

Course: 830:311 *Learning Processes*, Fall 2017 (index 09577 or 18237)

Day, Time, Location: T, Th (5:00-6:20, Ph115 [09577, section 04] or 6:40-8:00, SEC111 [18237, section 2])

Instructor: Dr. Louis Matzel (Office hours: T, 2:30-4:00, or by appointment, or if you can catch me)
Busch Psychology, Rm 313 phone: 848/445-5940 email: matzel@psych.rutgers.edu

Book: Domjan, M., *The Principles of Learning and Behavior*, 7th ed. Our bookstore will carry a custom edition (it will say something like "Rutgers University 7th Edition") that does not include an active learning section or a hard cover. This custom edition will save you about \$60. (However, you should know that as a custom edition, it will be harder to sell outside of Rutgers.) If you have cheap or easy access to the regular edition, that will work fine. I also think that there are electronic versions available. Note though that my lectures make only loose contact with the book (the book provides background info, but the tests are drawn *only* from material in the lectures), thus older editions of Domjan (all the way back to even the 4th edition) will suffice. In the end, the cheapest book that you can find will be fine. **Do NOT interpret any of the above to mean that you do not need the book!! I am assigning the book for a reason; it will clarify my lectures, provide background information, provide a good source of review, and will provide depth in areas that I do not explicitly cover in class. If you don't read the book, the lectures will be hard to follow!**

TA: Dylan Crawford (Dylan.crawford@rutgers.edu ; office hours TBA)

The TA's primary function is to make your exams available for you to review. Since I am the guy who teaches the material, makes the exams, and assigns the grades, it's probably best to see me with any questions about the material. Throughout the semester, the TA will have your exams (I will *never* have them). If you want to look at your exams (and you *should*), you **MUST** see the TA, then you can see me with any questions that you have.

Final Exam Time: Not yet determined, check the final exam web page.

Description: This course is as a survey of the processes that underlie the acquisition, storage, and expression of learning in animals (including humans). The acquisition of knowledge (i.e., learning) pervades every aspect of our lives, influencing our thoughts and behavior in sometimes intuitive and in other times perplexing ways. As psychologists, we must understand these learning processes if we are to understand the complexity of behavior.

Under most conditions, learning cannot be directly observed (owing to its being a mental *process*). Consequently, to study learning we use behavioral measures from which we *infer* that learning has occurred. For this purpose, we will often study nonhuman animals as with these animals it is possible to control behavior in an organized way. For the purposes of this course, we will assume that species differences (e.g., between human and nonhuman animals) are quantitative as opposed to qualitative, and as such, the general processes underlying learning in one species will apply to other species. (Note that in some instances, human learning *is* qualitatively different than animal learning, e.g., in the case of language acquisition. These are topics that are primarily covered in other classes. In *this* class, we will discuss basic processes that are common to both human and non-human animals.) Do not expect each of the *behaviors* that we discuss to have a direct analog in human behavior (just look at the attached videos!). For the most part, behaviors are used as tools to study mental processes, and the behaviors may not be interesting in themselves. This is a *critical* distinction, as those who fail to recognize it will often make the mistake of concluding that the behaviors we discuss throughout this course have no direct analog in human behavior and will quickly become bored. Remember, it's the *process* that the behavior reveals that matters!

I have arranged the course to cover nine topic areas that are of fundamental interest to modern learning theorists (and to me) and which in total provide a broad overview of the sometimes narrow/esoteric issues covered in your text. While discussing each of these topics, we will introduce many related concepts. To understand the material that we cover in class, you should be familiar with the material in the book, as it provides a foundation for the lectures. **Much of what I will discuss in class does not appear anywhere in the book.** If you don't understand something in the book, or want me to discuss something in the book that I haven't covered, or want clarification of what we talk about during lectures, *please* ask questions (or make comments) during class! Discussion helps us all understand the material a little better. Additionally, I can always talk to you about the material during my office hours (or any other time that you can catch me) and I respond to email when possible (but often not on the night before an exam, and *usually* not on the morning before an exam). Again though, it is a good idea to discuss things in class. Discussion means that you are thinking, and thinking will assure you a good grade. I'll say it again: **THINKING DURING CLASS WILL ASSURE YOU A GOOD GRADE!!!** You'll have plenty of time later for Facebook.

Course requirements and grading: Very simple: three tests. The first two tests will each be worth 30% of your grade, and the final is worth 40%. The final is *not* cumulative, but you must understand the material from earlier in the semester in order to understand the later stuff (i.e., you *cannot* do well on the final if you simply forget the material from earlier in the semester). In a class this large, I usually restrict my exams to multiple choice, but an essay question is possible. The only time I give make-up exams is if you provide me a *written* explanation of a *verifiable* emergency. (I'll probably not feel well at times this

semester, but I will still be in class.) My make-up exams are given on the reading day at the start of the final exam period (sometimes falling on the day before the final exam), and are usually comprised exclusively of essay questions. If you miss an exam, it is *your* responsibility to contact *me*.

This is **important**: don't expect to simply memorize words or facts and do well on my exams; you need to *understand* the material, *particularly* the concepts. This latter point is important; *don't busy yourself memorizing what I say in class!* Instead, **think about** what I say in class. In these regard, I should also note that it is not important that you write down every word that I say; instead, *think about what is being said!*

Because of an increasing tendency of students to try to persuade me to change their grade after the semester is over, let me be *very explicit*: I will give anyone as much help as they need *to prepare for tests* during the semester, and if you need to get extra help, or want to do "extra" work (i.e., prepare more, think more, study harder, talk to me more...), the time to do so is during the semester. Once you take the final exam, there is *nothing* you can do to change your grade, and I will *never* let you do "extra credit" to improve your grade (although I may occasionally assign extra credit during class).

IMPORTANT, IMPORTANT, IMPORTANT: You being an adult, attendance at my lectures is your choice. But again, **much of what will be covered in class is not in your textbook**, so I *highly* recommend that you come to class. This is an easy class if you pay attention. If you don't come to class, or if you sleep in class, or if you text your friends while in class, or if you play on Facebook while in class, you will probably do poorly. (Here's a clue to having a fuller life: Don't waste time on Facebook and Twitter!) If you don't want to come to class, it is probably best not to take this (or any) course. I should also mention that I have in the past seen the *First Class Notes* and *Scarlet Notes* for my lectures. They are typically full of factual errors and misrepresentations, and in my opinion, are an *impediment* to learning. *They are NOT a substitute for coming to class.* You should be very uncomfortable using anyone else's notes as a substitute for coming to class. The bottom line is, if you make that little effort to come to class and to pay attention while you are here (its less than three hours per week!), you will learn a lot and get a good grade. I also happen to think that the material is fun. I may on one or two occasions give some extra credit for something we do in class. If you miss that class, these assignments *cannot* be made up. **(Here's an anecdote: Last semester we had excellent attendance. Its no coincidence that 86% of the students received a final grade of either an "A" or a "B". Students that regularly missed classes probably failed.)** Remember, if you "only" miss two classes before an exam, you have missed about **20%** of the material for that exam. Hard to do well on that exam if you start with an 80%! On a final note, I will be posting my PowerPoint slides for the semester. ***They are NOT a substitute for attendance. Believe me, you will NOT understand them if you don't come to class!***

The student should obtain an appreciation and knowledge of the following:

1. Historical and modern approaches to our understanding of basic learning processes in human and infra-human subjects.
2. The different ways in which learning occurs - from associative to a more dynamic process requiring behavioral actions on the part of the learning subject.
3. Deficits in learning processes as a component in psychiatric and neurodegenerative disorders.
4. How information is retained in the short term (working memory) so it enables learning and ultimately long-term storage.
5. The nature of intelligence and its impact on learning.

