SPECIAL TOPICS: CONSUMER NEUROSCIENCE
MKTG 350-001, Spring 2016
The Wharton School, University of Pennsylvania

COURSE SYLLABUS
(1/13/2016)

Instructor: Dr. Wes Hutchinson   office: 763 Jon M. Huntsman Hall
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Office Hours: by appointment.

Reading Materials:

Text: Available through Amazon.com.

Ramsoy, Thomas Z. (2015). *Introduction to Neuromarketing and Consumer Neuroscience*. Copenhagen, Denmark: Neurons, Inc.[1]

Course Pack: Available through Penn Library Course Reserves (Canvas) and Study.Net (www.study.net).

Included in the course pack is (1) the *Journal of Marketing Research Special Issue on Neuroscience and Marketing*, plus (2) a variety of readings from the marketing and neuroscience literatures (see Reading List).

Recommended books (optional):

Gazzaniga, Ivry, & Mangun (2014), *Cognitive Neuroscience: The Biology of Mind*, 4th edition, New York, NY: Norton & Co.

Purves, Cabeza, Huettel, LaBar, Platt, & Woldorff (2013), *Principles of Cognitive Neuroscience*, 2nd edition, Sunderland, MA: Sinauer & Associates.

Glimcher & Fehr (2014), *Neuroeconomics: Decision Making and the Brain*, 2nd edition, London, UK: Academic Press.

Glimcher, Camerer, Fehr, & Poldrack (2009), *Neuroeconomics: Decision Making and the Brain*, London, UK: Academic Press.

Holmqvist, Kenneth, Nystrom, Marcus, Andersson, Richard, Dewhurst, Richard, Jarodzka, Halszka, et al. (2011) *Eye Tracking: A comprehensive guide to methods and measures*, Oxford University Press.

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[1] WARNING: This book has excellent content and awful copy editing

Romano Bergstrom, Jennifer, Schall, Andrew (2014), *Eye Tracking in User Experience Design*, Elsevier.

Potter, Robert F. (2012) *Psychophysiological Measurement and Meaning: Cognitive and Emotional Processing of Media*, Routledge, Taylor & Francis

Anderson, J.R. (2007) *How can the human mind occur in the physical universe?* Oxford University Press

Gray, Wayne D., Ed., Gray, Wayne D. (2007) *Integrated Models of Cognitive Systems (Cognitive Models and Architectures)* Oxford University Press.

Marr, David, Poggio, Tomaso A., Ullman, Shimon (1982) *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information*, W.H. Freeman & Co.

Recommended audiobooks (optional):

Medina, John J. (2014) *Your Best Brain*, Great Courses, The Teaching Company.

Colavita, Francis V. (2006) *Sensation, Perception, and the Aging Process*, Great Courses, The Teaching Company.

Joordens, Steve (2011) *Memory and the Human Lifespan*, Great Courses, The Teaching Company.

Grim, Patrick (2008) *Philosophy of Mind: Brains, Consciousness, and Thinking Machines*, Great Courses, The Teaching Company.

Course Description and Objectives:

Basic neuroscience made steady progress throughout the 20th century with only small areas of application outside of medicine. Over the past 30 years, however, breakthroughs in measurement and computation have accelerated basic research and created major applications for business and technology. Currently, applications to marketing research and product development are experiencing explosive growth that has been met with both excitement and skepticism.   This mini-course provides an overview of these developments.

The course follows a straightforward theory/application format for each major area of cognitive neuroscience and is divided into three modules: (1) Overview, (2) Attention, perception, and emotion, and (3) Thinking, learning, and deciding. Some classes focus on the basics of neuroscience simultaneously with illustrative applications. A key take-away from these classes is to gain the elementary scientific knowledge that is necessary to separate "neuro-reality" from "neuro-hype." In other classes, we cover application areas in greater detail. There are three general types of applications. First, there are applications of neuroscience in marketing research. Topics will range from well-known and widely used applications, such as eye-tracking measures in the lab and the field, to emerging methods and measures, such as mobile EEG, face reading

algorithms, and fMRI predictors of market response. Application areas include, packaging and shelf display, copy testing for television and print advertisements, video games, product usability studies, and simulators. Second, there are applications of neuroscience in the development of new products. Product development applications include wearable physiological devices and apps, sensory branding for foods and fragrances, pharmaceuticals and medical devices (especially prosthetic devices), and neuroscience-based "edutainment" designed to enhance cognitive functions. Special attention will also be paid to changes in brain anatomy and function over the lifespan. Key markets are children (mainly for enhancement products), seniors (mainly for remediation/restoration products), and working adults (both enhancement and remediation/restoration products). Finally, at the broadest level there are the implications of neuroscience for society, including social networks and the legal system.

