The Mind: Biological and Artificial

Course Description

When you think back to your first day of elementary school, or the day you first met your childhood pet, how accurate are your memories? Will artificially intelligent robots ever make it from the movie screen to the workplace, and if they do, just how much will they think like we do? Using popular science readings by authors like Robert Sapolsky, we will explore some of the peculiar ways in which our mind works and influences how we behave, and how scientists are using this information to build "artificial minds" in computer chips. Through writing informational and opinion pieces on topics like these, students will improve their ability to convey interesting and multifaceted ideas and develop cogent and convincing opinions in their writing.

Instructor

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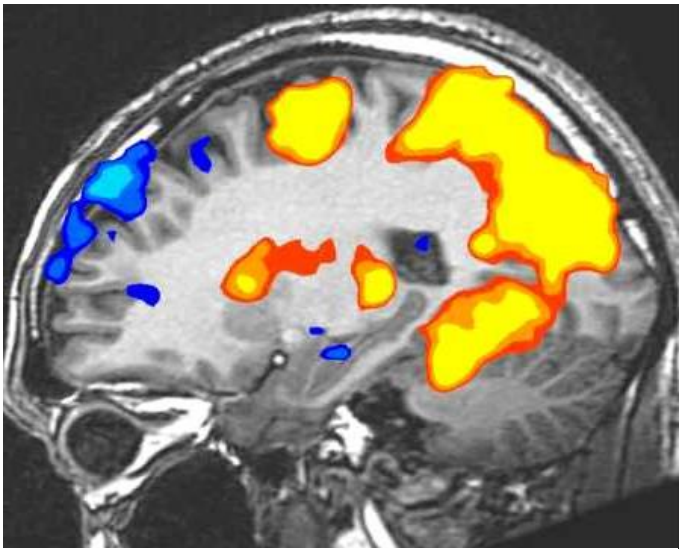
Office hours:
Tues. 10:00am-12:00pm
or by appointment

Meeting Times

Monday, Wednesday, and Friday 9:05-9:55am in Corson-Mudd W364

Course Rationale

This course is designed to develop your skills as a writer by engaging with questions on the nature of the mind. An understanding of the biology of our brain can help us better understand human behavior and decision making, and will allow us to better evaluate what is meant by "artificial intelligence." You will engage with readings from practicing scientists and science journalists on topics including neural basis of aggression and reward-seeking, the creation and fallibility of memories, and the encroachment of artificially intelligent machines into the workplace. These questions are engaging and of great importance, and will provide the basis for your writing assignments, which are the cornerstones of this seminar. This course will train you to think critically about unanswered questions, to integrate multiple considerations of difficult concepts, and to develop technical writing skills that clearly convey your ideas to readers.



A functional magnetic resonance image showing increased and decreased activity in the human brain during a cognitive task. *Credit: Hopelab*

Learning Outcomes

By completing this course, students will *demonstrate proficiency in their writing* through:

- Developing clear theses which can be supported by evidence;
- Employing clear and concise language to convey complex ideas and arguments;
- Effectively using preparatory writing strategies and editing techniques, including outlining and peer-review;
- Appropriately using and citing sources.

Students will demonstrate *an ability to engage in scientific discourse* by:

- Thinking critically about challenging topics and being able to convey multiple aspects of an issue;
- Distilling key points from primary literature, without being overwhelmed by detail;
- Evaluating conflicting evidence and being able to determine areas of consensus and areas of active debate.

Grading

Breakdown. Writing assignments (essays) make up the bulk of your grade as this is a writing seminar. That being said, a seminar can only be successful when students are prepared for and participate in class, and this is reflected in the grading scheme.

