

Sensation & Perception

01:830:301 – Sec. 02

(Index: 07248)

Fall 2020

Professor: Dr. Manish Singh
Meeting Times: MW 1:40 - 3:00 PM
Location: Online (Zoom)
Contact: Please use the Email tool on the Canvas course site
Office Hours: T 12:00 - 1:00 PM, Th 4:00 - 5:00 PM (Zoom)

Textbook: Sensation and Perception, 5th edition (2017)
Wolfe JM, Kluender KR, Levi DM et al.
Oxford University Press
ISBN: 9781605356419
(Also available in electronic eTextbook form)

Additional readings, handouts and resources will be made available from time to time within the respective Canvas modules.

COURSE OVERVIEW

The world as we perceive it is not "given" to our brains, but must be constructed, based on the pattern of physical stimulation impinging on the sense organs. This course will introduce students to the scientific study of sensation and perception, primarily from the point of view psychophysics (behavioral studies) and neurobiology.

Some of the questions we will address are: What does it mean for an organism (or even a robot or a computer system) to "perceive" its environment? What kinds of problems must the brain solve in order to make perception possible? How can we scientifically measure someone's perception? What is the link between the way things appear to us perceptually, and neural activity in the brain? How does the brain construct the percept of 3D shapes, colors, motions, sounds, etc.?

Learning goals include: (1) To develop scientific and critical reasoning skills; (2) To learn how the sense organs and nervous system generate our perception of the world; (3) To learn about psychophysical and biological methods that are used to measure and investigate perception; (4) To appreciate the complexities of the connection between the mind, the brain, and the world.

The course is divided into three parts:

- **Unit I** (Sep. 2 - Sep. 30): Introduction to the problem of perception; Light and eyes; Early visual processing
 - **Unit II** (Oct. 7 - Nov. 4): Object perception and recognition; Space perception; Color perception
 - **Unit III** (Nov. 11 - Dec. 9): Attention and Scene Perception; Motion Perception; Sound and hearing
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GRADES

Grades will be based on weekly quizzes and 3 exams (two mid-terms and a final exam). Quizzes and Exams will be administered through the Canvas course site.

Weekly quizzes:

There will be 10 weekly quizzes, each worth 4 points (for total of 40 points).

You will have a 24-hour period to complete each quiz: 6:00PM Thurs - 6:00PM Friday

There will usually be no quiz on weeks with only one class meeting, or on weeks that have a mid-term exam. (See the course Canvas site for more details).

MT Exam 1: Monday, Oct. 5, 1:40 - 3:00 pm (20 points)

MT Exam 2: Monday, Nov. 9, 1:40 - 3:00 pm (20 points)

Final Exam: Friday, Dec. 18, 8:00 - 9:20 AM (20 points)

See: <https://finalexams.rutgers.edu/>

COURSE REQUIREMENTS

Attending lectures:

Attending lectures is the most important part of the course. The readings will overlap only partially with the corresponding lectures. Some topics covered in the lecture may be given only scant attention in the text. Conversely, some issues discussed at length in the text will only be mentioned briefly in the lectures. The text and

lectures are meant to complement each other. The exams will generally emphasize the material from the lectures. However the text is crucial for solidifying your understanding of the material.

Attendance and Missed classes:

Students are expected to attend all classes; if you expect to miss a class, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence. An email is automatically sent to me.

You are responsible for the material covered in any class you miss. If you have to miss a class, or even a portion of a class, it is important to find out what was covered by borrowing notes from another student. Then, to get additional explanation, or to ask questions, come to office hours.

Academic Integrity:

Rutgers University takes academic dishonesty very seriously. Students are expected to maintain the highest level of academic integrity. You should familiarize yourself with the university [policy on academic integrity](#). Violations will be reported and enforced according to this policy.

See also: <https://nbprovost.rutgers.edu/academic-integrity-students>

Use of external website resources to obtain solutions to homework assignments, quizzes, or exams is cheating and a violation of the University Academic Integrity Policy. Cheating in the course may result in grade penalties, disciplinary sanctions or educational sanctions. Posting homework assignments, or exams, to external sites without the instructor's permission may be a violation of copyright and may constitute the facilitation of dishonesty, which may result in the same penalties as plain cheating.

The Rutgers honor pledge will be included on all exams for you to sign:
“*On my honor, I have neither received nor given any unauthorized assistance on this examination.*”

Quiz & Exam Policies:

1. Students are required to take all quizzes and exams. *Weekly quizzes cannot be made up in subsequent weeks* (note that you will have a 24-hour window each week to take a short weekly quiz). A make-up exam will be given only in the case of a documented illness. This will require a note from your doctor and dean. Make-up exams will be given at the end of the semester, during the week of the finals.

