INTRODUCTION TO BRAIN SCIENCE FOR BUSINESS
MKTG 237/737, Spring 2020 Q3
The Wharton School, University of Pennsylvania

COURSE SYLLABUS

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Overview

Can brain science help business? At first blush, this might seem like a bridge too far. After all, the efficiencies of the market virtually guarantee accurate asset pricing, marketing research and focus groups can test the efficacy of advertising, effective leadership can stimulate innovation and productivity, and sophisticated analytics can leverage big data to improve organizational structure to maximize return on investment. A deeper look, however, provokes the idea that brain science has enormous potential to inform business. We now know the basic architecture of the decision process in the human brain, from identification of choice options, to the calculation of their utility, to selecting one for consumption, and learning from this experience. We are also beginning to understand how fundamental economic principles like risk, ambiguity, and volatility shape these processes, and why these factors seem to influence different people in different ways and in different choice contexts. Importantly, neuroscience provides a powerful tool for understanding the private reasons, such as emotional responses or the influence of others, people make the choices they do- reasons they themselves may not be aware of or even understand. Brain science offers the potential to unlock the mechanisms underlying what many people consider to be the keys to the future of business, including creativity and innovation, empathy and connecting with others, social awareness and the common good, how people use information to guide decision making, and the experience and impact of online vs. live interaction and pedagogy. New developments, including biometrics, implantable and wearable brain interfaces, genomics, proteomics, metabolomics, and the human microbiome, offer the opportunity for enhanced precision not only in marketing and finance, but also in the talent identification and the development of full human potential.

Goals:

This course will provide an overview of contemporary brain science and its applications to business. Students first will be introduced to the basic anatomy and physiology of the brain and become familiar with important techniques for measuring brain function. The course will then survey major findings in neuroscience with applications to business, including selective attention and advertising; valuation and marketing; decision making and the tyranny of choice; learning, innovation and creativity; and social influence, team-building, and leadership. The course will end with a discussion of ethics, brain-machine interactions, and artificial intelligence, and a final poster session where teams will pitch new neuroscience applications for business.

Format:
The course will meet twice weekly. Generally, the first 2/3 of each class will be an interactive lecture, followed by team-based work to develop a business application based on the material presented in class. Students have been randomly assigned to teams and those teams will be endowed with 20 PLATTcoin. Teams will then "wager" for the opportunity to **avoid** presenting their idea to the class. All teams will be required to present once during the course. We will also have two invited speakers from industry who will talk about their experience working at the intersection of neuroscience and business.

Requirements:
Evaluations will be based on two take-home quizzes (25% each), one in-class team-based presentation of an idea for a business application (10%), and a final team-based poster-presentation of a "pitch" applying brain science to business (40%).

Readings:
There are two required texts for the course, "Neuroscience" edited by Purves et al., 2017, Sinauer Press (henceforth NS), Unit V as a downloadable e-book and "Neuroscience for Organizational Change" by Hilary Scarlett, 2016, Kogan Page Press (henceforth NOC). There are also a number of additional readings, including primary scientific articles and popular media, which will be posted on Canvas.

Academic Integrity:
Please re-familiarize yourself with the students' guide to Academic Integrity at Penn (http://www.upenn.edu/academicintegrity/index.html) and the Code of Academic Integrity: (http://www.upenn.edu/academicintegrity/ai_codeofacademicintegrity.html).

You may and are encouraged to discuss class topics with other students in the class. However, your individual and group assignments, responses, and contributions to class are to be your own original work and must truthfully represent the time and effort you apply.

Consult with the instructor if you have any questions about academic integrity expectations for this class. If you are unsure whether your work constitutes a violation of the Code of Academic Integrity, it is your responsibility to clarify any ambiguities.

Policies:
Use of Electronics: To help promote learning, retention, and engagement with the course, all phones, tablets, computers, and other electronics for all classes must be turned off and put away out of sight during the entire session (unless you are instructed to do otherwise). This policy will be strictly enforced.

Accommodations: The University of Pennsylvania provides reasonable accommodations to students with disabilities who have self-identified and been approved by the office of Student Disabilities Services(SDS). If you have not yet contacted SDS, and would like to request accommodations or have questions, you can make an appointment by calling SDS 215-573-9235. The office is located in the Weingarten Learning Resources Centerat Stouffer Commons 3702 Spruce Street, Suite 300. All services are confidential.