Writing Assignments:	70%
Homework:	20%
Participation:	10%

A Waymo self-driving car which uses computer imaging and artificial intelligence to navigate American streets. *Credit: Wired*

Writing Assignments. These essays are the most important aspect of the course; therefore, a good deal of class time will be spent preparing for these assignments. Such preparation includes drafting sections of the assignment, modeling the type of reading writing skills you'll need for the assignment, receiving peer revision on previous assignments or preparatory homework, among other things. There is a total of *six assignments*. Note that *three* of your assignments will go through a review and resubmission phase--both submissions, two of which require a one-page reflection for the resubmissions, will be incorporated into your grade for that assignment. Assignments are weighted differently based on their length and number of submissions. Grading details for each individual assignment are made clear in the "Details" sections of those assignments.

Assignment 1:	3 pg.	5%
Assignment 2:	3 pg.	15%
Assignment 3:	5 + 1 pg.[1]	25%
Assignment 4:	2 pg.	15%
Assignment 5:	5 pg. [2]	15%
Assignment 6:	5 + 1 pg.[1]	25%

[1] Assignments 3 and 6 require two submissions. A one-page reflection on the changes you made between drafts is required with the second submission.

[2] Assignment 5 requires two submissions but will only go through peer review. As I am not grading the first draft, a one-page reflection isn't necessary.

Homework. As part of the preparation process for each essay assignment, I will use a series of in-class and homework writing assignments. The goal of these is to get you thinking about the content of the upcoming writing assignment, and to produce something tangible that could actually be used in the upcoming essay assignment. These are "low-stakes" assignments and are only graded on completeness.

Participation. Small seminar classes such as this one require that all students participate in class discussions. The majority of our classes will consist of you and other students working together to interpret readings, providing feedback on each other's writing, etc. Because the success of this class is dependent on your engagement, participation is included in the grade.

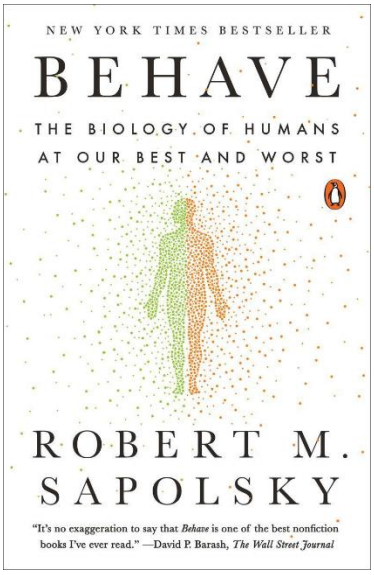
Final grade. Your total score will be assigned a letter grade according to the standard scale: $x \geq 97\%$ = A+; $93 \leq x < 97\%$ = A; $90 \leq x < 93\%$ = A-, etc. *Despite your numerical grade, you are guaranteed at least a B if you*:

1. Miss class no more than 3 times—talk to me if you foresee major issues with this.
2. Routinely come to class on time—arriving more than 10 minutes late counts as an absence.
3. Meet due dates and assignment criteria for all essays and homework assignments.
4. Regularly participate in all in-class activities.
5. Attend at least 2 conferences with me.

I use this "grading contract" to relieve some of the stress you may feel about grades and your GPA, and because I believe that if you genuinely put forth your full effort, you deserve a B even if your numerical grades are lower. Note that *if you do not put forth your full effort and do not meet the above criteria, your letter grade will match your numerical grade.*

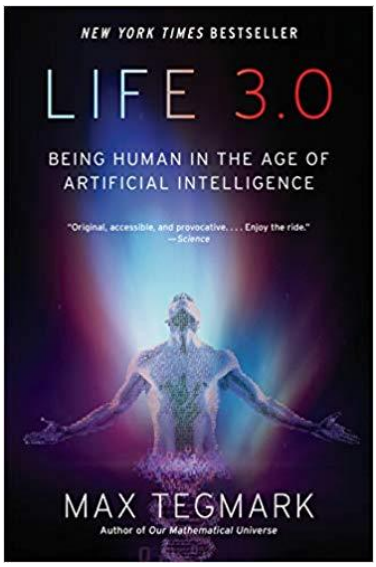
Course Policies

My promises to you. This is primarily a writing course, and as such I spend a good deal of time reading and responding to your writing. I aim to make my feedback constructive and respectful, with the goal of helping all of you improve your writing, no matter the skill set with which you entered my class. I will do my best to comment on and grade your work within *three weekdays* of the due date. I also aim to be an accessible and approachable teacher for everyone. To this end I will respond to all of your emails within *one weekday* and will make an effort to be available for appointments outside of office hours. If circumstances arise such that I cannot meet these expectations, I will let you know ahead of time.



