MIKE CURB COLLEGE OF ENTERTAINMENT AND MUSIC BUSINESS
COURSE SYLLABUS

Course # / Title: AET 4230 Auditory Perception and Hearing Science
Course Credit Hours: 3 hrs.
Semester: Spring 2010
Instructors: Wesley A. Bulla, B.M., M.M.E., Ph.D.
            Kent Walker, B.A., M.M, Ph.D. candidate
Instructor Contacts: wesley.bulla@belmont.edu 615.460.6272
                    kent.walker@belmont.edu 615.460.5435
Instructor Office Hours: 9:00 AM - 4:30 PM M-F
Class Location: MCREMS B25 (Massey Center R. E. Mulloy Studios room B25)
Meeting Time(s): MW 4:00-5:15 PM
Final Exam: Friday, May 07 2010, 7:00-9:00 PM

Course Description:

This course is a study of auditory perception, psychoacoustics, and hearing science as it relates to audio engineering, sound recording, and music production.

Course Outcomes: At the end of this course, the student will be able to:

• Recall facts and detailed information about the neurobiological organization of the auditory system.
• Explain the function, significance, and parameters of the mechanisms of aural processing.
• Evaluate and contrast writing and research on auditory perception.

Performance Tasks: During this course, the student will:

• Identify and explain the significance of the physical and neurobiological mechanisms of auditory processing.
• Read, compare, and critique research-based journal articles.
• Assess the parameters of aural stimuli response through the application of critical listening.
• Participate in the design and implementation of a psychoacoustic research project.
• Create a journal-style paper based on the empirical findings from a course-driven perceptual research project.

Assessment Tools: During this course, outcomes mastery will be evaluated by:

• Multiple choice and short-answer tests based on lectures and assigned readings.
• Long-form comprehensive essay exams.
• Participatory implementation of applied research protocols.
• 1st and 2nd drafts of journal-style empirical research paper.

Testing & Assignments:

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<tr>
<th>Activity</th>
<th>Credit</th>
<th>Purpose / Description</th>
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<tbody>
<tr>
<td>1. Quizzes</td>
<td>20 %</td>
<td>Based on reading assignments and lectures, weekly quizzes will assess the student’s knowledge and understanding of the topic. Quiz format will be multiple choice and short-answer.</td>
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<tr>
<td>2. Comprehensive Late-term Exam</td>
<td>20 %</td>
<td>Based on reading assignments and lectures, a comprehensive late-term test will assess the depth of the student’s mastery of the knowledge of the topic. This test is comprised of a series of long-form essay questions.</td>
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<tr>
<td>3. Research Project &amp; Papers</td>
<td>Participation 20 % Draft #1 20 % Final Paper 20 %</td>
<td>1st and 2nd drafts of a research paper (7- to 10-pages plus abstract/charts/graphs/citations) written in AES Journal peer-review submission format. The paper will allow the student to incorporate assigned readings, individual background research, course lecture material, and data from a psychophysical experiment conducted by the class and will demonstrate an assimilation of knowledge gained from original research, lectures, and assigned readings.</td>
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Course & Classroom Policies

Attendance & Participation: Class attendance follows university policy as stated in the current Undergraduate Bulletin. Class participation is expected; attendance and absence will be noted. Points (%) will be deducted from the final grade for unexcused absences. 1 absence, 2 %; 2 absences, 4 %; 3 absences, 6 %; 4 absences, 8 %; 5 absences, 10 %; 6 absences, 12 %; 7 absences, 14 %; 8 absences, the student will be dropped from the class with a failing grade (WF).

Course & Classroom Policies: Materials: Standard classroom materials such as a notebook and writing utensils will be needed. A no. 2 pencil will be required for the multiple-choice quizzes. Copies of readings will be given out in class. Supplemental readings and resources will be posted on the class website at http://campus.belmont.edu/mb/AET4230.

Grade Evaluation: As per CEMB policy, the grade assignment scale for this course is:

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<tr>
<th>Grade</th>
<th>Percent (GPA)</th>
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<tbody>
<tr>
<td>A</td>
<td>94 (4.0)</td>
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<tr>
<td>A-</td>
<td>90 (3.7)</td>
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<tr>
<td>B+</td>
<td>87 (3.3)</td>
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<tr>
<td>B</td>
<td>84 (3.0)</td>
</tr>
<tr>
<td>B-</td>
<td>80 (2.7)</td>
</tr>
<tr>
<td>C+</td>
<td>77 (2.3)</td>
</tr>
<tr>
<td>C</td>
<td>74 (2.0)</td>
</tr>
<tr>
<td>C-</td>
<td>70 (1.7)</td>
</tr>
<tr>
<td>D+</td>
<td>67 (1.3)</td>
</tr>
<tr>
<td>D</td>
<td>64 (1.0)</td>
</tr>
<tr>
<td>D-</td>
<td>60 (0.7)</td>
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<tr>
<td>F</td>
<td>&lt; 60 (0.0)</td>
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Honor Code: It is the responsibility of each student to abide by the Belmont University Honor Code. “In affirmation of the Belmont University Statement of Values, I pledge that I will not give or receive aid during examinations; I will not give or receive false or impermissible aid in course work, in the preparation of reports, or in any other type of work that is to be used by the instructor as the basis of my grade; I will not engage in any form of academic fraud. Furthermore, I will uphold my responsibility to see to it that others abide by the spirit and letter of this Honor Pledge.”

