Psychology 347 (13335): PERCEPTION

WINTER TERM 2019:
January 7 – March 23
Class meets in Cramer Hall, Room 401, MWF, 10:15 – 11:20am

OFFICE HOURS:
Mondays, 11:30am – 12:30pm (Bill); Cramer 309
Grad TA TBD; Cramer 367

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Please use these email addresses, NOT d2l

No text is required. We list an old edition, because the material is similar, and it costs a lot less. Newer editions are also acceptable; read chapters that correspond to the topics.

***PLEASE READ THROUGH ALL UPDATED MATERIAL ON OUR d2l website...

ADDITIONAL BOOK (highly recommended): Hallucinations, by Oliver Sacks

ART SUPPLIES (required): Sketchbook (standard 11” x 14” drawing, 80 pound weight paper, with at least 24 sheets), colored pencils (basic set, 12 assorted colors), Assorted graphite sticks, Pink pearl eraser, one pound block of air dry clay (e.g., from Das), Assorted pipe cleaners. See d2l course website for more details on what you’ll need.
NOTE: You will need $2.50 to participate in the Portland Art Museum tour, and $2.50 for a tablet that will temporarily mess with your taste buds! (DUE FRIDAY, January 11!)

GOAL OF THE COURSE: Perception involves the routing, identification, and interpretation of energy and information in our environment, both external and internal. Typically, it begins with detection of stimuli by sensory neurons, and the relay of this information to specific neural networks in the brain.

In this class we will investigate the mechanisms that underlie sensory detection of specific categories of stimuli (e.g., in visual, auditory, olfactory, gustatory, somatosensory (including touch, proprioception, nociception), and vestibular realms) and the CNS networks involved in perceptual discrimination, interpretation, and complex cognitive responses.

We’ll also look at how these critical, adaptive networks develop, and how they are influenced by drugs and, ultimately, decay...

We’ll also explore how artists have approached, understood and integrated aspects of sensory detection and perception into often extraordinary works that compel, move, inspire, and affect our understanding of ourselves and our world. We’ll visit the Portland Art Museum to view art with an eye towards the neural mechanisms involved in perception, and we’ll create objects designed to help reflect on and understand the concepts we’ll discuss...

GRADES: Grades are based on the following point scale: 90 points and above = A; 80 – 89 points = B; 70 – 79 points = C; 60 – 69 points = D; 59 points or below = F. An A or B is an ABOVE AVERAGE grade, a C is AVERAGE, and a D is BELOW AVERAGE. You can earn points in this class in the following ways...

**** DEADLINES ARE IMPORTANT: LATE WORK RECEIVES HALF CREDIT. ****

QUIZZES (60 points)
Quiz One: Psychophysics, neurons, and synapses (15 points)
Quiz Two: Gustation, olfaction, and somatosensation (15 points)
Quiz Three: Visual system (15 points)
Quiz Four: Auditory and vestibular systems (15 points)
ART PROJECTS (30 points)
SUBMIT ALL PROJECTS TO JEFF IN CLASS; LATE SUBMISSIONS EARN HALF CREDIT
Art Project 1: Neuron model building (5 points)
Art Project 2: Neuron metaphor drawing (5 points)
Art Project 3: Blind touch sculpture (5 points)
Art Project 4: Mirror drawing (5 points)
Art Project 5: Blurred drawing (5 points)
Art Project 6: Sensory neuron model (5 points)

FINAL ART PROJECT (10 points)
Final Art Project: Final poster with gestalt collage (10 points)
The final poster will consist of two parts. There will be four collages or drawings that are examples of gestalt grouping principles followed by a written explanation of how those principles are working. The second portion will be a formal analysis of a well known work of art, identifying the principles you chose for your collages or drawings within the image and clearly stating where and how those are operating within that work of art. The gestalt collages, famous artwork, and written descriptions for both will be fixed to an 18"x24" (minimum size) poster and presented to the class during the time slot for our final exam.

ACADEMIC HONESTY: Any evidence of cheating or plagiarism will lead to serious academic consequences, including possible failure of the course and/or dismissal from school. Plagiarism is also a violation of the PSU Code of Student Conduct. For more information see: http://www.pdx.edu/dos/psu-student-code-conduct

STUDENTS WITH DISABILITIES: If you are a student with a documented disability and registered with the Disability Resource Center (DRC), please contact the instructor immediately to facilitate arranging academic accommodations. If you have a disability and have not yet registered with the DRC, please contact the DRC immediately.