Who should take this course:

This course is self-contained and has no prerequisites. That said, students with some background in business, industrial design, psychology, or neuroscience are likely to find the material covered in this course complementary to the knowledge they already have.

Grading: Typical grade distributions are given below.

Component	Maximum Points	Expected Average	Expected Range
Participation (individual)	50	45	40-50
Personal essay (individual)	100	90	80-100
Eye-tracking Project (group)	400	360	320 - 400
Take-Home Exam (individual)	450	405	350 - 450
TOTAL	1,000	900	800 - 1,000

Class Participation/Homework (Individual): Class participation includes attendance, preparation, and discussion during lectures. **No laptops, tablets, or smartphones.**

Personal essay (Individual): Each student will write a 1-page personal essay (400 words maximum) describing what they feel are the largest potential risks and benefits of consumer neuroscience to society. Details for this assignment will be distributed in class.

Eye-tracking Project: Groups of 3 - 5 students will complete a project that identifies consumer insights based on eye-tracking data. There are two potential sources of eye-tracking data: (1) archived data from field studies of consumers while they are shopping, (2) small sample (N < 10) original data collected during the term that compares advertisements (magazine or television), store shelf displays, or product designs. Details for this assignment will be distributed in class.

Take-Home Exam (Individual): The take-home exam covers the basic concepts presented in the lectures and associated readings. It is an open-book, open-notes test with objective and short essay questions that is done individually. The goal of the exam is to reveal to students any concepts or readings that were not adequately comprehended, and the open-book, open-note format allows students to easily fill in any such gaps in knowledge.

Course Schedule*

		Tuesday		Thursday
Module 1: Overview			**14-Jan**	**1. Overview: Essential facts & concepts**
			TOPICS:	Combining consumer behavior & neuroscience. The evolution/neuroanatomical perspective.
			READ:	*INCN* (ch. 1 & 2)
	19-Jan	**2. Overview: Essential facts & concepts**	**21-Jan**	**3. Overview: Measurement & computation**
	TOPICS:	The psychological/behavioral and innovation/product development perspective. Behavioral models & measures (judgments, choices, decision times, errors). Innovation and evaluating ideas for new products, including trial/repeat studies/models for new products.	TOPICS:	The measurement/computational perspective. Physiological (eye movements, pupil size, skin conductance, heart rate) and neural measurement (EEG, PET, fMRI, single cell recordings) procedures; neuroscience & commercial marketing research. The basics of quantitative modeling: process models, modular production systems and neural networks.
	READ:	Day (2007); Hutchinson (2011abc)	READ:	*INCN* (ch. 3); Kable JNPE (2011); Karmarkar & Plassmann (2015); McClure et al (2004);
Module 2: Attention, perception & emotion	**26-Jan**	**4. Vision**	**28-Jan**	**5. Sensory branding**
	TOPICS:	The visual system, including the eye, retina, midbrain, visual cortex, and related association areas; visual attention, including goal-directed and stimulus-driven pathways in the parietal and frontal lobes; locating and identifying objects.	TOPICS:	Pamela Dalton, Ph.D., MPH Member, Monell Chemical Senses Center (Taste and smell.)
	READ:	*INCN* (ch. 4, pp. 62-68; ch. 5; Chandon et al. (2009);	READ:	Deng, Hui, Hutchinson (2010)
	2-Feb	**6. Sensorimotor processes & brain-computer interfaces**	**4-Feb**	**7. Sensorimotor processes (continued)**
	GUEST:	Martha Farah, Professor of Psychology and Director of the Center for Neuroscience and Society (Vision, skin sensations, and muscle movements; sensorimotor restoration/enhancement.)	TOPICS:	Transduction by sense organs, primary brain structures, and the role of experience/learning for hearing, taste, smell, skin sensations, and pain; muscle movements, reflexes, skilled movements; sensory restoration/enhancement & prosthetics.
	READ:	BCI video	READ:	*INCN* (ch. 4, pp. 69-80); Bensmaia (2015)
	9-Feb	**8. Emotion, arousal, advertising & branding**	**11-Feb**	**9. Point of purchase marketing & usability studies**
	TOPICS:	Amygdala, hippocampus, cingulate, orbitofrontal cortex, hypothalamus; intensity and valence of emotion; measures of emotion. Hierarchy of effects models; evaluative conditioning; neural correlates of brand preferences and brand loyalty.	GUEST:	Scott Young, President, Perception Research Services Int. Michael Smith, VP, Nielsen Consumer Neuroscience
	READ:	*INCN* (ch. 4); Yoon et al (2006); Chen Nelson Hsu JMR (2015); Venkatraman et al JMR (2015); Cerf et al JMR (2015);Pozharliev et al JMR (2015)	READ:	Chandon et al (2007)
Module 3: Thinking, learning & deciding	**16-Feb**	**10. Valuation, intertemporal choice, self-control, reward, and reinforcement learning**	**18-Feb**	**11. Neuroscience and society - marketing & regulation issues for NS products**
	TOPICS:	Dopaminergic system and prediction errors; ventral striatum, medial prefrontal cortex, and posterior cingulate cortex.	GUEST:	Roy Hamilton, Dawn Mechanic, Penn Memory Center, HUP
	READ:	*INCN* (ch. 8); Reimann et al JCP (2010); Platt & Plassmann (2014)	READ:	*INCN* (ch. 10)
	23-Feb	**12. Social interactions in humans and non-human primates**	**25-Feb**	**13. Memory, language, learning, inference, and expertise**
	TOPICS:	Michael Platt PIK Professor of Marketing, Neuroscience, Psychology	TOPICS:	Explicit/declarative memory (medial temporal lobe, mid-brain, association cortex); implicit/non-declarative memory (basal ganglia, perceptual & association cortex, cerebellum, reflex pathways); hemispheric specialization.
	READ:		READ:	*INCN* (ch. 7); Karmakar Shiv Knutson JMR (2015);
	1-Mar	**14. Executive control, decisions, & behavioral game theory**	**3-Mar**	**15. Project presentations - poster session**
	TOPICS:	Working memory and prefrontal cortex; goals & parietal/frontal pathways; connections to valuation, learning, and attention; neuroeconomics; behavioral game theory.	TOPICS:	
	READ:	Cascio et al JMR (2015); Platt & Huettel NN (2008); Kurth et al BSF (2010)	READ:	
	DUE:	Personal essay due.	DUE:	Group project due.

* Most readings may be done before or after class. This schedule is likely to change during the term; check Canvas for updated versions. Some scheduling/logistical issues remain for some guest speakers.

Reading List

Introduction to Neuromarketing and Consumer Neuroscience (*INCN*)

Chapter 1: Introduction
Chapter 2: The Brain
Chapter 3: The Neuromarketing Toolbox
Chapter 4: Senses and Perception
Chapter 5: Attention and Consciousness
Chapter 6: Emotions and Feelings
Chapter 7: Learning and Memory
Chapter 8: Wanting, Liking, and Deciding
Chapter 9: Consumer Aberrations
Chapter 10: Epilogue

Journal of Marketing Research Special Issue on Neuroscience and Marketing

Camerer, Colin and Carolyn Yoon (2015), "Introduction to the Journal of Marketing Research Special Issue on Neuroscience and Marketing," *Journal of Marketing Research*, 52 (August), 423-26.

Plassmann, Hilke, Vinod Venkatraman, Scott Huettel, and Carolyn Yoon (2015), "Consumer Neuroscience: Applications, Challenges, and Possible Solutions," *Journal of Marketing Research*, 52 (August), 427-35.

Venkatraman, Vinod, Angelika Dimoka, Paul A. Pavlou, Khoi Vo, William Hampton, Bryan Bollinger, et al. (2015), "Predicting Advertising Success Beyond Traditional Measures: New Insights from Neurophysiological Methods and Market Response Modeling," *Journal of Marketing Research*, 52 (August), 436-52.

Chen, Yu-Ping, Leif Nelson, and Ming Hsu (2015), "From 'Where' to 'What': Distributed Representations of Brand Associations in the Human Brain," *Journal of Marketing Research*, 52 (August), 453-66.

Karmarkar, Uma R., Baba Shiv, and Brian Knutson (2015), "Cost Conscious? The Neural and Behavioral Impact of Price Primacy on Decision Making," *Journal of Marketing Research*, 52 (August), 467-81.

Boksem, Maarten A.S. and Ale Smidts (2015), "Brain Responses to Movie Trailers Predict Individual Preferences for Movies and Their Population-Wide Commercial Success," *Journal of Marketing Research*, 52 (August), 482-92.

Plassmann, Hilke and Bernd Weber (2015), "Individual Differences in Marketing Placebo Effects: Evidence from Brain Imaging and Behavioral Experiments," *Journal of Marketing Research*, 52 (August), 493-510.

Telpaz, Ariel, Ryan Webb, and Dino J. Levy (2015), "Using EEG to Predict Consumers' Future Choices," *Journal of Marketing Research*, 52 (August), 511-29.

Cerf, Moran, Eric Greenleaf, Tom Meyvis, and Vicki G. Morwitz (2015), "Using Single-Neuron Recording in Marketing: Opportunities, Challenges, and an Application to Fear Enhancement in Communications," *Journal of Marketing Research*, 52 (August), 530-45.

Pozharliev, Rumen, Willem J.M.I. Verbeke, Jan W. van Strien, and Richard P. Bagozzi (2015), "Merely Being with You Increases My Attention to Luxury Products: Using EEG to Understand Consumers' Emotional Experience with Luxury Branded Products," *Journal of Marketing Research*, 52 (August), 546-58.