<u>Topic</u>	<u>Week of (all dates are tentative, and subject to change: KEEP UP!)</u>	<u>Relevant Chapters</u>
1. What are the necessary and sufficient conditions for the formation of simple memories? Thorndike, Pavlov, and the origins of the empirical analysis of learning and memory.	September 3	Chapters 1, 3
2. Is learning a <i>reflexive</i> or <i>cognitive</i> process? Tolman, Hull, and the origins of modern learning theory.	September 10	Chapter 4
3. Processing stimuli in combination; learning is an <i>active</i> process! Formal models of learning	September 24	Chapter 2, review Chap 4
Test 1	Thursday, October 12 (VERY tentative!!!)	

4. October 8 Chapters 5, 6, 7
Instrumental learning and schedules of reinforcement: Earning a paycheck
5. October 22 Chapter 8, 9, 10
Aversive control of behavior with punishment: Why do we commit crimes?
Avoidance and escape behavior.
6. November 5 Review Chapters 5, 6
Depression and anxiety: do these disorders reflect a failure to control or predict our environment?
Animal models of dementia.
- Test 2** Thursday, November 16 (VERY tentative!!!)
7. November 19 Chapter 11, 12
Representing space in memory; the “cognitive map”. Memory processes.
8. November 26 Review Chapter 11
Working memory, attentional systems, and animal (that includes human) intelligence.

!!OUR LAST CLASS IS December 12!!

Test 3: Sometime between December 15-22 (look it up!)

Two Definitions of Learning (what’s the difference?):

“[Conditioning] is the process by which an activity originates or is changed through reacting to an encountered situation, provided that the change in activity cannot be explained on the basis of native tendencies, maturation, or temporary states.”

E.R. Hilgard, 1956

“Conditioning is the learning of relations among events so as to allow the organism to represent its environment.”

R.A. Rescorla, 1988

Videos and pictures/text that accompany lectures. You **MUST** look at all of these at the start of the semester (before the second class), then again before the appropriate lectures. They will make the procedures that we talk about in class immediately easy to understand rather than abstractions. The numbers before each video indicate the topic for which each video is most relevant. Many other videos will be shown in class.

1) Shaping a bar-press response (Trial-and-error; Thorndike’s Law of Effect; operant conditioning):
<http://www.youtube.com/watch?v=4TyYX5C8uul&list=UUZGICwh60p09VER10CTn8-A&index=2&feature=plcp>
Note that the green light indicates that food has been delivered.

1) Yes, operant conditioning does operate in the “real world”:
<https://www.youtube.com/watch?v=K6JICVEDfuE>
Is the “functional significance” of shaping a bar press now obvious?

1) Have a look at Pavlov’s Dogs. <http://blogs.smithsonianmag.com/smartnews/2013/02/what-kind-of-dog-was-pavlovs-dog> There are TWO errors in the very FIRST sentence of the accompanying article. Can you figure out what they are? (Hint: One is conceptual, one is technical.) Note that the first dog in the fourth row is in the actual

harness that is used during training.

1) Different forms of conditioned responses to either a light or a tone paired with the delivery of food:

<http://www.youtube.com/watch?v=5WQFygY-gZM&list=UUZGICwh60p09VER10CTn8-A&index=5&feature=plcp>

Note that the red light indicates food delivery.

1) **Fear Conditioning** (15 sec tone followed by brief foot-shock. Note that the animal has previously learned to press the bar to earn food. By the 10th pairing of the tone and shock, the animal suppresses bar pressing during the tone (indicative of learned fear of the tone). <http://www.youtube.com/watch?v=ZIZekx1P1g4&feature=relmfu>

Note that the tone is indicated by the “tone symbol” and the shock is indicated by a “lightning bolt”. Observe that the shock is quite mild (i.e., the animal is clearly agitated by it, but does not exhibit any real pain).

1) **Autoshaped keypeck response:**

<http://www.youtube.com/watch?v=cacwAvvgg8EA&list=UUZGICwh60p09VER10CTn8-A&index=10&feature=plcp>

The round light is the Conditioned Stimulus (CS) and the Unconditioned Stimulus is grain pellets (the delivery is indicated by the illumination of the food hopper). Look carefully at the bird’s beak as it pecks at the key.

