Course: 830:311 *Learning Processes*, Fall 2019

When/Where: M, W (**section 02**, 3:20-4:40, SEC 111, index 13604) OR (**section 03**, 1:40-3:00, PH 111, index 19190)

Instructor: Dr. Louis Matzel (Office hours: W, 12:00-1:30, 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. (This link will give you easy access: http://www.facultybookshelf.org/course/19745). The link leads to our bookstore, and also to an Amazon and electronic rental version (the latter of which is the cheapest option). Note 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. The bottom line: 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 harder to follow and you will need to do more test prep!***

TA: Michelle Rosenthal (Mika@psych.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, you need 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.

Description: This course is as a survey of the processes that underlie the acquisition, storage (memory), 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.

Learning is a mental *process*, and thus under most conditions, cannot be directly observed. Instead, we typically *infer* learning from changes in behavior. However, behavior is often difficult to interpret (thus requiring "control" observations), and can be simplified with the study of nonhuman animals. For the purposes of this course, we will assume that species differences (e.g., between human and nonhuman animals) are often 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 videos suggested at the end of this document!). For our purposes, behaviors are merely 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 that we discuss have no analog in human behavior. If you make this mistake, you will quickly become bored. Remember, it's the *process* that the behavior reveals, not the behavior itself, that usually 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 (I will *not* be discussing everything that is 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. **On the other hand, 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. Its *always* best to clarify the material as it is being discussed, SO ASK QUESTIONS AND MAKE COMMENTS IN CLASS!** *The exams will be EASY if you just think about the material while we are discussing it.* You'll have plenty of time later for Facebook and Twitter, so just put it away during class.

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 or have a

headache 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 to make any arrangements.

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. *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 the concepts*!

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" after the final exam (although I may occasionally assign extra credit during class).

IMPORTANT: You're all adults, and you can decide whether to attend lectures or not. 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 during the lectures. 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. If you don't want to come to class, it is probably best not to take this (or any) course (why *are* you in college?). 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. (**Here's an anecdote: Last year we had excellent attendance. It's 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. If you read somewhere that "it's impossible to get better than a C in this class", it was probably written by someone who didn't come to class, even to hear the discussion of exam grades.**) Remember, if you "only" miss two classes before an exam, you have missed about ***20%*** of the material for that exam. It's hard to do well on an exam if you start with only 80% of the information. 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!***

Some University administrator has decided that we must post "learning objectives". Here they are:

1. Learn to think critically about the nature of psychological experimentation.
2. Understand the processes that underlie basic learning abilities.
3. Understand how learning underlies seemingly mysterious behaviors.
4. Understand how learning contributes to abnormal behavior.
5. Understand how *your* behavior changes with experience.
6. Develop an appreciation for the complexity of behavior and the strategies to interpret it.

Topic	Week of (all dates are *tentative*, and subject to change: **KEEP UP!**)	Relevant Chapters
1.	September 2	Chapters 1, 3
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.		
2.	September 9	Chapter 4
Is learning a *reflexive* or *cognitive* process? Tolman, Hull, and the origins of modern learning theory.		
3.	September 23	Chapter 2, review Chap 4
Processing stimuli in combination; learning is an *active* process! Formal models of learning		
Test 1	Wednesday, October 9 (VERY tentative!!!)	

4. October 7 Chapers 5, 6, 7
Instrumental learning and schedules of reinforcement: Earning a paycheck

5. October 21 Chapter 8, 9, 10
Aversive control of behavior with punishment: Why do we commit crimes?
Avoidance and escape behavior.

6. November 4 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 Wednesday, November 13 (VERY tentative!!!)

7. November 18 Chapter 11, 12
Representing space in memory; the "cognitive map". Memory processes.

8. November 25
Working memory, attentional systems, and animal (that includes human) intelligence. Review Chapter 11

!!OUR LAST CLASS IS Wednesday, December 11!!

Test 3:

13604 Section 02: Dec 20, 2019: 12:00 PM - 3:00 PM
19190 Section 03: Dec 18, 2019: 8:00 AM - 11:00 AM

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. I'll show most of these (and many more) in class. However, you should look at all of these before our second class. 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 and links are usually available on your lecture slides.

1) Shaping a bar-press response (Trial-and-error; Thorndide's Law of Effect; operant conditioning):
http://www.youtube.com/watch?v=4TyYX5C8uuI&list=UUZGlCwh60p09VER10CTn8-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=K6JlCVEDfuE
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-qZM&list=UUZGlCwh60p09VER10CTn8-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=ZlZekx1P1g4&feature=relmfu **Note that there is no sound in this video, so 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=cacwAvgg8EA&list=UUZGlCwh60p09VER10CTn8-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=Ma8HCM3Z5Ic

3) Autoshaped keypeck in a long box (is this behavior "dysfunctional"?):
http://www.youtube.com/watch?v=KnJPPaiJG6Y&feature=autoplay&list=UUZGlCwh60p09VER10CTn8-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=UUZGlCwh60p09VER10CTn8-A&playnext=4

3) Omission procedure imposed on an autoshaped keypeck
http://www.youtube.com/watch?v=gE6ixMxrCuo&feature=autoplay&list=UUZGlCwh60p09VER10CTn8-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: YOU COULD HAVE COME TO CLASS MORE, or seen me during the semester, but at this point there's nothing left to do 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 to come by**.**

Remember, *someone* is paying for your education, and knowing more stuff is always better than knowing less stuff.