PSYC 401A/501A, Principles of Psychophysiology
Spring, 2008, Mondays, 3:00-5:00 P.M.
Room 304 Psychology

Instructor
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424 Psychology
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Phone: 621-4992
Office Hours: W 4:00-5:00, F 1:00-2:00

Course Description
This course will provide an overview of the principles, theory, and applications of psychophysiological assessment. The course has two main goals: a) to provide an introduction to theory and research in major areas of human psychophysiology with a particular emphasis on psychophysiological correlates and physiological substrates of cognition, affect, and psychopathology; and b) to provide an introduction to laboratory techniques and methodological principles in human psychophysiology. The latter goal will be met through didactic as well as experiential means. For this reason, the course is designed to be taken (but not required to be taken) concurrently with PSYC 401B/501B, Psychophysiology Laboratory.

Course Structure
The course will involve a combination of lecture, discussion, and demonstrations. I will bring in samples of physiological signals for us to examine, and if you have psychophysiological data you are interested in examining, please let me know. There is no explicit participation requirement, but you will get more out of the course if you ask questions as they arise. We will be covering technical material, and you should feel quite free to interject your questions as they arise. Each class period, you will hand in a 3x5 card with your name and a question or comment that arose for you in the context of the lecture. This feedback mechanism, in addition to serving to keep attendance, will provide me with feedback in terms of how the material is being understood (or not understood!).

Readings
Readings will be taken from two textbooks, which are available at the Student Union bookstore. One is a rather expensive but comprehensive handbook that will serve as a great reference for those of you who have continuing interest in the field. The other book is out of print, but is available as a nominally-priced FastCopy packet, also at the Student Union Bookstore. Readings will also be taken from other sources, which are available as pdf files for downloading.

The main single source of readings for the course is:


The assigned readings from this text are listed below under the schedule of topics and readings. The other textbook is a programmed-learning text in basic electricity that is available as the FastCopy packet:


You should complete Chapters 1-5 of this programmed text. There will be a pass/fail test covering this material to be administered at the beginning of class 18 February, 2006. You must score above 80% to pass; you may retake the test should you need to do so.
Evaluation
Students in 401A will be evaluated separately from those in 501A. Your grade will be determined by the electricity test (passing gives you 20% of the total points; failing = no points), attendance (10%), your grade on a research proposal paper (40%, details to follow, due 5 May, 2006, 3 pm), and your performance on a take-home final (30%, due 12 May, 2006, noon). The take-home final will be given to students on the last day of class and be due one week later during the final exam time. Late papers or exams will receive a 10% reduction in possible points for each day such papers or exams are late.

Your letter grade will be determined in the following way: The highest total score (based on the electricity test, attendance, the paper, and the take home final) attained by any student in the class (for 401A and for 501A, considered separately) will become the reference score for grading. There will therefore be one reference score for 401A, and one for 501A. The student(s) with this highest total score will receive a grade of 100%. All other students will receive a percentage grade based upon this highest score, and the following scale will be applied:

- 90% & above = A
- 80%-89% = B
- 70%-79% = C
- 60%-69% = D
- Below 60% = Fail

Incompletes
Short of major medical illness or global catastrophe, there is virtually no reason I will award an incomplete grade for this course. Incompletes merely move a crisis from one time to another.

Academic Integrity
Cheating and plagiarism on any exam or the paper will result in a failing grade for the course, a notice will be sent to the Dean’s office, and expulsion from the University of Arizona can result. Plagiarism is defined as any case where one person tries to take credit for the ideas or work of another, including fellow students, or published authors.

