

Looking Into the Brain: Principles and Applications of Neuroimaging

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Readings: The primary text for the course will be *Looking Inside the Brain: The Power of Neuroimaging* by Denis Le Bihan. This is available on Amazon in both print and digital editions. There will also be supplementary readings for the course; primarily excerpts from other books and journal articles. These will be provided by the instructor. The textbook, however, should be purchased prior to students arriving in Greece.

Course Overview: In this course, we will examine how the remarkable technology of neuroimaging has changed our understanding of our brains, ourselves, and multiple disciplines across the sciences. The course will begin with a review of the history and principles of neuroimaging, focusing on MRI and fMRI, as well as a discussion of the statistical methods necessary to interpret the rich and detailed data these methods provide. Next, we will consider what the insights derived from neuroimaging can tell us about fundamental processes in psychology such as emotion, learning and memory, and sensory perception. In the third part of the course, we will examine what a deeper understanding of the workings of our brains means for other disciplines, including philosophy, economics, clinical psychiatry, and the study of sex and gender.

Attendance: Attendance is strongly encouraged but not explicitly required. I will not take attendance, but note that materials covered in lecture, as well as in assigned reading, may be included on the exams.

Grading: Your grade will be determined by the combination of two exams and a final paper (to be completed within 4 weeks of completion of the course) on a topic in neuroimaging covered in the course. The exams will be non-cumulative, and primarily based on issues covered in lecture. Each exam will account for 30% of your grade, for a total of 60%. The remaining 40% will be determined by your paper. Grades will be assigned using the following scale based on percentage of total available points:

	B+ 86.67-89.99	C+ 76.67-79.99	D+ 66.67-69.99	F < 60.00
A 93.34-100	B 83.34-86.66	C 73.34-76.66	D 63.34-66.66	
A - 90.00-93.33	B- 80.00-83.33	C- 70.00-73.33	D- 60.00-63.33	

Online materials: Slides from each lecture will be emailed to all participants following each lecture. Additionally, audio recordings of each lecture will also be available.

Academic Integrity: Students are expected to conform to the same principles of academic integrity required by their home universities. Cheating will not be tolerated, and will result in failure of the course. Similarly, plagiarism will not be tolerated in the preparation of the paper. If you are uncertain as to what constitutes plagiarism, please discuss with the instructor.

Class Schedule: The schedule of lectures is below. This will be updated with specific dates when a class time is set. Be aware that some changes to this schedule may be made during the course, if we find that some topics require extra time. Any changes to the schedule will be announced at least one session in advance.

	Topic	Reading:
DAY 1	Introduction to the Brain and History of Neuroimaging:	Le Bihan, Chapters 1 and 2
DAY 2	Beyond Anatomy: Functional Neuroimaging	Le Bihan, Chapters 3 and 4
DAY 3	Putting It All Together: Finding Networks in the Brain	Le Bihan, Chapter 5
DAY 4	Too Much Data: Experimental Design and Statistical Models in Neuroimaging	Le Bihan, Chapter 6 – Supplemental readings
DAY 5	What's Next? Imaging Genetics, Connectomics, and the Future of Neuroimaging EXAM 1	Supplemental Readings TBA
DAY 6	Cognitive Neuroscience: How Neuroimaging Changed Our Understanding of How We Perceive, Remember, and Think	Supplementary Readings: Excerpts from Gazzaniga, <i>Cognitive Neuroscience</i>
DAY 7	Neuroimaging in the Clinic: Imaging insights into neurological and psychiatric disorder	Supplemental Readings: Excerpts from Sacks, <i>The Man Who Mistook His Wife For A Hat</i>
DAY 8	Neuroeconomics: Reward and Irrationality in the Brain	Supplemental Readings: Excerpts from Ariely, <i>Predictably Irrational</i>
DAY 9	Sex on the Brain: The Neuroscience of Sex, Gender, and Sexual Preference	Supplementary Readings: Andreano & Cahill, 2010
DAY 10	Brains in a Jar: Neuroscience, Philosophy, and Self EXAM 2	Supplemental Readings: Excerpts from Churchland, <i>Neurophilosophy</i> and Searle, <i>Minds, Machines, and Persons</i>