NOTE: Incompletes are rarely given, and are based on criteria described in the university catalog. Incompletes are not appropriate when less than ¾’s of the course work has been scored. No incomplete will be assigned without a written formal agreement and timeline related to course completion.
EXCUSES: Life has ups and downs, and everyone struggles sometimes with family, work, and other personal concerns and commitments. However, unless there is a serious, unexpected, sudden, documented and significant emergency, please do not petition for special treatment regarding deadlines for projects, quizzes, or exams. We are required to treat all students fairly, and that means each of you must think ahead and plan for when assignments are due. Everyone is subject to the same course expectations...

THE CLASSES

WEEK ONE (1/7 – 1/11)
** MONEY: For Art Museum Tour ($2.50) and taste tablet ($2.50) due Friday, 1/11!

INTRODUCTIONS: syllabus, basic concepts, history of perception, philosophical considerations, psychophysics, measuring the threshold, signal detection theory, neuroesthetics. What is real? How do we know what’s out there (or in here :)?

READ (optional): Text, Chapter 1 (Introduction)

WEEK TWO (1/14 – 1/18)
NO CLASS WEDNESDAY (1/16)

SENSORY DETECTION: Neurons carry information-rich electrical messages, and communicate with each other by releasing chemical messengers (neurotransmitters).

What sort of sensory detection machinery do you have? How is detected information transferred to neural networks for further processing and response?

* ART PROJECT 1 Friday (1/18): Neuron model (bring pipe cleaners)

READ (optional): Text, Chapter 1 (Introduction)

WEEK THREE (1/21 – 1/25)
NO CLASS MONDAY (1/21): Martin Luther King Junior Day

* QUIZ ONE FRIDAY (1/25): History, psychophysics, neurons and synapses

CHEMICAL SENSES (Gustation and Olfaction); taste and smell versus flavor; differences with other senses (ipsilateral projection and limbic/paralimbic targets); taste receptor cells, taste buds and papillae; basic tastes; labeled line vs. pattern coding; a few receptor mechanisms;
gustatory pathways; flavor is so much more than taste; olfactory neurons, glomeruli, bulb, and CNS projection targets; vomeronasal organ and the Flehmen response

READ (optional): Text, Chapters 13 (Olfaction), 14 (Taste)

WEEK FOUR (1/28 – 2/1)
* Miracle berry demonstration (bring extra food!) Monday (1/28)
* ART PROJECT 1 DUE WEDNESDAY (1/30)
* ART PROJECT 2 Wednesday (1/30): Neuron metaphor (bring drawing supplies)

INTRODUCTION TO SOMATOSENSATION; Mechanical senses (touch, proprioception) vs. protective senses (temperature, pain, itch, deep sensual touch); mechanoreceptor physiology and mechanisms (e.g., Meissner's, Pacinian, Ruffini's corpuscles, Merkel's receptors, muscle spindle receptors, Golgi tendon organs); Dorsal column system/trigeminal nerve for CNS delivery of mechanoreception

READ (optional): Text, Chapter 12 (Touch)

WEEK FIVE (2/4 – 2/8)
* QUIZ TWO FRIDAY (2/8): Gustation, olfaction, somatosensation
* ART PROJECT 2 DUE WEDNESDAY (2/6)
* ART PROJECT 3 Wednesday (1/10): Blind touch sculpture (bring clay)

More on somatosensation: Anterolateral system for detection, delivery and mapping of emotionally salient stimuli; relevant receptors, and receptor mechanisms (nociceptors, thermoreceptors, itch-sensitive neurons, deep touch receptors), pathways (spinothalamic, spinoreticular, spinomesencephalic); involvement of hypothalamic detection/response, and CNS cortical networks for somatosensory integration (S1, S2, insula, anterior cingulate);

