

## SPECIAL TOPICS: INTRODUCTION TO BRAIN SCIENCE FOR BUSINESS

MKTG 351/851, Spring 2018 Q3  
The Wharton School, University of Pennsylvania

### COURSE SYLLABUS

(12/12/2017)

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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.

**Format:**

The course will meet twice weekly. Generally, the first half of each class will be an interactive lecture, followed by demonstrations and discussion.

**Requirements:**

Evaluations will be based on two take-home quizzes (25% each) and a team-based poster-presentation of a “pitch” applying brain science to business (50%).

**Readings:**

There are two required texts for the course, “Neuroeconomics: Decision Making and the Brain,” edited by Glimcher & Fehr, 2014, Elsevier Academic Press (henceforth GF) and “Neuroscience” edited by Purves et al., forthcoming in 2017, Sinauer Press (henceforth NS), Unit V as a downloadable e-book. There are also a number of additional readings, including primary scientific articles and popular media, which will be posted on Canvas.

**Course Schedule (1/11/18-3/1/18)**

<b>Thursday</b>	<b>Tuesday</b>
<b>Introduction</b> 1/11/18	<b>What brains look like and how they work</b> 1/16/18
TOPICS: Overview of the history of neuroscience, evolutionary psychology, and neuroeconomics  READINGS: GF, Introduction; NS, Chapter 1	TOPICS: Introduction to brain anatomy; neurons, synapses, and circuits; neurotransmitters; in-class anatomy and physiology demos  READINGS: GF, Chapter 5; NS, Chapters 27 and Appendix "Survey of Human Neuroanatomy"
<b>Measurement and manipulation</b> 1/18/18	<b>Evidence, value, and the tyranny of choice</b> 1/23/18
TOPICS: Brain imaging, EEG, animal models, pharmacology, eye-tracking, pupillometry, brain stimulation, optogenetics; in-class demos and discussion of applications to business  READINGS: GF, Chapter 6; NS, Chapter 1	TOPICS: Evidence accumulation, value scaling, divisive normalization, and the physiological basis of choice overload  READINGS: GF, Chapters 19 and 20
<b>Vision, attention, and advertising</b> 1/25/18	<b>Sex, status, and the evolution of marketing</b> 1/30/18
TOPICS: The visual system, salience, attention, and eye movements; effects of attention on evidence accumulation; applications to ad development, product design, and user experience; in-class demos and discussion  READINGS: GF, Chapter 8; NS Chapter 29	TOPICS: The intrinsic value of social information, sex and status as reliable signals, impact on marketing  READINGS: NS, Chapter 34; Deaner and Platt, 2005; Hayden et al. 2008; Acykalin et al. under review  TAKE HOME QUIZ 1
<b>Invited Speaker Carl Marci, Nielsen Inc.</b> 2/1/18	<b>Learning, valuation, and consumption</b> 2/6/18
TOPICS: Leveraging Neuroscience for Marketing in the Age of Distraction  READINGS: None.	TOPICS: Reinforcement learning, dopamine, serotonin, valuation, and the drive to consume  READINGS: GF, Chapter 15; Sterling, 2016
<b>The physiology of preferences. Using brain data to predict market behavior</b> 2/8/18	<b>Innovation, exploration, and the brain</b> 2/13/18
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: GF, Chapters 13 and 20; NS, Chapter 32NS; Genevsky and Knutson, 2016; Boksem and Smidts, 2015; Falk et al., 2016	TOPICS: The default mode network, norepinephrine, exploration, and creativity; promoting innovation in the brain and in organizational structure  READINGS: Pearson et al 2014; Barack and Platt, in press

<b>Emotion, decisions, and the brain</b> <b>2/15/18</b>	<b>The “social brain”, team-building, brand loyalty, theory of mind, strategy, markets</b> <b>2/20/18</b>
<b>TOPICS:</b> Emotions, stress, mood, memory, and preferences  <b>READINGS:</b> GF, Chapter 12; NS, Chapter 31	<b>TOPICS:</b> The social brain, social networks, social hierarchy, plasticity, oxytocin; are brands like people? Social cognition and contagion, the “mind in the market”  <b>READINGS:</b> Tremblay et al., 2017; GF, Chapter 27; Jiang et al., 2014; Yoon et al. 2006; Smith et al. 2013  <b>TAKE HOME QUIZ 2</b>
<b>Ethical, legal, and society implications (ELSI) of applied neuroscience in business</b> <b>2/22/18</b>	<b>Group poster session preparation</b> <b>2/27/18</b>
<b>TOPICS:</b> 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  <b>READINGS:</b> Robertson et al. 2016; Prehn et al. 2015	<b>TOPICS:</b> Student teams will have this time to work together to finalize their poster presentations.  <b>READINGS:</b> None
<b>Poster session: Pitching brain-to-business applications</b> <b>3/1/18</b>  <b>TOPICS:</b> A festive poster session will conclude the course. Student teams will pitch their idea for a brain-to-business application.  <b>READINGS:</b> None	

**Last day: 3/1/18**