Speech Chain
 - Linguistic Parameter
 - Physiologic Parameter
 - Acoustic Parameter
 - Perceptual Parameter
- B. The Respiratory System 15 %
1. Speech Production
 - Neurophysiology of Speech
 - Respiration
 2. Research Tools in Respiratory Analysis
 3. Techniques for Studying Respiratory Output
- C. The Laryngeal System 15 %
1. Speech Production
 - Phonation
 2. Research Tools in Laryngeal Function
 3. Techniques for Studying Laryngeal Activity
- D. The Articulatory System 15 %
1. Speech Production
 - Articulation and Resonance
 2. Research Tools in Supralaryngeal Movement
 3. Techniques for Studying Articulatory Movements
 4. Speech Production
 - Feedback Mechanisms in Speech
 - Models of Speech Production
 - Production of a Sentence
- E. Acoustics and Acoustic Analysis of Speech 20 %
1. Pioneers in Speech Science
 - Hermann Von Helmholtz
 - Henry Sweet
 - Alexander Graham Bell
 2. Acoustics
 - A Pure Tone
 - Complex Tones
 - Frequency and Pitch
 - The Decibel
 - Intensity and Loudness
 - Velocity of Sound Through Space
 - Wavelength

- Resonance
- Acoustics and Speech
- 3. Research Tools in Acoustic Phonetics
- 4. Sound Waves and Their Propagation
 - Physical and Psychological Parameters
 - Transmission Mediums
 - Resonance Phenomenon
- 5. Acoustic Theory of Speech Production
 - Source Spectrum
 - Transfer Function
 - Radiation Characteristics
- 6. Acoustic Recording and Measurement Equipment

- 7. Speech Production
 - Acoustic Theory of Vowel Production
 - English Speech Sounds

F. Synthesis of Speech Signals

- 1. Pioneers in Speech Science
 - Homer W. Dudley
 - Franklin Cooper
 - Alvin Liberman
 - Pierre Delattre
- 2. Speech Perception
 - The Listener
 - Hearing
 - Perception of Speech
- 3. Research Tools in Speech Perception
- 4. Synthetic Speech Techniques
- 5. Compressed and Expanded Speech
- 6. Computerized Speech

15 %

G. Theories of Speech Perception

- 1. Speech Perception
 - Neurophysiology of Speech Perception
 - Theories of Speech Perception

10 %

EVALUATION METHODS

Three (3) Power Essay examinations will be given with each

exam composed of four (4) essay questions. Grading of each question will be on the basis of one point for each concept, factual point, or graphic representation and/or labeling. Each exam will be graded by summing the points on each section and comparing that total to a scale representing specific letter grades. Averaging the three examination scores at the end of the semester will be the basis of the final letter grade. The following scores represent the ranges for all letter grades:

A = 90-100
B = 80-89
C = 70-79
F = 0-69

REQUIRED TEXTBOOK, SUPPLEMENTAL BOOKS AND READINGS

Textbook: Borden, G.J. and Harris, K.S. (1984). Speech Science Primer: Physiology, Acoustics, and Perception of Speech. Baltimore, MD: Williams & Wilkins.

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- Bernthal, J., & Beukelman, D. (1978). Intraoral air pressure during the production of /p/ and /b/ by children, youths, and adults. Journal of Speech and Hearing Research, 21, 361-371.
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- Cullinan, W., & Tekieli, M. (1979). Perception of vowel features in temporally-segmented noise portions of stop-consonant cv syllables. Journal of Speech and Hearing Research, 22, 122-131.
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- utterance length on the pressure characteristics of English /p/ and b/. Journal of Speech and Hearing Research, 26, 111-117.
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- articulation-disordered children. Journal of Speech and Hearing Research, 30, 171-184.
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Koenigsknecht, R. (1976). Development of the voicing contrast: A comparison of voice onset time in stop perception and production. Journal of Speech and Hearing Research, 19, 93-111.

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LaRiviere, C., Winitz, H., & Herriman, E. (1975). The distribution of perceptual cues in English prevocalic fricatives. Journal of Speech and Hearing Research, 18, 613-622.

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- Lehiste, I. Information conveyed by vowels.
- Lehiste, I. Transition and release as perceptual cues for final plosives.
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