Cascio, Christopher N., Matthew Brook O'Donnell, Joseph Bayer, Francis J. Tinney Jr., and Emily B. Falk (2015), "Neural Correlates of Susceptibility to Group Opinions in Online Word-of- Mouth Recommendations," *Journal of Marketing Research*, 52 (August), 559-75.

Individual readings

Kable, Joseph W. (2011), "The Cognitive Neuroscience Toolkit for the Neuroeconomist: A Functional Overview," *Journal of Neuroscience, Psychology and Economics*, 4 (2), 63-84.

Yoon, Carolyn, Richard Gonzalez, Antoine Bechara, Gregory S. Bems, Alain A. Dagher, Laurette Dube, et al. (2012), "Decision Neuroscience and Consumer Decision Making," *Marketing Letters*, 23 (2), 473-85.

Smidts, Ale, Ming Hsu, Alan G. Sanfey, Maarten A.S. Boksem, Richard B. Ebstein, Scott A. Huettel, et al. (2014), "Advancing Consumer Neuroscience," *Marketing Letters*, 25 (3), 257-67.

McClure, S. M., Li, J., Tomlin, D., Cypert, K. S., Montague, L. M., & Montague, P. R. (2004). Neural correlates of behavioral preference for culturally familiar drinks. *Neuron*, 44(2), 379–387.

Yoon, C., Gutchess, A. H., Feinberg, F., & Polk, T. A. (2006). A functional magnetic resonance imaging study of neural dissociations between brand and person judgments. *Journal of Consumer Research*, 33(1), 31–40.

Deng, Xiaoyan, Sam K. Hui and J. Wesley Hutchinson (2010), "Consumer Preferences for Color Combinations: An Empirical Analysis of Similarity-Based Relationships," *Journal of Consumer Psychology*, 20(October), 476-484.

Chandon, Pierre, J. Wesley Hutchinson, Eric Bradlow, and Scott H. Young (2007), "Measuring Value of Point-of-Purchase Marketing with Commercial Eye-Tracking Data," in *Visual Marketing: From Attention to Action*, eds., Michel Wedel and Rik Peters, Mahwah, NJ: Lawrence Erlbaum Associates, 225-58.

Chandon, Pierre, J. Wesley Hutchinson, Eric Bradlow, and Scott H. Young (2009), "Does In-Store Marketing Work? Effects of the Number and Position of Shelf Facings on Brand Attention and Evaluation at the Point of Purchase," *Journal of Marketing*, 73 (November), 1-17.

Berns, Gregory S. and Sara E. Moore (2012), "A Neural Predictor of Cultural Popularity," *Journal of Consumer Psychology*, 22 (1), 154-60.

Reimann, M., Zaichkowsky, J., Neuhaus, C., Bender, T., & Weber, B. (2010). Aesthetic package design: A behavioral, neural, and psychological investigation. *Journal of Consumer Psychology*, 20(4), 431–441.

Platt ML, Huettel SA, (2008), Risky business: the neuroeconomics of decision making under uncertainty. *Nature Neuroscience* 11(4): 398-403, Apr 2008.

Platt, M. L. & H. Plassmann (2014). Multistage Valuation Signals and Common Neural Currencies," in *Neuroeconomics: Decision Making and the Brain*. P. Glimcher and E. Fehr (eds.). 2nd edition, London, UK: Academic Press.

Bensmaia SJ. (2015) Biological and bionic hands: natural neural coding and artificial perception. *Phil. Trans. R. Soc. B*

Kurth F, Zilles K, Fox PT, Laird AR, Eickhoff SB (2010), A link between the systems: functional differentiation and integration within the human insula revealed by meta-analysis, *Brain Structure & Function*, 214, 519–534.

Choi DW, Armitage R, Brady LS, Coetzee T, Fisher W, Hyman S, Pande A, Paul, S Potter W, Roin B, and Sherer T (2014). Medicines for the Mind: Policy-Based ''Pull'' Incentives for Creating Breakthrough CNS Drugs, *Neuron*, 84, 554-563.

Day HBR (2007) Is It Real? Can We Win? Is It Worth Doing? Managing Risk and Reward in an Innovation Portfolio

Hutchinson (2011a) *The Profit Strategy Checklist*, Teaching Note.

Hutchinson (2011b) *The Concept Statement*, Teaching Note.

Hutchinson (2011c) *Three Frameworks for New Product Development*, Teaching Note.

Falk, E. B., Berkman, E. T., & Lieberman, M. D. (2012). From neural responses to population behavior: Neural focus group predicts population-level media effects. *Psychological Science*, 23(5), 439–445.

Falk, E. B., Berkman, E. T., Mann, T., Harrison, B., & Lieberman, M. D. (2010). Predicting persuasion-induced behavior change from the brain. *Journal of Neuroscience*, 30(25), 8421–8424.