

# *Human Psychophysiology*

PSYC-305 • Fall 2002

## **Instructor Information**

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## **Course Overview**

Psychophysiology deals with the relation of human psychological states, dispositions, and processes to physiological responses measured, for the most part, by non-invasive procedures. Although specialized with respect to methodology, the field is broad with respect to subject matter, cutting across the many sub-disciplines of psychology as well as having deep roots in physiology and neuroscience. This course is intended to introduce you to basic psychophysiological concepts and laboratory methods, and to expose you to some of the research and practical problems to which psychophysiological techniques have been applied.

*Human Psychophysiology* combines elements of a lecture and a laboratory course. Class sessions and reading assignments will address basic physiology, measurement concepts, and psychophysiological research. Between class meetings, you will take part in structured laboratory exercises designed to demonstrate some of the phenomena and research protocols you have encountered in lectures and reading, and to give you direct experience with the recording equipment. You and your classmates will serve as the subjects for most of these exercises, although for one exercise our subjects will be PSYC-100 volunteers.

## **Course Requirements**

### ***Responsibility: Attendance, Reliability, and Timeliness***

Most of your coursework will be conducted in small teams. Teams function well only to the degree that individuals contribute reliably to their coordinated actions. A high degree of personal responsibility is, therefore, a course requirement.

For starters, our course structure is such that *your attendance at all scheduled class periods is mandatory*. If you are absent, you may miss important information and turn a subsequent lab session into a train wreck. Since the data you collect are the basis for everyone's analytic work, such disasters are unacceptable. Your absence may also make it difficult for your teammates to schedule lab time, work sessions, etc. So, if you *must* miss a class period because of illness or an unavoidable schedule conflict, contact me in advance (by phone or email) so that we can plan around you—and maintain contact with your teammates!

I expect you to be reliable in keeping laboratory appointments. If you are scheduled to be in the lab at a particular time, then *be there*—and be there *on time*. Missing an appointment inconveniences your teammates (and, even worse, possibly a volunteer subject). Your absence or tardiness may force the run to be cancelled, disrupting our course schedule. Showing up late for a scheduled appointment can result in an overrun that inconveniences those who may be waiting to use the lab after you. *If you are "one of those people" who just can't seem to show up for meetings at the agreed-upon time and place, you have no business taking this course--period.*

**N.B. Should consistent and timely attendance to class or team appointments become a problem at any time, I will dock your grade. Should the problem persist, I will drop you from the course and assign a grade of NE.**

### ***Assignments and Evaluation***

**Lab Exercises.** If all goes as planned, you will complete six lab exercises over the course of the semester, five of which will require submission of a lab report for grading (no report will be required for Lab 6). Detailed written protocols for each of these labs are available on the course website. Working in small teams, you will conduct a lab, typically with each team member cycling through the role of subject; perform required analyses; and submit a written report. For labs 1 through 5, I will process your recordings and provide you with a data file and a set of questions, some pertaining to the data and some pertaining more generally to the topic of the lab. Your team will analyze the data and submit written answers to the questions. I will evaluate these reports for accuracy, completeness, clarity, and—especially with respect to the figures that you prepare—*neatness*. All members of the team will receive the same grade for the lab in question, with one exception: Serious in-lab performance problems could result in a penalty for responsible team member(s) only. Note that team memberships will be shuffled for each lab exercise.

Learning to operate and troubleshoot sensitive recording equipment is an essential part of psychophysiological research, so I will also evaluate your performance in the laboratory. I can't stand beside you during all of your work, but the recordings that you make will allow me to peek over your shoulder *post hoc*. I'll be scrutinizing these recordings for evidence of the care and craft you brought to the exercise. Did you follow the instructions? Did you apply electrodes and transducers skillfully? Did you monitor the equipment closely, trouble-shoot problems when they arose, and obtain good, clean recordings; or did you sit and stare at a physiologically-nonsensical trace on a screen for 20 minutes and never give it a second thought? (I've seen plenty of the latter, believe me.) These are the kinds of questions I'll be asking when I look at your data. The list below is intended to give you some idea of the range of lab performances:

- **Clean run:** The lab protocol was followed to the letter, good recordings were obtained, data were stored in the right place. Lab, electrodes, and clean-up area clean and neat.
- **Minor problems:** Non-critical waveforms clipped (R-wave clipped in an experiment requiring only IBI data), excessive electrode impedance, data stored in the wrong directory; lab left disorganized or messy, etc.
- **Major problems:** Critical waveform clipped for extended period without correction (e.g., eyeblink in a startle experiment), flat-line in a channel from incorrect electrode application, long periods of uncorrected artifacts in IBI channel, serious errors in execution of the protocol; electrodes or EEG cap cleaned inadequately; disinfection instructions not followed, etc.
- **Train wreck:** e.g., no data recorded because of gross procedural error; previously-recorded data file overwritten, etc.

