Physiological Psychology (PSY 326)

Fall, 2006 MW 12:30 – 1:45 TR 8:00 – 9:15 Bush 160

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Office hours by appointment

Text: Biological Psychology, 9th Edition, James W. Kalat
Additional readings provided on Blackboard

Overview and Course Objectives

Physiological psychology is the study of the mind and behavior using biological methods. While most experimental branches of psychology study mind and behavior by manipulating the environment of the organism, physiological psychologists may manipulate the organism itself. This very powerful approach has provided a great deal of information about classic psychological issues like sensation and perception, motivation, emotion, attention, learning and memory, language, and even consciousness. This course surveys broadly the contributions of the biological approach to psychology.

This course is also two for the price of one – in addition to learning more about psychology, it will be necessary to learn quite a bit of biology. Particularly the first part of the course and much of the lab work will deal with neuroanatomy and neurophysiology.

In my opinion, many textbooks in this field (and many researchers as well) make the mistake of emphasizing the biological or medical fruits of physiological psychology. Our emphasis will be on psychology. On the other hand, I personally feel it is unconscionable for a student of psychology to be ignorant of neural processes, virtually regardless of their eventual focus in psychology. So we will aim to obtain a basic understanding of neural biology as well.

Assessment

The surest way to learn the material is to keep up on the reading and to take notes actively in class. I tend to think of the text book as supporting material, but my lectures are the primary material for the course. If you miss a lecture, I recommend you get notes from a colleague, study the notes, and then meet with me to review what you cannot glean from the notes. I do not have time to give lectures more than once, but at the same time you've hired me with your tuition money to teach this material, and I do not at all begrudge reviewing material outside of class time, so long as you come in with specific questions. The best thing to do is to email me with a list of possible meeting times.

There will be 5 exams, one writing assignment, and a lab research project.

Exams. Exams will be in-class. Two will be during lecture sessions, and will be a mix of short answer and one longer essay; the Final Exam will be similar. One exam will be in the lab where you will identify brain areas. One exam will be a 10-minute oral exam.

Writing Assignment. For the research critique assignment, I will provide a list of 6 recent articles. You choose one to summarize and critique and then propose a follow-up study in a 6-8 page typewritten paper. (See Blackboard for more details.)

Lab Project. We will run rats in a physiological psychology experiment. Animals will be run in team fashion outside of class hours in my research lab. I have an experiment vaguely in

mind that will require some light-weight physiological methods; probably injection and possibly a minor surgical procedure.

I believe even an undergraduate physiological psychology course should provide the opportunity to engage in real research in the field. At the same time, I believe that anyone who has medical, ethical, or emotional difficulties in conducting semi-invasive procedures on rats or mice should not be prevented from taking this course. Therefore, you can elect any of three options to complete this requirement:

a. Minor participation. In this case, you elect not to participate in the project except when we discuss the design and the results. We can discuss an alternative project (individual or group) or writing assignment to take the place of participation.

b. Medium participation. In this case, you elect to contribute to running animals in behavioral tests and possibly observing the physiological procedures, but you do not wish to perform these procedures. This is all I expect of you for this course.

c. Maximum participation. In this case, you want the opportunity to learn and perform the physiological procedures (which may include injection and/or surgery) in addition to contributing to running rats or mice in behavioral procedures. I am not requiring maximum participation, nor does choosing this provide any "extra credit" in the course. But those who want the opportunity to learn these skills should have the option to do so – particularly if working in my lab or going on to a career in research seems like a possibility to you.

In addition to the group project, we will "meet the animals" and discuss handling and animal care in an early lab session. I would like everyone to participate, but anyone with severe rodent allergies should see me prior to this lab.

Grading

The 7 components of your grade contribute as follows:

In-class exams:	3 x 16% = 48%
Oral exam:	10%
Lab exam:	12%
Lab project:	10%
Research critique:	20%

The grading scale will be determined at the end of the semester based on the distribution of final scores. In my courses in the past, A-level work is usually achieved by students earning < 90% of the total possible points. I do not want to publish a grading scale in advance except to say that achieving 90%, 80%, 70%, or 60% will earn you at least an A, B, C, and D, if not better. My philosophy is to challenge you with integrative questions on exams, but not to penalize you for failing to answer completely. In many cases getting a question "half right" is a B-level response, but 50% by a normal grading scale would be a failing grade.

Make-up Policy

I'm pretty reasonable. My expectation is that you're in this class because you want to learn the material. I also presume I am teaching adults. If you anticipate needing to miss an exam date or a deadline, or if you had an emergency that necessitated missing a date, you may request a make-up exam or a waiver of point deduction for a missed deadline. Such requests should be timely, and must be submitted in writing. I will not entertain face-to-face or phone requests. Written requests should be submitted as a formal memo (can be attached to an email) and should contain all of the information I would need to evaluate your request.

Schedule

In general, we will have lecture in Bush 160 on Tuesdays and Thursdays, and will have Lab/Discussion on Mondays and Wednesdays, in which the class will be split into a Monday group and a Wednesday group. These lab groups will occasionally meet in Bush 160, but the location may vary, so be sure you are up to date.

