**Modeling Seminar: Seminar in Psychology (PSYC 6300) and Special Topics in Psychology (PSYC 4359)**

**Spring 2019**

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**Office Hours:** TTh 3:30-4:30 or by appointment

**Course Web Page:** The course is on Blackboard

**Course description:** Mathematical and computational models of psychological phenomena, using neural networks among other techniques. Processes covered include short- and long-term memory, conditioning, categorization, decision making, and executive function. Some models incorporate known behavioral and cognitive functions of specific brain regions.

**Prerequisites:** Sufficient intellectual curiosity, and willingness to think as if the box doesn’t exist.

**Text**: Levine, *Introduction to Neural and Cognitive Modeling* (3rd edition), Routledge 2019. Book will be available from the author/instructor right after the start of class, at $45 for the paperback edition. In addition there will be student presentations of original articles, mostly on neural network models but including a few on relevant experimental results.

**Learning Objectives**: To give the working experimental psychologist or cognitive neuroscientist a sense of how quantitative techniques can be used not just for data analysis but for illumination of the underlying causes and mechanisms of cognitive and behavioral processes.

**Examinations and Grading**:

There will be no final or midterm examination.

Students will lead class discussions on different articles and on sections of Levine’s book, the number of articles per student depending on the size of the class. (20 pts.)

Students will download MATLAB from MATLAB Key and use it to write code for solving the equations representing 3 of the simpler neural network models (models of pattern learning, perception, and conditioning). This will be a class project due at the end of the semester (40 pts.)

Each student will write a paper of approximately 5-6 single-spaced or 10-12 double-spaced pages length (in 12-point font) describing a model of their own choosing relevant to any area of experimental psychology or neuroscience. This can be either an existing model from the literature or one that the student creates. (40 pts.)

**Attendance**: Students are expected to attend every class period unless they inform me in advance of a legitimate conflict.

**Class schedule (subject to change)**

1/15 to 1/22 *General modeling philosophy and outlook*

Readings: Levine, Chapter 1

Meeter, Jehee, and Murre (2007)

Ashby and Hélie (2011)

Grossberg (2006)

1/24 to 1/29 *Early history of neural networks and artificial intelligence*

Readings: Levine, Chapter 2

Rumelhart & McClelland (1986), Vol. 1, Ch. 1

1/31 to 2/12 *Associative learning, synaptic plasticity, and long-term memory*

Readings: Levine, Chapter 3, pp. 40-49, 54-71

Levine, Appendix 1, pp. 343-355

Kandel and Tauc (1965)

Grossberg (1969a, 1969b, 1972a, 1972b)

Sutton and Barto (1981)

**MATLAB exercise 1 will be Exercise 2 at the end of Chapter 3.** Around this time we will try to schedule a MATLAB tutorial with an expert from the UTA library, possible outside the regular class time.

2/14 to 2/26 *Competition, lateral inhibition, and short-term memory*

Readings: Levine, Chapter 4

Wilson and Cowan (1972, 1973)

Grossberg and Levine (1975)

Hopfield (1982)

Grossberg and Mingolla (1985a, 1985b)

**MATLAB exercise 2 will be Exercise 2 at the end of Chapter 4.**

2/28 to 3/7 *Progress in cognitive neuroscience*

Readings: Levine, Chapter 5

Schultz et al. (1993)

Eichenbaum et al. (2007)

WEEK OF MARCH 11: SPRING BREAK

3/19 to 3/26 *Models of conditioning and reinforcement learning*

Readings: Levine, Chapter 6

Grossberg and Schmajuk (1987)

Daw et al. (2005)

O’Reilly et al. (2007)

**MATLAB exercise 3 will be Exercise 2 at the end of Chapter 6.**

3/28 to 4/4 *Models of categorization, coding, and unsupervised learning*

Readings: Levine, Chapter 7, pp. 216-237

Carpenter and Grossberg (1987)

4/9 to 4/16 *Models of supervised pattern and category learning*

Readings: Levine, Chapter 8

Rumelhart et al. (1986)

Ashby et al. (1998)

4/18 to 4/25 *Models of complex mental functions*

Readings: Levine, Chapter 9

Grossberg and Pearson (2008)

Broniatowski and Reyna (2017)

Brainerd et al. (2014)

4/30 to 5/2 Student presentations of models

(*Grading will only be on the written papers! The oral presentation is for feedback to you and general education of the class.*)

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://wweb.uta.edu/aao/fao/>).

**Disability Accommodations:** UTArlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD).Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: **The Office for Students with Disabilities, (OSD)** <http://www.uta.edu/disability/> or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability).

**Counseling and Psychological Services (CAPS)** [www.uta.edu/caps/](http://www.uta.edu/caps/) or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

**Non-Discrimination Policy:** The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit [uta.edu/eos](http://www.uta.edu/hr/eos/index.php).

**Title IX Policy:** The University of Texas at Arlington (“University”) is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated.*For information regarding Title IX, visit* [www.uta.edu/titleIX](http://www.uta.edu/titleIX) or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or [titleix@uta.edu](mailto:titleix@uta.edu)

**Academic Integrity:** Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents’ Rule* 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University. Additional information is available at <https://www.uta.edu/conduct/>. Faculty are encouraged to discuss plagiarism and share the following library tutorials <http://libguides.uta.edu/copyright/plagiarism> and <http://library.uta.edu/plagiarism/>

**Lab Safety Training:** **[Required for laboratory courses in the Colleges of Engineering and Science where students may be working with chemicals, biological material, radiological material or lasers] Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities.** Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., Fall through Summer II) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Campus Carry:** Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit <http://www.uta.edu/news/info/campus-carry/>

**Student Feedback Survey:** At the end of each term, students enrolled in face-to-face and online classes categorized as “lecture,” “seminar,” or “laboratory” are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback via the SFS database is aggregated with that of other students enrolled in the course. Students’ anonymity will be protected to the extent that the law allows. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:** for semester-long courses**,** a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located [insert a description of the nearest exit/emergency exit]. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

**Active Shooter:** The safety and security of our campus is the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor. Please review the information provided by UTA Police regarding the options and strategies we can all use to stay safe during difficult situations. <https://police.uta.edu/activeshooter>