Required texts. All students must obtain copies of *Behave* by Robert Sapolsky and *Life 3.0* by Max Tegmark. Both texts can be purchased at the bookstore or various online outlets. On some days you will need to bring one of these books to class--I will notify you when this is the case.

I will provide PDFs or web links to other assigned readings. Each of the assigned texts are available for under $20, but if you are unable to afford these books please reach out to me.



Office hours and individual conferences. My regular office hours are Tuesdays from 11:00am-12:00pm, but you should always feel free to set up a different time to talk with me if this doesn't fit your schedule. Office hours are held in my office, Mudd W211, but as I share this office with other graduate students I'll often have a sign on my door describing where I am in the building's atrium. Per FWS requirements, you must schedule *2 individual conferences with me over the course of the semester* during which we will discuss your writing. In the course schedule, I've highlighted when these conferences will take place. I'll distribute sign-up sheets to facilitate this as those weeks approach.

Peer review. The writing process requires that we seek and receive feedback on our work so that it can improve. While I will always provide feedback on your assignments, it's equally beneficial to get comments from your peers who are working on the same essays. Therefore, know that everything you write in this class may be read by others in the class. When working one-on-one with a partner, your name will of course be attached to your writing. When I use examples to share with the class, your name will not be revealed. Such openness is essential for a writing class like this to work well.

Technology. We will do a good deal of in-class writing, and I understand that many students prefer to type rather than handwrite. When reviewing your peers' work, laptops will be *necessary* so you can share your writing with each other. Laptops and tablets are therefore always allowed in class, though I ask that you be respectful and not browse or work on other subjects.

Attendance. Because active participation is key to a successful seminar class, I do keep track of student attendance (this will be partially reflected in your *Participation* grade--see "Grades" section above). I fully understand that illness, religious holidays, and other life events may arise causing you to miss class. Please let me know if this is the case, and I will accommodate you. Repeated or unexplained absences will decrease your participation grade.

Plagiarism. Plagiarism is defined as the practice of taking someone else's work or ideas and passing them off as one's own. Cornell's Academic Code strictly prohibits plagiarism and lists the sequence of repercussions if you are found guilty of plagiarism. Because this is an introductory writing course, I assume good will in all of my students and will work with you if your writing inadvertently approaches plagiarism. Given this assumption of good will, I will be particularly disappointed if any student tries to pass off copy-and-pasted text as their own work.

Disability. I am happy to accommodate any student who has a learning or cognitive disability, a physical disability that makes it difficult for you to get across campus from class-to-class, or mental health issues such as anxiety and depression. Please feel free to reach out to me if any of the

above (or other illnesses or disabilities that I've failed to mention) apply to you, and we will work to find a solution.

Cornell Writing Centers. The Cornell Writing Centers (WC) provide support for individuals at any stage of the writing process. It is a free resource available to everyone on campus—faculty, staff, graduate and undergraduate students—for nearly any kind of writing project: applications, presentations, lab reports, essays, papers, and more. Tutors (trained undergraduate and graduate students) serve as responsive listeners and readers who can address questions about the writing process or about particular pieces of writing. They can also consider questions of confidence, critical reading, analytic thought, and imagination. Writing tutors also have experience working with non-native speakers of English. During the academic year, the WC are open Mondays through Thursdays from 3:30 – 5:30pm (Mann Library & Rockefeller Hall 178) and Sundays through Thursdays from 7:00 – 10:00pm (Olin library Room 403; Uris Library Room 108; Tatkon Center Room 3343). Writers can schedule appointments or drop in at a convenient time.

Schedule

Class #	Date	Unit (Writing | Content)	In-class	Reading/homework due this class
1	F Aug. 24	Introduction to College Writing | Basic AI	**Activity**: Introductions and intuitive definitions of "mind"	
2	M Aug. 26		**Lecture**: Syllabus and course expectations **Interactive**: AI examples; Turing test; recursion	Read syllabus Read *Life 3.0* p. 3-21
3	W Aug. 28		**Discussion**: Examples from story (HW 1.1) and class discussion **Activity**: Reactions free-writing	Homework 1.1
4	F Aug. 31	Summary and Communication Styles | Brain and Behavior	**Lecture**: Intro to the brain; the amygdala **Discussion**: Moral accountability and brain disease	Read *Behave* p. 21-23, 31-44 ("The Amygdala") **Assignment 1** *(due 9:00am)*
	M Sep. 3	**No class** (Labor Day)		
5	W Sep. 5		**Lecture**: Decision-making and cognition **Activity**: Intuiting inputs and outputs of prefrontal cortex	Read *Behave* p. 45-64 ("The Frontal Cortex") Homework 2.1
6	F Sep. 7		**Activity**: Small group analysis of anecdotal	Homework 2.2

			humor, specific example, metaphor **Activity**: Summary/style in different texts (Bear 493-494 and Kandel 402-405)	
7	M Sep. 10	Defending and Supporting Arguments | Memory	**Lecture**: Memory introduction **Activity**: Summary workshop	**Assignment 2** *(due 9:00am)* Read Miller, *Smithsonian Mag.*
8	W Sep. 12		**Lecture**: Neural plasticity, memory consolidation and reconsolidation **Activity**: Clear sentences workshop **Assess**: Instructor/class assessment	Read *Behave* p. 137-153 (neural plasticity)
9	F Sep. 14		**Activity**: Memory recall debate (Brian Williams)	Listen "Free Brian Williams," *Revisionist History* Homework 3.1
10	M Sep. 17		**Lecture**: Unreliability of memory **Activity**: Determining arguments in Loftus (1997); finding quotes to support arguments	Read Loftus (1997) [Blackboard] Homework 3.2
11	W Sep. 19		*Guest: Kelee Pacion (Mann Library)* **Lecture**: Using library resources	Review course library guide website
12	F Sep. 21		**Lecture**: Support for eyewitness testimony reform **Activity**: Eyewitness testimony debate	Read Wixted & Mickes, *Scientific American (blog)* Homework 3.3
13	M Sep. 24		**Activity**: Introductions workshop	Homework 3.4
14	W Sep. 26		**Activity**: Close analysis of text (using Metz, 2018) **Lecture**: Giving good feedback	**Assignment 3** first submission *(due 9:00am)* Read Metz, *New York Times*
15	F Sep. 28		**Activity**: Assignment 3 peer review	Homework 3.5
16	M Oct. 1		**Activity**: Topic sentences (blacked out sentences from readings)	

			Activity: Rewrite topic sentences of their own essays	
17	W Oct. 3	Writing for an Audience | Science and the Media	**Lecture**: Organization of scientific papers **Lecture**: Studying human nature **Activity**: Reverse outline of Zhong & Liljenquist (2006) intro	Read Pain, *Science* (blog)
18	F Oct. 5		**Activity**: Analyzing Zhong & Liljenquist (2006)'s results	Read Zhong & Liljenquist (2006) [Blackboard]
	M Oct. 8	**No class** (Fall Break)		
19	W Oct. 10		**Activity**: Popular press descriptions of science **Activity**: Peer feedback on Homework 4.1	Homework 4.1 **Assignment 3** final submission *(due 9:00am)—postponed*
20	F Oct. 12		**Discussion**: Class-led discussion of Bail et al. (2018)	Read Bail et al. (2018) [Blackboard]
21	M Oct. 15		**Activity**: Small group reverse outline and discussion of chosen papers	Homework 4.2
22	W Oct. 17		**Activity**: Analyzing popular press articles about	Homework 4.3
23	F Oct. 19		**Interactive**: Medical uses of recreational drugs **Activity**: MDMA medical legalization debate	Listen "Molly—Scary Drug or Promising Therapy?" *Science Vs.*
24	M Oct. 22		**Activity**: Peer review of introductions	Homework 4.4
25	W Oct. 24	Close Textual Analysis and Supporting a Thesis | Psychiatric Disorders	**Lecture**: Diagnosing and treating psychiatric disorders	**Assignment 4** *(due 9:00am)*
26	F Oct. 26		**Discussion**: "The Depressed Person" guided discussion	Read "The Depressed Person," Wallace [Blackboard]