2. Once you begin work on an exam, it will count. No exam scores can be dropped. So, if you are ill, do not take the exam; see your doctor.

Technology Requirements:

Given the online format of the course, you will need a laptop or desktop computer to join the lectures and office hours on Zoom, to access the course site on Canvas, and to take all quizzes and exams.

Please visit the [Rutgers Student Tech Guide](#) page for resources available to all students. If you do not have the appropriate technology for financial reasons, please email Dean of Students deanofstudents@echo.rutgers.edu for assistance. If you are

facing other financial hardships, please visit the Office of Financial Aid at <https://financialaid.rutgers.edu/>

Questions:

If you have general questions, or need further clarification on the class material, please come to office hours. I will be holding two office hours each week.

HELPFUL HINTS FOR DOING WELL IN THIS COURSE

1. Attend Class

The most important requirement for doing well is to attend class regularly. If you miss a class -- or even a portion of a class -- be sure to borrow notes from another student and find out what was covered. This is crucial because subsequent material will build quickly on previously covered material.

2. Ask Questions

Ask questions during lecture. Or ask questions right after the lecture. Or ask questions during office hours. If there is a point of confusion somewhere, it is important to get it cleared right away. Otherwise it may make it more difficult for you to understand subsequent material.

3. Review your notes and write summaries

Review your notes and make sure you understand the main points of each lecture. A good way to test your understanding is to write a short summary that highlights the main ideas.

4. Pay special attention to graphs and figures

Graphs summarize a great deal of important information. Make sure you understand what each graph is depicting, and why that information is relevant.

For example, ask yourself: What is the variable on the X-axis of the graph? What is the variable on the Y-axis? What does the shape of the graph tell us about the relationship between these two variables? Finally, what is the significance of this information for understanding perception?

Figures and perceptual demos (or "illusions") are especially important in the study of perception. When you encounter such a figure or illusion, always ask yourself: What exactly does this illusion demonstrate? What does it tell us about how our perceptual systems work?

5. Pace yourself

Pace your reading wisely for each chapter. Do not leave it for the last minute. Otherwise you are unlikely to remember much.

COURSE STRUCTURE

Module 1: Introduction and Fundamentals

- Sep. 2 (Wed): Relationship between the physical and perceptual world
- Sep. 8 (Tue*): The fundamental problem of perception
- Sep. 9 (Wed): Approaches to the study of perception: Psychophysical methods
- Sep. 14 (Mon): Biological approaches to perception

**Note: On Tuesday, Sep. 8, RU classes will be held on a Monday schedule.*

Module 2: Light and the Eye

- Sep. 16 (Wed): Light; Optics; The human eye
- Sep. 21 (Mon): The Retina; Rod & Cone systems
- Sep. 23 (Wed): Ganglion cells; Lightness perception

Module 3: Spatial vision and Early visual processing

- Sep. 28 (Mon): Primary visual cortex (Area V1)
- Sep. 30 (Wed): Spatial vision; Contrast sensitivity function

MT EXAM I: October 5 (Monday): 1:40 - 3:00 PM

Module 4: Object perception and recognition

- Oct. 7 (Wed): Perceiving objects; Gestalt Laws
- Oct. 12 (Mon): Figure and ground; Visual completion
- Oct. 14: (Wed): Object recognition; Face recognition

Module 6: 3D perception and binocular vision

- Oct. 19 (Mon): Space perception; Monocular cues
- Oct. 21 (Wed): Depth and Apparent size; Motion parallax
- Oct. 26 (Mon): Binocular vision

Module 5: Color perception

- Oct. 28 (Wed): Color Perception; Color mixing; Color matching
- Nov. 2 (Mon): Trichromacy; Color opponency
- Nov. 4 (Wed): Color constancy; Color deficiencies

MT EXAM II: November 9 (Monday): 1:40 - 3:00 PM

Module 7: Attention and scene perception

- Nov. 11 (Wed): Attention; Visual search
- Nov. 16 (Mon): Attentional cueing; Object-based attention
- Nov. 18 (Wed): Scene Perception / Intro to Motion

Module 8: Motion perception

- Nov. 18 (Wed): Scene Perception / Intro to Motion
- Nov. 23 (Mon): Apparent motion; Correspondence problem; Aperture Problem
- Nov. 30 (Mon*): Motion Integration; Area MT; Motion adaptation

**Note: There will be no class on Wed., Nov. 25 (RU will be on a Friday schedule)*

Module 9: Hearing: Sound, auditory system, and sound localization

- Dec. 2 (Wed): Sound; The human ear
- Dec. 7 (Mon): Mechanisms of hearing
- Dec. 9 (Wed): Sound localization

FINAL EXAM: December 18 (Friday): 8:00 - 9:20 AM