I *expect* you to make mistakes—but I also expect you to *learn from them*.

**Quizzes.** You will also complete three on-line quizzes covering major concepts from reading assignments and lectures. Quizzes will be posted on our *Blackboard* website and their availability announced by email. Each quiz will remain available for a specified period of time (never less than one week) during which you may take it at your convenience. When a quiz reaches its "expiration date," it will be removed from the website. The quizzes will consist primarily of fill-in-the-blank type questions. Their purpose is to insure that you are doing the reading, paying attention during lectures, and absorbing important information. Quizzes will be the only non-collaborative aspect of the course. Each quiz is to be taken individually and without assistance from any source (human, written, or electronic) whatsoever.

**Grading.** Our small class size precludes my grading on a curve of any sort. I will assign absolute percentage grades ranging from A+ to F to lab reports and quizzes according to the following brackets:

97% = A+	88% = B+	79% = C+	70% = D+
94% = A	85% = B	76% = C	67% = D
91% = A-	82% = B-	73% = C-	64% = D-

Lab exercises 1 - 5 will be equally weighted and together will contribute 70% to your final grade. Lab 6 (for which no lab report will be required) will be worth 10%, and your overall quiz grade will contribute the remaining 20% to your course grade.

All lab reports should be submitted electronically using the Digital Drop Box facility on our *Blackboard* course site. Anticipated due dates for lab participation and lab reports are listed in the course schedule. My fantasy of how things *should* progress and how they may *actually* progress could differ. If it becomes necessary to alter our schedule for some reason, we will do so on the basis of class consensus. However, once a deadline has been "locked in" and agreed to by all, I expect it to be met. Late work will be penalized one grade-step (i.e., 3 percentage points) per day, weekends included.

## Lecture Topics and Associated Reading Assignments

Most of your reading will come from *Psychophysiology: The Mind–Body Perspective*, by Kenneth Hugdahl. A few additional readings may also be required. Such readings will be posted as PDFs on the course website.

### **Introduction to Psychophysiology**

Text Ch. 1 *Introduction*

### **Basic Concepts and Introduction to the Oberlin Psychophysiology Lab**

Text Ch. 2 *Concepts and Terms*

### **Nervous System**

Text Ch. 3 *The Nervous System*

Ch. 4 *The Brain*

Ch. 5 *The Autonomic Nervous System*

**Quiz 1 here**

### Cardiovascular Activity

- Text Ch. 9 *The Heart and Blood Circulation*  
Ch. 10 *Cardiovascular Psychophysiology*

### Electrodermal Activity

- Text Ch. 6: *Electrodermal Activity*  
Ch. 7. *Orienting and Conditioning*  
Ch. 8 *Clinical Applications of Electrodermal Activity*

**Quiz 2 here**

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### Brain Activity

- Text Ch. 11 *The Electroencephalogram*  
Ch. 12 *Event-Related Potentials*  
Ch. 13 *Brain Imaging Techniques*

### Muscle Activity

- Text Ch. 14 *Skeletal Muscles, Eye Movements, and the Respiratory System*

### Detection of Deception

Read about the MERA (multifaceted electroencephalographic response analysis) technique developed by Farwell at <http://brainwavescience.com/FBIRPT4.htm>

**Quiz 3 here**

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## The Honor Code

Team lab projects in this course are explicitly collaborative. Team members are expected to work together to produce lab reports. Cross-consultation among teams is also allowable. However, the final report submitted by a particular team must consist only of analyses, graphics, and text prepared by the team's members (i.e., a team may not copy analytic output, graphics, or text produced by anyone else). Lab reports submitted via *Blackboard's* Digital Drop Box must contain a title page displaying the lab number followed by the Oberlin Honor Pledge (i.e. *I affirm that I have adhered to the Honor Code in this assignment*) above the names of all team members. This arrangement will serve in lieu of a personal signature as each student's guarantee that the abovementioned rules were followed in the preparation of the report.

Quizzes will be posted online. Each is to be completed individually within the allotted time and without any assistance of *any* kind (no books, notes, electronic resources, or interpersonal communications). Each quiz will end with a statement of the Oberlin Honor Pledge which the student must endorse (i.e., mark "True") before the quiz is submitted.

## A Priori Apology

We will be dependent on electronic equipment and computer software that sometimes appear to be haunted or subject to random quantum-mechanical fluctuations. It will take a great deal of my time and energy to shepherd us through the semester, and I cannot promise that things will always go smoothly. I would appreciate your patience and understanding, and I hope that you will remain flexible should problems arise.