27	M Oct. 29		**Activity**: Determining a thesis for "This is Water" **Activity**: Brainstorming theses	Read "This is Water," Wallace [Blackboard]
28	W Oct. 31		**Activity**: Outlining and supporting with evidence a thesis	Homework 5.1
29	F Nov. 2		**Activity**: Write body paragraph for another student	Homework 5.2
30	M Nov. 5[1]		*Guest: David Bulkin* **Activity**: Group peer review/workshop of Assignment 5	**Assignment 5** first submission *(due 9:00am)*
31	W Nov. 7[1]	Developing a Thesis | Impact of Science on Society	*Guest: David Bulkin* **Activity**: "Moral Machine" discussion	Listen "Driverless Dilemma," *Radiolab* Homework 5.3
32	F Nov. 9		**Interactive**: Artificial intelligence and evolution **Activity**: Tone in writing	Read *Life 3.0*, p. 22-34 ("Most Important Question of our Time")
33	M Nov. 12		**Lecture**: Short-term effects of AI **Activity**: Active/passive voice	**Assignment 5** resubmission *(due 9:00am)* Read *Life 3.0*, p. 34-47 ("Most Important Question of our Time")
34	W Nov. 14		*Observation: Eliot Shapiro (FWS Leader)* **Discussion**: Technology's impact on humans **Activity**: Characteristics of beneficial and harmful technologies	Homework 6.1 (bring in article to discuss) *Recommended*: Skim *Life 3.0*, p. 82-133 ("The Near Future")
35	F Nov. 16	**Class canceled**		
36	M Nov. 19[2]		*Guest: Sara Keen (FWS Peer Collaboration Partner)* **Lecture**: Cultural evolution **Interactive**: Envisioning the future	Read Harari, *Wired* Read Harari, *The Guardian*
	W Nov. 21	**No class** (Thanksgiving)		
	F Nov. 23	**No class** (Thanksgiving)		

37	M Nov. 26		**Lecture**: Measuring intelligence **Discussion**: Intelligence across species	Read *Life 3.0*, p. 49-55, 61-67 ("Matter Turns Intelligent")
38	W Nov. 28		**Interactive**: Economic impacts of automation **Debate**: Universal basic income	Read Heller, *The New Yorker* Homework 6.2
39	F Nov. 30		**Activity**: Assignment 6 one-minute presentations **Assess**: Course/instructor assessment	Homework 6.3
40	M Dec. 3		**Lecture**: Course recap **Activity**: Peer review of Assignment 6	**Assignment 6** first submission *(due 9:00am)*
	W Dec. 12	**Exam period** [3]		**Assignment 6** resubmission *(due 11:59pm)*

* Student conferences during shaded weeks.

[1] As I will be away at a conference, these classes will be taught by guest lecturer David Bulkin, a postdoctoral researcher in Neurobiology & Behavior and a former instructor of Introduction to Psychology.

[2] As part of a peer collaboration in the Knight Institute, Sara Keen (another FWS instructor) will teach this class.

[3] There is no final exam, but your final assignment is due during this period. The due date is set according to the University-published final exam calendar.