2) **Complex Maze** (egocentric, i.e., self-referenced, form of operant learning):

<http://www.youtube.com/watch?feature=fvwp&NR=1&v=Ma8HCM3Z5lc>

3) **Autoshaped keypeck in a long box** (is this behavior “dysfunctional”?):

<http://www.youtube.com/watch?v=KnJPPaiJG6Y&feature=autoplay&list=UUZGICwh60p09VER10CTn8-A&playnext=2>

3) **Habituation of a startle response** (a *nonassociative* form of learning):

<http://www.youtube.com/watch?v=Kfu0FAAu-10&feature=autoplay&list=UUZGICwh60p09VER10CTn8-A&playnext=4>

3) **Omission procedure imposed on an autoshaped keypeck**

<http://www.youtube.com/watch?v=gE6ixMxrCuo&feature=autoplay&list=UUZGICwh60p09VER10CTn8-A&playnext=1>

Note that the bird *really* wants to peck that key!

5) **Operant responding on a fixed schedule**

<https://www.youtube.com/watch?v=MOgowRy2WC0>

6) **Elevated Plus Maze** (test for anxiety/fear/exploration) <http://www.youtube.com/watch?v=PLcX2MbpmDY&feature=related>

7) **Radial Arm Maze** (*can be* guided by spatial cues, but in this case...):

www.youtube.com/watch?v=zBNoNoEB1X0

<http://www.youtube.com/watch?v=y7zQgz0vmWo&feature=related>

Note that this animal has acquired an algorithmic strategy, i.e., “turn left”, to solve the maze. The investigators that are using this maze have incorrectly assumed that the behavior reflects spatial learning.

7) **Water Maze** (non-spatial, visible platform):

http://www.youtube.com/watch?v=MO_G5gXDZAQ&feature=related

7) **Water Maze** (spatial, hidden platform):

<http://www.youtube.com/watch?v=24kDZncAC9M&feature=related>

Animals have feelings too:

www.youtube.com/watch?v=nGeKSicQkPw&feature=my_watch_later_videos&list=WL75B7AC719163AEDE



“You only live once; Make sure it’s enough.”

Lastly, here is a parable, based on a REAL CONVERSATION that took place on the morning of a recent final exam. As with many parables, there is much to be learned...

Here's the background: I give three exams, one of which is the final that is scheduled for TODAY at 10 AM. The first two exams each had 38 questions, and grades for those exams were previously posted as percentages. The exams have been available to review now for a couple of months. My phone rings at 9:00 AM. Here's the conversation:

Caller: Uhh, I have a question about the first two exams. I got a 36% and a 44%. Are those percents [sic] out of 38 or out of 100?

me: "Percents" are out of 100.

.....LONG SILENCE.....

caller: So those aren't good grades?

me: HAVE YOU LOOKED AT YOUR EXAMS!?

caller: Well, I was planning to see the TA.

me: When were you going to do that? Your final is in 60 minutes. Have you missed any classes? (The answer is obvious, since I talk about exam grades in class.)

caller: Only five or six. (My translation: eight or ten or more, which means that he missed more than ONE THIRD of the material.)

.....LONG SILENCE.....

caller: So, would you say those are bad grades?

me: Generally speaking, knowing only 40% of the material is pretty bad.

caller: So do you think I'm failing?

me: As I described in class (if you were there), 60% is my cut-off for a D, so yes, you are failing.

caller: Is there any extra work I could do?

me: There's lot's of work you *could* have done [e.g., , you could have read the book, you could have studied harder, you could have talked to me about the material, you could have looked at your exams, YOU COULD HAVE COME TO CLASS MORE]. However, there's nothing *left to do* now but take the final exam.

Moral of the story: I want to help anyone who *tries*. This class will be easy for you if you come to class, pay attention, and give the material a little bit of thought while we are discussing it. You can stare blankly at your phone *after* class is over. If you need help, I'm in my office every day, but you have to make the effort.