

# Syllabus for PSYCH-UA.60

## From illusions to inference: Adventures in human perception

This syllabus is subject to change. Changes will be announced in class and by email.

### 1. Course logistics

#### *Instructor*

Prof. Wei Ji Ma, [weijima@nyu.edu](mailto:weijima@nyu.edu), 212 992 6530, Meyer 750C

Office hours: Fridays from 3 to 5 PM

#### *Teaching assistants*

Last names beginning with A-G: Your TA is Maija Honig, [maija.honig@nyu.edu](mailto:maija.honig@nyu.edu)

Last names beginning with H-Q: Your TA is Anselm Rothe, [ar3918@nyu.edu](mailto:ar3918@nyu.edu)

Last names beginning with R-Z: Your TA is Yanli Zhou, [yz1349@nyu.edu](mailto:yz1349@nyu.edu)

#### *Classes*

Mondays from 4:00 to 6:30 PM

Meyer Hall (4 Washington Place), Room 815

#### *Questions*

The instructor and TAs will not answer content-related questions by email. Please ask your questions at an office hour or by appointment instead.

#### *Clickers*

- Clickers will be distributed in the first class. They will be used for quick polls during lecture as well as for taking attendance. You can keep the clickers for the duration of the course but have to return them during the last class.
- As soon as you can, register your clicker on NYU Classes. Instructions can be found on the course website on NYU Classes, under “Resources”. Or go to <http://www.nyu.edu/campusmedia/data/pdfs/Student%20Guide%20for%20Clicker%20Registration.pdf>
- Please don't forget to bring your clicker to class.
- If you lose your clicker or experience technical problems, go to Campus Media, basement of Silver Center, LL7A, to get a replacement.

#### *Materials*

- There is no textbook.
- Readings consist of the lecture notes, lecture slides, and the following additional readings, which will be posted on NYU Classes under Resources:

- Two Federal Aviation Administration brochures on spatial disorientation
- Wansink, Painter, North (2005), *Bottomless bowls: why visual cues of size may influence intake*, *Obesity Research* 13 (1), 93-100
- Morrot, Brochet, Dubourdieu (2001), *The color of odors*, *Brain and Language* 79 (2), 309-20
- Ehrsson (2007), *The experimental induction of out-of-body experiences*, *Science* 317, 1048
- Chapter 25 from Kandel, Schwartz, Jessell, *Principles of Neural Science*.
- Audio + slide recordings of all lectures will be posted on NYU Classes.

## 2. Course objectives

### *Course description*

Why do we see two lines of the same length as different? Why do healthy people hear spoken words in noise? Why do we eat more when we see there is more food left? Our sensory perception easily falls prey to illusions and biases. It is tempting to think of these as failures of our brain, but they are not! In fact, they reveal the difficult challenges that our brain faces when interpreting the world, and the clever (and sometimes not so clever) solutions that it comes up with.

We will use a wide variety of well-known and lesser-known illusions (visual, auditory, tactile, vestibular, and multisensory) to understand the central concept of inference in perception: the notion that the brain constantly forms hypotheses about the outside world and tries to figure out which of them is most probable. We will draw parallels with examples from online shopping to medical diagnosis to spam filtering to election forecasting to searching for crashed planes. There will be guest lectures by outside experts: last year, we had an artist talk about anamorphic illusions in art, a pilot about illusions in aviation, a wine expert about wine tasting illusions, and a neurologist about neurological disorders of perception.

This course is suitable not only for students majoring in psychology and neuroscience, but also in other fields, including biology, physics, computer science, economics, marketing, mathematics, and engineering.

### *Didactic philosophy*

The goal of this course is to encourage curiosity and exploration about illusions and inference. We would like this to be reflected in the homework, small-group discussions, and final: they are meant to focus on critical thinking and active learning, rather than on memorization. If you feel at any point that this can be improved, don't wait until the evaluations but please mention it. The quality of the course can greatly benefit from feedback, and changes can be made as we go.

### 3. Grading

The course grade will consist of:

- 50% homework
- 15% midterm
- 20% final
- 15% participation

#### *Homework*

- There will be 12 homework sets. The lowest two homework grades can be dropped and will not be counted for the course grade.
- **Homework is due before 4 pm on the day of class, through NYU Classes → Assignments. Please submit your work as a single attachment.**
- Only typed work is accepted, with one exception: drawings can be made by hand and either scanned/photographed and attached electronically, or handed in at the beginning of class (don't forget to write your name).
- Late homework will not be accepted and will count as 0.
- Collaboration on homework is permitted, but each student has to write their own work. **Copying someone else's work is fraud and will yield a grade of 0.**
- If you think your homework has been graded incorrectly, please first talk to your TA and if no resolution is reached, to Weiji.

#### *Exams*

- The midterm will be take-home, open-book, and consist of homework-type questions. You will be allowed to consult any notes, books, and online resources. Collaboration or assistance from others are not allowed.
- The final will be in-class, open-book, and consist of homework-type questions. You will be allowed to consult any notes and books in paper form, but no other sources.
- There will be no make-up exams and no early exams.

#### *Participation*

- Attendance is mandatory. You are expected to participate during lecture by answering "clicker" questions, by working in pairs during discussion questions. You are expected to participate during recitation by being actively involved in discussions.
- To request an excused absence, please email your TA and me in advance.

#### *Letter grades*

- All numerical grades will be on a scale from 0 to 10.

- Your numerical score will be turned into a letter grade according to the following scale:  
9-10 A; 8.7-8.9 A-; 8.4-8.6 B+; 8-8.3 B; 7.7-7.9 B-; 7.4-7.6 C+; 7.0-7.3 C; 6.7-6.9 C-;  
6.4-6.6 D+; 6-6.3 D; 5.7-5.9 D-; 0-5.6 F.

#### 4. Overview of classes

Day	What	HW due	Topic
Jan-25	Class 1		Introduction and overview
Feb-1	Class 2	<b>1</b>	Vision: depth, retina, prior, likelihood
Feb-8	Class 3	<b>2</b>	Vision: anamorphic illusions
Feb-15	No class		
Feb-22	Class 4	<b>3</b>	Vision: nuisance parameters
Feb-29	Class 5	<b>4</b>	Vision: illumination as a nuisance parameter
Mar-7	Class 6	<b>5</b>	Vision: Gestalt and forced perspective; causal inference
Mar-14	No class		
Mar-21	Class 7	<b>Midterm</b>	Vision: light and color
Mar-28	Class 8	<b>6</b>	Bayes' rule and vestibular illusions
Apr-4	Class 9	<b>7</b>	Vestibular illusions
Apr-11	Class 10	<b>8</b>	Auditory and auditory-visual illusions
Apr-18	Class 11	<b>9</b>	Auditory-visual illusions
Apr-25	Class 12	<b>10</b>	Other sensory modalities
May-2	Class 13	<b>11</b>	Illusions without inference
May-9	Class 14	<b>12</b>	Neurological disorders in perception
May 16	<b>Final</b>		