Tentative Schedule of Topics & Readings

Link to Reading List for Download of pdfs

Link to Podcasts and Lecture Slides

21 January: Martin Luther King Holiday -- University Closed

28 January: Overviews


4 February: Foundations: Basic Electricity, Neuroanatomy and Neurophysiology

11 February: *Electrodermal Activity: Basics and Application to Polygraph Testing*


18 February: *BASIC ELECTRICITY TEST ADMINISTERED AT START OF CLASS*

Catch Up Class: Electrodermal Activity continued, Possibly The Oculomotor System


25 February: *Cardiovascular Psychophysiology*


3 March: *The Skeletomotor System*


10 March:  *The Electroencephalogram, Basics in Recording EEG, Frequency Domain Analysis and its Applications I -- Mood Disorders & Emotions*


17 March:  *Spring Recess!!!!!!!!!!*

24 March:  *Frequency Domain Analysis and its Applications II -- Oscillatory and "40 Hertz" Phenomena*


31 March:  *The Polysomnograph and Issues in Sleep Research*


7 April:  *The Event-Related Potential: Basics and Applications (CNV, early components & P300)*


14 April:  *More Applications of the ERP: P300, N400, ERN*


21 April:  **Functional Neuroimaging: PET and fMRI**
neuroimaging. In J.T. Cacioppo, L.G. Tassinary, & G.G. Berntson (Eds.). *Handbook of
220-232.
Amsterdam: Elsevier.*

28 April:  **Advanced Signal Processing I**
Neuroscience Methods.*
Canolty, R.T., Edwards, E., Dalal, S.S., Soltani, M., Nagarajan, S.S., Kirsch, H.E., Berger, M.S.,
Barbara, N.M., & Knight, R.T. (2006). High gamma power is phase-locked to theta oscillations in
human neocortex. *Science, 313,* 1626-1628. (see also the supplemental material if interested)

5 May:  **(PAPER DUE 3 PM) Advanced Signal Processing II**
Romani, G.L. (Eds.), *Auditory Evoked Magnetic Fields and Electric Potentials. Advances in
Audiology, 6,* (pp. 40-69). Switzerland: Basel, Karger.
Urbach TP. Kutas M. (2002). The intractability of scaling scalp distributions to infer neuroelectric
*Trends in Cognitive Sciences, 8,* 204-210.
trial coupling of concurrent EEG and fMRI identifies the dynamics of performance monitoring.
*Journal of Neuroscience, 25,* 11730 –11737.

12 May:  **FINAL EXAM DUE NOON**

**Other recommended sources for the seriously inclined:**
Publishing. (Note, there is also a 2004 edition)
Associates.
Thompson Publishing.
Supervising Instructor: John JB Allen (jallen@u.arizona.edu)
Laboratory Teaching Assistant: Jim Cavanagh (jimcav@email.arizona.edu)

Laboratory Location
Laboratory sessions will take place in the Psychophysiology Laboratory, room 409 Psychology. This is a research laboratory, but times will be made available for class members to conduct experiments, under the supervision of the teaching assistant, in the laboratory.

Meeting Times and Important Dates

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<tr>
<th>Lab Mtg</th>
<th>Report Due</th>
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<tbody>
<tr>
<td>Feb 14</td>
<td>4:00-7:00</td>
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<tr>
<td>Feb 28</td>
<td>4:00-7:00</td>
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<td>Mar 27</td>
<td>4:00-7:00</td>
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<td>Apr 17</td>
<td>4:00-7:00</td>
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<td></td>
<td>Skin Conductance (2/28)</td>
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<td>Cardiovascular (3/13)</td>
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<td></td>
<td>EEG (4/10)</td>
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<td>ERP (5/1)</td>
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Description
Psychophysiology Laboratory must be taken concurrently with PSYC 401A/501A, Psychophysiology Seminar. The objective of the laboratory is to provide a pragmatic "hands-on" experience in psychophysiological recording and analysis. The laboratory will involve learning the many facets of psychophysiological signal acquisition and analysis. Four experiments will be conducted, each involving different response systems, offering you the opportunity to gain experience acquiring, analyzing, and interpreting autonomic and electrocortical psychophysiological measures.

Evaluation
For each experiment, students will be required to write an APA-style method and results section. These four papers will form the basis of your grade for the lab.

Experiments to be conducted

Experiment 1: Skin-conductance Guilty Knowledge Technique
Experiment 2: Electrocardiographic (EKG) responses to stress
Experiment 3: Frontal electroencephalographic (EEG) spectral changes
Experiment 4: Event-related brain potentials (ERPs)

Readings:
Readings will be provided as required in addition to the following, which should be read in advance of the first laboratory session: