

## Course Information

Course Number: PSYC 689  
Course Title: Special Topics in Decision-Making  
Section:  
Time: F 10:40 – 12:50  
Location: Online  
Credit Hours: 3

## Instructor Details

Instructor: Dr. Darrell A. Worthy  
Office: PSYC 267  
Phone: (979) 845-3799  
E-Mail: [worthyda@tamu.edu](mailto:worthyda@tamu.edu) (preferred method of contact)  
Office Hours: By appointment

## Course Description

The goal of this course is to expose students to prominent research related to decision making, and to stimulate critical thinking about the research and current directions of the field. The readings for the course come directly from high-impact, peer-reviewed journals, and they cover a broad range of topics related to decision making including classic theories, heuristics and biases, framing, neural systems, neuroeconomics, reinforcement learning, emotion, and neuropsychological issues. The format will allow students to improve their speaking and discussion skills, and the material covered will improve students' knowledge base of one of the most prominent areas of psychology. The course is centered on readings from cognitive psychology and cognitive neuroscience, but students with focuses in other areas of psychology, as well as students in business, economics, and marketing may benefit from the course.

## Course Prerequisites

*None.*

## Special Course Designation

*None*

## Course Learning Outcomes

To gain knowledge of scholarly research on decision-making. This knowledge should help students produce better research and will prepare them for their eventual qualifying examinations. Students are also expected to learn from other students' perspectives. If students conduct research that is related to the work covered in the course, then this course may help those students design better studies that are more likely to be published in top academic journals.

## Textbook and/or Resource Materials

*None.*

*Readings will be distributed via email or on ecampus or canvas (if we are forced to switch from ecampus to canvas).*

## Grading Policy and Requirements

*Group discussion:* The most important contribution each person can make is to actively participate in the discussions of each week's readings. Seminars with intensive, active participation are perhaps one of the most valuable forums for learning in graduate school. Students will come with different perspectives and backgrounds, and the amalgamation of these different views leads to a much richer learning experience for all involved. There is certainly some individual variability in the tendency to participate in these types of discussions, but it is critical to an academic career to develop the ability to do so. To succeed in the field you must be willing to share your ideas in the face of criticism, and the seminar format offers you an excellent opportunity to practice doing so. It is also important to mention any difficulties you had in understanding specific points of the articles.

*Written reactions:* Each person should submit a brief written reaction to the readings that are to be discussed each week. **Reactions will be due to me, via email, by Thursday at 4 PM each week.** The purpose of Reactions should not be simple summaries of the articles. A brief summary is fine to begin the reaction, but the goal is to give your personal reaction, as a scientist, to the contents of the articles. The ideas presented in your reactions can be anything from connections to other research (from this class or elsewhere), to extensions or improvements on the methods used, to new experiment ideas you generated from reading the article, to criticisms of the authors' methods, logic, or conclusions. The minimum length for reactions is one double spaced page, and there is no maximum. The reaction paper is over all three readings, but you do not have to give equal length to all three. All reactions must be submitted as a Word Document (.doc or .docx) or as a pdf. Each reaction paper will be worth 5 points and the reaction paper with the lowest grade will be dropped.

*Presenting articles and leading discussion:* On the first day of class we will assign presenters for each article. Each student will likely have to present at least 2-3 articles during the semester, depending on class size. The presenter is expected to more thoroughly read the material, and should come to class with a general idea of how they are going to present the article. The presenter should first summarize the article, and then discuss implications for other domains, limitations, points of debate or contention mentioned in the article, and other important things to discuss in relation to the article.

*Final exam:* The final exam is open-book and in a take-home essay format. The exam will be emailed to students by noon on Monday April 26rd and must be turned in (via email) by 5 PM on Friday April 30th. There is no class on Friday April 30th, so students may use the normal class time to complete the exam. Each student is required to submit two possible essay questions to me by 5 PM on Friday April 23rd. There is no class scheduled on April 5th, due to a conference I am attending, so students may use the normal class time to develop their exam questions.

## Grading

Group discussion: 50 points

Written reactions: 50 points (Due Thursday by 4 PM before each class)

Leading discussion: 50 points

Exam Questions: 10 points (Due April 23<sup>rd</sup>)  
Final exam: 100 points (Due April 30<sup>th</sup>)

**Final grades will be determined based on the following point system:**

- A - 233-260 points**
- B – 207-232 points**
- C – 181-206 points**
- D – 155-180 points**
- F – 154 or fewer points**

### Late Work Policy

For late weekly reaction papers I will take:

- 1 point off if submitted between 4 PM – 7 PM on Thursday night
- 2.5 points off if submitted between 7 PM Thursday – 10 AM Friday (day of class)
- No credit will be given if submitted after 10 AM on the day of class.

If you are sick and cannot present your article then you can talk to me about possibly making that up; however, please make every effort to present your assigned articles so that the class functions smoothly.

For the late final exams I will take:

- 5 points off if submitted after 5 PM on April 30<sup>th</sup>, but before 9 AM on Monday May 3<sup>rd</sup>.
- An additional 10 points off for each 24 hour period after. For example, if turned in on Monday May 3<sup>rd</sup> at 7 PM I would take a total of 15 points off, May 4<sup>th</sup> would be 25 points off etc.

### Course Schedule

**January 22** Introduction to course, and assignment of articles to weekly presenters.

**January 29 Probability Learning 1**

Shanks, D.R., Tunney, R.J., & McCarthy, J.D. (2002). A re-examination of probability matching and rational choice. *Journal of Behavioral Decision-Making*, 15, 233-250.

Bower, G.H. (1994). A turning point in mathematical learning theory. *Psychological Review*, 101(2), 290-300.

Vulkan, N. (2000). An economist's perspective on probability matching. *Journal of Economic Surveys*, 14(1), 101-118.

Optional:

Estes, W.K. (1950). Toward a statistical theory of learning. *Psychological Review*, 57(2), 94-107.

**February 5 Probability Learning 2**

Kahneman, D., & Tversky, A. (1972). Subjective probability: A judgment of representativeness. *Cognitive Psychology*, 3, 430-454.

Estes, W.K. (1976). The cognitive side of probability learning. *Psychological Review*, 83(1), 37-64.

Bar-Hillel, M. (1980). The base-rate fallacy in probability judgments. *Acta Psychologica*, 44, 211-233.

Optional:

---

Don, H.J., Otto, A.R., Cornwall, A.C., Davis, T., & Worthy, D.A. (2019). Learning reward frequency over reward probability: A tale of two learning rules. *Cognition*, *193*, 104042.

### **February 12 Framing**

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211*, 453-458.

De Martino, B., Kumaran, D., Seymour, B., & Dolan, R.J. (2006). Frames, biases, and rational decision-making in the human brain. *Science*, *313*, 684-687.

Levin, I.P., Schneider, S.L., & Gaeth, G.J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes*, *76*, 149-188.

### **February 19 Judgment and Confidence**

Einhorn, H.J., & Hogarth, R.M. (1978). Confidence in Judgment: Persistence of the illusion of validity. *Psychological Review*, *85* (5), 395-416.

Dawes, R.M., Faust, D., & Meehl, P.E. (1989). Clinical versus actuarial judgment. *Science*, *243*, 1668-1674.

Dawes, R.M. (1979). The robust beauty of improper linear models in decision-making. *American Psychologist*, *34*, 571-582.

Optional:

Grove, W.M., Zald, D.H., Lebow, B.S., Snitz, B.E., & Nelson, C. (2000). Clinical versus mechanical prediction: A meta-analysis. *Psychological Assessment*, *12*(1), 19-30.

### **February 26 Intertemporal Choice**

McClure, S.M., Laibson, D.I., Loewenstein, G., & Cohen, J.D. (2004). Separate neural systems value immediate and delayed monetary rewards. *Science*, *306*, 503-507.

Otto, A.R., Markman, A.B., & Love, B.C. (2012). Taking more now: The optimality of impulsive choice hinges on environment structure. *Social Psychological and Personality Sciences* *3*(2), 131-138.

Peters, J., & Buchel, C. (2010). Episodic future thinking reduces reward delay discounting through and enhancement of prefrontal-mediotemporal interactions. *Neuron*, *66*(1), 138-148.

Optional:

Figner, B., Knoch, D., Johnson, E.J., Krosch, A.R., Lisanby, S.H., Feher, E., et al. (2010). Lateral prefrontal cortex and self-control in intertemporal choice. *Nature Neuroscience*, *13* (5), 538-539.

### **March 5 Memory**

Gershman, S.J., & Daw, N.D. (2017). Reinforcement learning and episodic memory in humans and animals: An integrative framework. *Annual Review of Psychology*, *68*, 101-128.

Mattar, M., & Daw, N.D. (2018). Prioritized memory access explains planning and hippocampal replay. *Nature Neuroscience*.

Shadlen, M.N., & Shohamy, D. (2016). Decision making and sequential sampling from memory. *Neuron*, *90*, 927-939.

### **March 12 Habitual versus Goal-Directed Choice**

- Rangel, A., Camerer, C., & Montague, P.R. (2008). A framework for studying the neurobiology of value-based decision making. *Nature Reviews Neuroscience*, 9, 545-556.
- Linnebank, F.E., Kindt, M., & de Wit, S. (2018). Investigating the balance between goal-directed and habitual control in experimental and real-life settings. *Learning & Behavior*, 46(3), 306-319.
- Chen, Z., Veling, H., Diksterhuis, A. & Holland, R.W. (2016). How does not responding to appetitive stimuli cause devaluation: Evaluative conditioning or response inhibition? *Journal of Experimental Psychology: General*, 145(12), 1687-1701.

Optional:

- Sloman, S.A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin*, 119, 3-22.
- Daw, N.D., Niv, Y., & Dayan, P. (2005). Uncertainty-based competition between prefrontal and dorsolateral striatal systems for behavioral control. *Nature Neurosciences*, 8, 1704-1711.

### **March 19 – Spring Break**

#### **March 26 Exploration/Exploitation**

- Daw, N.D., O’Doherty, J.P., Dayan, P., Seymour, B., & Dolan, R.J. (2006). Cortical substrates for exploratory decisions in humans. *Nature*, 441, 876-879.
- Otto, A.R., Knox, W.B., Markman, A.B., & Love, B.C. (2014). Physiological and behavioral signatures of reflective exploratory choice. *Cognitive, Affective, & Behavioral Neuroscience*, 14(4), 1167-1183.
- Wilson, R.C., Geana, A., White, J.M., Ludvig, E.A., & Cohen, J.D. (2014). Humans use directed and random exploration to solve the explore-exploit dilemma. *Journal of Experimental Psychology: General*, 143(6), 2074-2081.

Optional:

- Cohen, J.D., McClure, S.M., & Yu, A.J. (2007). Should I stay or should I go? How the human brain manages the trade-off between exploitation and exploration. *Philosophical Transactions of the Royal Society B*, 362, 933-942.
- Frank, M.J., Doll, B.B., Oas-Terpstra, J., & Moreno, F. (2009). Prefrontal and striatal dopaminergic genes predict individual differences in exploration and exploitation. *Nature Neuroscience*, 12, 1062-1068.

### **April 2 Reading Day, no classes**

#### **April 9 “Real-world” Decisions**

- Schulz, E., Bhui, R., Love, B.C., Brier, B., Todd, M.T., & Gershman, S.J. (2019). Structured, uncertainty-driven exploration in real world consumer choice. *Proceedings of the National Academy of Sciences*, 116 (28), 13903-13908.
- Thorstad, R., & Wolff, P. (2018). A big data analysis of the relationship between future thinking and decision-making. *Proceedings of the National Academy of Sciences*, 115(8), 1740-1748.
- Neiman, T., & Loewenstein, Y. (2011). Reinforcement learning in professional basketball players. *Nature Communications*, 2(1), 569

Optional:

- Otto, A.R., Fleming, S.M., & Glimcher, P.W. (2016). Unexpected but incidental positive outcomes predict real-world gambling. *Psychological Science*, 27(3), 299-311.

**April 16          Emotion**

- Bechara, A. (2004). The role of emotion in decision-making: Evidence from neurological patients with orbitofrontal damage. *Brain & Cognition*, 55, 30-40.
- Seymour, B., & Dolan, R. (2008). Emotion, Decision Making, and the Amygdala. *Neuron*, 58, 662-671.
- Wu, Y., van Dijk, E., & Clark, L. (2015). Near-wins and near-losses in gambling: A behavioral and facial EMG study. *Psychophysiology*, 52(3), 359-366.

Optional:

- Loewenstein, G.F., Weber, E.U., Hsee, C.K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127, 267-286.

**April 23          Effort**

- Westbrook, A., Bosch, R., van den Maata, J.I., Hofmans, L., Papadopetraki, D., Cools, R., & Frank, M.J. (2020). Dopamine promotes cognitive effort by biasing the benefits versus costs of cognitive work. *Science*, 367(6484), 1362-1366.
- Otto, A.R., & Vassena, E. (2020). It's all relative: Reward-induced cognitive control modulation depends on context. *Journal of Experimental Psychology: General*.
- Chong, T.T.-J., Apps, M., Giehl, K., Sillence, A., Grima, L.L., & Husain, M. (2017). Neurocomputational mechanisms underlying subjective valuation of effort costs. *PLOS Biology*, 15(2), e1002598.

**April 30          No class. Final exam due by 5 PM**

**Attendance Policy**

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

**Academic Integrity Statement and Policy**

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

“Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](#)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at [aggiehonor.tamu.edu](http://aggiehonor.tamu.edu).

## Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit [disability.tamu.edu](http://disability.tamu.edu). Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

## Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's [Title IX webpage](#).

## Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org).

## COVID-19 Temporary Amendment to Minimum Syllabus Requirements

### *Campus Safety Measures*

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the Fall 2020 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring—Students should follow CDC recommendations for self-monitoring. **Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely and should not participate in face-to-face instruction.**
- Face Coverings—[Face coverings](#) (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of face coverings and additional guidance are provided in the [Face Covering policy](#) and [Frequently Asked Questions \(FAQ\)](#) available on the [Provost website](#).
- Physical Distancing—Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students must wear a face covering (or a face shield if they have an exemption letter). If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the [Student Conduct office](#) for sanctions. Additionally, the faculty member may choose to teach that day's class remotely for all students.

### *Personal Illness and Quarantine*

Students required to quarantine must participate in courses and course-related activities remotely and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or illness that is too severe for the student to attend class qualify for an excused absence (See [Student Rule 7, Section 7.2.2.](#)) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7. While Student Rule 7, Section 7.3.2.1, indicates a medical confirmation note from the student's medical provider is preferred, **for Fall 2020 only, students may use the Explanatory Statement for Absence from Class form in lieu of a medical confirmation. Students must submit the Explanatory Statement for Absence from Class within two business days after the last date of absence.**