“These facts seem to us to indicate the existence of an automatic mechanism by which the blood supply of any part of the cerebral tissue is varied in accordance with the activity of the chemical changes which underlie the functional action of that part”


INSTRUCTOR: Marcelo Febo, Ph.D.
Office location: L4-100F Psychiatry Suite, McKnight Brain Institute
Email: febo@ufl.edu
Phone: 352-294-4911

OFFICE HOURS: By prior appointment with Dr. Febo or course TA

COURSE TA: In Progress

COURSE WEBSITE: In Progress

COURSE COMMUNICATIONS: A discussion board will be available soon on the UF e-Learning support services: https://elearning2.courses.ufl.edu. For urgent matters, students may also contact professor directly by email or schedule an office hour appointment.

RECOMMENDED TEXT(S):

Textbooks are not absolutely required but are strongly recommended. One of the following may be used:


ADDITIONAL RESOURCES: The professor will also assign selected readings from the literature as an advanced supplement to textbook chapters. See below for representative papers under ‘Scheduled Topics Overview’.
COURSE DESCRIPTION: Functional magnetic resonance imaging (fMRI) is at the forefront of many research fields in neuroscience. The method is widely applied in human and animal studies to investigate neural mechanisms. Introduction to Functional MRI will provide students with the basic and practical principles underlying fMRI of the brain. Students will complete the course having an in-depth introduction to neurophysiological mechanisms that couple magnetic resonance phenomenon to task- or stimulus-dependent changes in neuronal activity and cerebral metabolism.

PREREQUISITE KNOWLEDGE AND SKILLS: Consent of instructor. There are no prerequisite courses. However, it is strongly recommended that students take Basic Magnetic Resonance Imaging GMS 6080 (Dr. Stephen J. Blackband) for an introduction to basic mechanisms underlying nuclear magnetic resonance. Although we will go over some of the basic concepts of NMR to reinforce learning and in order to introduce functional MR, the course will not provide an extended discussion of these physical concepts. Students not enrolled in the in GMS 6080 will be expected to go over these concepts in sufficient detail using one of the above recommended texts (the professor may provide other options as introductory textbooks). It is also recommended that graduate students take the Principles of Neuroscience Sequence. Knowledge of General Medical and/or Comparative Physiology is advantageous but not required.

PURPOSE OF COURSE: To have an in-depth introduction to the neurophysiological mechanisms contributing to fMRI signals.

COURSE GOALS AND/OR OBJECTIVES: Upon completion students will (i) critically articulate, write and explain neurophysiological literature applying functional MRI, (ii) have basic experience with fMRI data handling and analysis, and (iii) will learn the basic skills needed to pursue application of fMRI in their own research to investigate neural mechanisms.

TEACHING PHILOSOPHY: We will emphasize basic concepts under a variety of topics in order to explore basic physiological mechanisms contributing to fMRI signals. Discussions are expected to be carried out at a high level and to be interactive, with students contributing to the topics. Students are encouraged to think how these mechanisms apply to their own area of study and how they may design studies to examine specific questions in their fields using fMRI.

INSTRUCTIONAL METHODS: Learning in the course is intended to be a product of interactive and dynamic discussions, with introductory lectures and discussions by the instructor combined with student presentations on assigned material, critical thinking questions and one hands-on workshop session. Expert faculty/researcher guests may be invited to supplement class lectures/discussions.

COURSE POLICIES:

ATTENDANCE POLICY: Attendance is mandatory. Students should drop from course after missing 2 or more absences from class. Absence due to sickness will require that the student bring a note or other signed written statement from a physician in order to remove the absence from the 2 or more absence policy. Standard UF withdrawal policies and deadlines will be followed (http://www.registrar.ufl.edu/currents/petwithdrawals.html).

QUIZ/EXAM POLICY: Exams will be given as take home tests to be handed in on specific dates.

MAKE-UP POLICY: There are no make-ups for take home tests. Class paper discussions and presentations will not have make-ups.

ASSIGNMENT POLICY: The professor will not accept exams that are past due.
COURSE TECHNOLOGY: Students will access lectures online through the UF e-Learning system. On Nov. 13-15 we will hold a practical learning session and will ask students to bring laptop computers, if available.

UF POLICIES:

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES: Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at http://www.dso.ufl.edu/students.php.

NETIQUETTE: COMMUNICATION COURTESY: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. [Describe what is expected and what will occur as a result of improper behavior] http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf

GETTING HELP:

For issues with technical difficulties for E-learning in Sakai, please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- https://lss.at.ufl.edu/help.shtml

** Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Other resources are available at http://www.distance.ufl.edu/getting-help for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course please visit http://www.distance.ufl.edu/student-complaints to submit a complaint.

GRADING POLICIES:
GRADING SCALE: Letter scheme. For more information, see: http://www.isis.ufl.edu/minusgrades.html

Take home questions 40 %

Presentations 30 %

Participation 30 %

*No final exam

COURSE SCHEDULE:

FINAL EXAM: Final exam is not given. Students are graded as indicated above.

SCHEDULED TOPICS OVERVIEW:

Oct. 30 - Nov. 1 Introduction to fMRI
   - Course overview, Historical perspectives and General MRI Safety
   - Basic mechanisms review (from protons to functional maps)
   Take home: historical papers assignment

Nov. 6 - Nov. 8 Exploring The Physiology of the Blood Oxygen Level Dependent (BOLD) signal
   - The BOLD effect
   - Cerebral Energetics
   - Hemodynamic mechanisms
   - Neuron-vascular coupling mechanisms
   Take home: physiological mechanisms influencing BOLD

Nov. 13 - Nov. 15 Methodological Considerations (Practical Session)
   - Mapping functional activation in the brain
   - Introduction to Study Design, Data Collection, Data Processing and Analysis, Interpretations
     (Computer Sessions With Medical Image Visualization and Analysis and Statistical Parametric Mapping version 8)
   Take home: ‘sample data crunching’

Nov. 20 - Nov. 22 Alternative Functional Brain Mapping Techniques
   - Cerebral Blood Flow Methods (arterial spin labeling)
   - Cerebral Blood Volume Methods (Iron Oxide Contrast Agents)
   - Multimodal MRI
Take home: design a study

Nov. 27 - Nov. 29 Modern Applications
- Resting State fMRI, Pharmacological MRI, Comparative/Translational MR Imaging (Animal MRI)
- Psychiatry, Neurology applications.

In class: Study presentation, comparison to published article

Representative Readings:


*Disclaimer: Topics outlined in the schedule above are subject to change. The present syllabus represents the instructor’s current plans and objectives. As the course progresses, scheduled topics and the instructor’s considerations of relevant topics may change in order to enhance the student’s learning. Such changes will be communicated clearly and in a timely fashion, and is not unusual or unexpected.