Course Schedule (1/17/19 - 3/14/19)

Thursday	Tuesday
Introduction to the course **1/16/20**	**What brains look like and how they really work** **1/21/20**
TOPICS: Overview of the history of neuroscience, evolutionary psychology, and neuroeconomics **READINGS: NS, Chapter 1; NOC, Chapter 1**	**TOPICS: Introduction to brain anatomy; neurons, synapses, and circuits; neurotransmitters; in-class brain anatomy dissection** **READINGS: NS, Chapter 27; NOC, Chapter 2**
Tools of the trade: How to measure and manipulate brain function **1/23/20**	**The neuroscience of decision making** **1/28/20**
TOPICS: Brain imaging, EEG, animal models, pharmacology, eye-tracking, pupillometry, brain stimulation, optogenetics; in-class demos and discussion of applications to business. **READINGS: NS, Chapter 1**	**TOPICS: Evidence accumulation, value scaling, divisive normalization, and the physiological basis of choice overload. Implications for business decisions.** **READINGS: NS, Chapter 32; NOC, Chapter 7; Webb, Louie and Glimcher 2016**
Vision, attention, design and advertising **1/30/20**	**Learning, valuation, and consumption: How incidental moods influence our decisions** **2/4/20**
TOPICS: The visual system, salience, attention, and eye movements; effects of attention on evidence accumulation; applications to ad development, product design, and user experience. **READINGS: NS Chapter 29**	**TOPICS: Reinforcement learning, dopamine, serotonin, valuation, incidental mood and the drive to consume.** **READINGS: NS, Chapter 31; Otto et al. 2016**
Beyond the focus group: Neuromarketing and the science of persuasion **2/6/20**	**Managing innovation through neuroscience** **2/11/20**
TOPICS: Subjective preferences, internal states, functional localization of brand preferences and marketing actions. Neuroscience as a tool for out of sample predictions of market level behavior. **READINGS: NS, Chapter 32; Genevsky and Knutson, 2016; Boksem and Smidts, 2015; Falk et al., 2016; Cerf et al. 2016** **TAKE HOME QUIZ 1**	**TOPICS: The default mode network, norepinephrine, exploration, and creativity; promoting innovation in the brain and in organizational structure** **READINGS: NOC, Chapter 4; Pearson et al 2014; Barack and Platt, 2017; Hills 2008**
The social brain: Cultivating leadership and building team chemistry **2/13/20**	**Neuroscience, healthcare, and finance** *Guest Chris Molaro CEO, Neuroflow* **2/18/20**
TOPICS: The social brain, social networks, social hierarchy, plasticity, social hormones. Social cognition and contagion, the "mind in the market." **READINGS: NOC, Chapter 5; Platt, Scientific American blog 2018; Tremblay et al., 2017; De Martino et al., 2013**	**TOPICS: Variation in cognition, financial decision-making, and associated brain circuitry across individuals and across the lifespan. Implications for healthcare and wealth management.** **READINGS: Kable et al. 2018; NEFE Executive Summary**

Building brand equity through neuroscience 2/20/20	Ethical, legal, and societal implications (ELSI) of applied neuroscience in business 2/25/20
TOPICS: Brand equity, Using neuroscience tools to understand brand equity, brand recall, brand loyalty, and brand extension. Discussion of the use of these tools to improve marketing. READINGS: Sheng and Platt, 1 and 2; Yoon et al. 2006	TOPICS: Ethical, legal, and societal implications of neuroscience applications to business; wearables, implantables and brain-machine interface; individual variation and human capital; artificial intelligence; personality and targeted advertising Robertson et al. 2016; Prehn et al. 2015; Pearson et al. 2018 TAKE HOME QUIZ 2
Group poster session preparation 2/27/20	Brain-to-business application pitch session 3/3/20
TOPICS: Student teams will have this time to work together to finalize their poster presentations. Professor Platt and the TAs will be on-hand for consultation. READINGS: None	TOPICS: A festive poster session will conclude the course. Student teams will pitch their idea for a brain-to-business application. READINGS: None