INTRODUCTION TO THE VISUAL SYSTEM; Nature of the stimulus (narrow range of electromagnetic energy), anatomy of the eye (cornea, pupil, iris, lens, retina); presbyopia, myopia; retinal network physiology (photoreceptors, bipolar cells, ganglion cells, horizontal and amacrine cells); rods vs. cones (S, M, L), Ishihara testing, intrinsically photosensitive ganglion cells and circadian cycles; sensitivity vs. acuity, center/surround receptive fields, parvocellular vs. magnocellular pathways; central visual targets (LGN to V1, superior colliculi, hypothalamus, pre-tectal region); visual hemifields, nerves vs. tracts

READ (optional): Text, Chapter 2 (The First Steps in Vision: Seeing Stars); Chapters 3 (Spatial Vision); 4 (Perceiving and Recognizing Objects)

WEEK SIX (2/11 – 2/15)
* ART PROJECT 3 DUE WEDNESDAY (2/13)
* ART PROJECT 4 Friday (2/15): Mirror drawing (bring mirror drawing sheet/d2l)

More on the visual system; Optimal stimuli and receptive fields; columnar organization of the neocortex; functional organization of V1 (orientation specificity); P pathways and object
recognition in ventral temporal lobe, visual agnosia, propopagnosia; M pathways and spatial mapping in parietal columns; neural network contributions to the figure/ground illusion

**WEEK SEVEN (2/18 – 2/22)**
* **ART PROJECT 4 DUE FRIDAY (2/22)**
* **ART PROJECT 5 Friday (2/22):** Blurred drawing (drawing pad, graphite stick, eraser)

More on the visual system

**WEEK EIGHT (2/25 – 3/1)**
* **ART PROJECT 5 DUE WEDNESDAY (2/27)**
* **QUIZ THREE FRIDAY (3/1):** Visual system

THE AUDITORY SYSTEM; Physical features of the stimulus (frequency, amplitude, complexity) vs. perceptual experiences of the sound (pitch, loudness, timbre); ear anatomy (outer, middle, inner; pinna, tympanic membrane, ossicles, oval window, cochlea); structure and function relations (e.g., pinna size vs. frequency/amplitude detection); acoustic reflex; physiology of the cochlea; inner/outer hair cells; mechanism of stimulus transduction; frequency coding (tonotopy)

READ (optional): Text, Chapter 9 (Hearing: Physiology and Psychoacoustics)

**WEEK NINE (3/4 – 3/8)**

More on the auditory system; VESTIBULAR SYSTEM; Physical coding of frequency, amplitude and complexity in the cochlea; central pathways for audition; sound localization; physiology of vestibular organs (semicircular canals, otolith organs); vestibulo-ocular reflex; detection mechanisms for three vestibular “modalities” (angular motion/acceleration and semicircular canals, gravity/tilt and linear acceleration and the otolith organs); anatomy of vestibular organs (canals, vestibules, ampullae, cristae, hair cells; utricle/saccule and macula, otolithic membrane, otoconia); CNS pathways for vestibular perception

READ (optional): Text, Chapter 10 (Hearing in the environment)

**WEEK TEN (3/11 – 3/15)**
* **QUIZ FOUR FRIDAY (3/15):** Auditory and vestibular systems
* **ART PROJECT 6 DUE FRIDAY (3/15)**

HALLUCINATIONS: Drug effects, and other sources of perceptual distortion
Charles Bonnet Syndrome; Musical Ear Syndrome, sensory deprivation experiments...

READ (highly recommended): Oliver Sack's "Hallucinations"
FINAL PROJECT ON WEDNESDAY, MARCH 20\textsuperscript{th}, 10:15 – 12:05pm
(Please note: The final project will \textit{not} be moved for any reason)

\textbf{A REMINDER:} Life has ups and downs, and everyone struggles sometimes with family, work, and other personal concerns and commitments. \textbf{However, unless there is a serious, unexpected, sudden, documented, significant emergency, please do not petition for special treatment regarding deadlines for projects, quizzes, or exams.}

Once again, we are required to treat all students fairly, and consistently, and that means each one of you must think ahead and plan for when assignments are due. Everyone is subject to the same course expectations.

Note that sometimes, for a myriad of reasons, life intervenes to create ongoing difficulties with class attendance, and meeting academic requirements. \textit{In these cases, it’s often best to withdraw from the course, and perhaps re-enroll at a less stressful time...}