Accommodation of Disabilities: In compliance with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act, Belmont University will provide reasonable accommodation of all medically documented disabilities. If you have a disability and would like the university to provide reasonable accommodations of the disability during this course, please notify the Office of the Dean of Students located in Beaman Student Life Center (460-6407) as soon as possible.

Class Schedule (subject to change)

<table>
<thead>
<tr>
<th>Week</th>
<th>Activities</th>
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| 1    | The ear-brain mechanism and Head Related Transfer Functions (HRTF)  
The scientific method: assemble background evidence, form and test a hypothesis, draw a conclusion.  
*Reading: Are You Hearing What I’m Hearing? (Rumsey) JAES v56, no. 12 Dec 2008* |
| 2    | MLK Day No Class (Jan 18)  
How to read a research paper.  
*Quiz 1: Are You Hearing What I’m Hearing? (Rumsey)*  
*Assignment #1: Are You Hearing What I’m Hearing? (Rumsey)* |
| 3    | Discussion of Rumsey “Are You Hearing What I’m Hearing?”  
Assignment #1 due (Jan 25)  
The ear-brain mechanism: cochlear structure, the organ of Corti, basilar membrane, and sensory cells.  
*Reading: The Ear and How it Works and The Auditory Brain (Mathews)*  
*Reading: The Ears are Analog Part 1 and Part 2 (Bulla)* |
<table>
<thead>
<tr>
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| 4    | Perceptual Audio Evaluation—Theory, Method, and Application  
*Reading:* Chapter 2 from *Perceptual Audio Evaluation* (Beck & Zacharof)  
*Quiz 2:* *The Ear and How it Works and The Auditory Brain* (Mathews) |
| 5    | The ear-brain mechanism cont.: masking curves & critical bandwidth, pitch perception (rate & place), cochlear tuning and auditory neural processes.  
Perceptual audio test: pitch, loudness, & timbre under loudspeaker & headphone conditions.  
*Quiz 3:* *Perceptual Audio Evaluation* (Beck & Zacharof) |
| 6    | Auditory investigation class project planning.  
Perceptual test results analysis and discussion.  
Binaural Hearing: Auditory precedence, summing localization, echo threshold, minimum audible angle, pinna filtering, binaural localization horizontal & vertical.  
Listening Demo: Phase, binaural level differences, masking and auditory beats.  
*Reading:* *Echo Threshold & the Precedence Effect* (Bulla)  
*Reading:* *Auditory Space Perception* (Bulla) |
| 7    | Auditory investigation class project planning.  
Listening Demo: pinna filtering, noise burst w/notch filtering  
Review of auditory space perception: life-cycle of sound in space.  
*Reading:* *AES paper #6323 Localization in the Horizontal Plane* (Jeppesen, Moller)  
*Quiz 4:* *Echo Threshold & the Precedence Effect* |
| 8    | Psychophysical auditory perception class project execution (class projects 1 & 2)  
*Reading:* *Audibility of a CD-Standard A/D/A Loop Inserted into High-Resolution Audio Playback* (Meyer, Moran)  
*Reading:* *Now Hear This: Spatial Hearing* (parts 1 & 2) (Bulla) |
| 9    | Mar. 08-12 Spring Break |
| 10   | Psychophysical auditory perception class project execution (class projects 1 & 2)  
Review of knowledge base to date.  
*Quiz 5:* *Auditory Perceptual Systems* |
| 11   | Analysis & discussion of project data.  
Discussion of Audibility of a CD-Standard A/D/A Loop Inserted into High-Resolution Audio Playback (Meyer, Moran)  
*Reading:* *AES paper #5673 Localization of lateral phantom images in a 5-channel system with and without simulated early reflections* (Corey, Wosczyn)  
*Draft #1 of research paper due.* |
| 12   | Individual meetings for revision of paper draft. |
| 13   | Discussion of AES paper #5673  
*LATE-TERM EXAM* |
| 14   | Individual meetings for revision of paper draft.  
Review late-term exam |
| 15   | Field trip to the Vanderbilt anechoic & reverberation chambers.  
Review of knowledge base to date. |
| 16   | Individual meetings for review of paper.  |
| 17   | Revision and final draft of research paper due. |