There are a couple of exceptions to this schedule. The first week and the last two weeks, we will meet every day as a group. The third week, because of the Labor Day holiday, the Monday lab will meet on Thursday instead. Because of Fall Break, we will all meet on Wednesday, October 11 for the Animal Handling and Ethics lab. Finally, we will all meet on Wednesday, November 1 for a belated Halloween edition of Physio lab. That Monday will be an optional Exam review session.

Readings. Readings assigned come from the Kalat text ("module" numbers). If you see this symbol: 📚, there is also an additional reading for the class that can be found on the course webpage (Blackboard). All readings should be done before class, and you should bring a copy of the reading for the paper conference on October 16 and 18.

DATE			TOPIC	READING
AUG	21	M	Why brains? What is physio psych?	
	22	T	The mind-body problem	M 1.1 & 📚 [1]
	23	W	Lab lecture: Neuroanatomy	M 4.1
	24	R	Lab lecture: Neuroanatomy	M 4.2
	29	T	Neurons and glia	M 2.1
	31	R	Action potentials	M 2.2
	M,W Labs		Sheep brain I	
SEP	5	T	Postsynaptic receptors	
	W,R Labs		Sheep brain II	
	12	T	Synaptic integration	M 3.1
	14	R	Neurotransmitter systems	M 3.2
	M,W Labs		**Oral exams**	
	19	T	Drugs	M 3.3, 15.1
	21	R	Catch up and review	
	M,W Labs		Rat brain histology	
	26	T	**Exam 1**	
	28	R	The psychology of vision	📚 [2]
	M,W Labs		Neuroanatomy self-test and review	
OCT	3	T	The retina	M 6.1
	5	R	Visual cortex	M 6.2
	M,W Labs		**Lab Exam**	
	12	R	Form and Color	📚 [3]
	W Labs		Animal handling, care, and ethics	
	17	T	Seeing motion	📚 [4]
	19	R	Visual development	M 6.3 & 📚 [5;6]
	M,W Labs		Special topic: fMRI (paper conference)	📚 [7]
	24	T	Audition and sound localization	M 7.1
	26	R	Somatosensory maps and plasticity	M 7.2 & 📚 [8]
	M,W Labs		Outline and scheduling session: lab group project	📚 [9]

	31	T	**Exam 2**	
NOV	2	R	Thirst and salt appetite	M 10.1 – 10.2
		M	Optional Exam 2 review session	
		W	*** All meet Wednesday for the Halloween Edition of Physio Lab ***	
	7	T	Hunger	M 10.3
	9	R	Caloric restriction	[10]
	M,W Labs		Lab project	
	14	T	Movement I	M 8.1 – 8.2
	16	R	Movement II; **Research Critique and Proposal Due**	M 8.3
	M,W Labs		Lab project	
	20	M	The search for the engram: simple learning	M 13.1
	21	T	Long-term potentiation and synaptic plasticity	M 13.2
	27	M	Memory and relational learning	
	28	T	Sleep and plasticity	M 9.2 – 9.3
	29	W	Your choice (pick a module, any module)	
	30	R	Wrap-up and exam review	
DEC	4	M	**Final Exam – 2:00 – 4:00 pm**	

Additional Readings ()

1. Sheinberg DL, Logothetis NK: **The role of temporal cortical areas in perceptual organization**. *Proc.Nat.Acad.Sci.USA* 1997, **94:**3408-3413.

2. Goodale MA, Westwood DA: **An evolving view of duplex vision: separate but interacting cortical pathways for perception and action**. *Curr.Opin.Neurobiol.* 2004, **14:**203-211.

3. Kobatake E, Wang G, Tanaka K: **Effects of shape-discrimination training on the selectivity of inferotemporal cells in adult monkeys**. *J.Neurophysiol.* 1998, **80:**324-330.

4. Salzman CD, Britten KH, Newsome WT: **Cortical microstimulation influences perceptual judgements of motion direction**. *Nature* 1990, **346:**174-177.

5. Blakemore C, Cooper GF: **Development of the brain depends on the visual environment**. *Nature* 1970, **228:**477-478.

6. Annis RC, Frost B: **Human visual ecology and orientation anisotropies in acuity**. *Science* 1973, **182:**729-731.

7. Bartels A, Zeki S: **The neural basis of romantic love**. *Neuroreport* 2000, **11:**3829-3834.

8. Xerri C, Stern JM, Merzenich MM: **Alterations of the cortical representation of the rat ventrum induced by nursing behavior**. *J.Neurosci.* 1994, **14:**1710-1721.

9. Markison S, St.John SJ, Spector AC: **Glossopharyngeal nerve transection does not compromise the specificity of taste-guided sodium appetite in rats**. *American Journal of Physiology: Regulatory, Integrative, and Comparative Physiology* 1995, **269:**215-21.

10. Vasselli JR, Weindruch R, Heymsfield SB, Pi-Sunyer FX, Boozer CN, Yi N, Wang C, Pietrobelli A, Allison DB: **Intentional weight loss reduces mortality rate in a rodent model of dietary obesity**. *Obes.Res.* 2005, **13:**693-702.