PSYC589/888

Online Course Image to Inference Fall 2022 3 Credit Hours

https://crnl.readthedocs.io/psyc589888/index.html

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Office Hours: Fridays 9-10am or via appointment

Guest Lecturers: Dr John Absher, Dr Roger Newman-Norlund, Dr Taylor Hanavik, Dr

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Description

Functional magnetic resonance imaging is a recent and powerful tool for inferring brain function. This technique identifies brain regions that are activated by different tasks – for example we can find the brain regions that activate when someone sees a familiar face. This course is designed to give students an understanding of the potential and limitations of this technique, and the ability to critically evaluate the inferences that can be drawn from fMRI. The course describes all stages of an fMRI study – from the design of the behavioral task (e.g. asking the participant to view faces), to the image processing (e.g. correcting images for head movements that occurred during scanning), through to statistical analysis (identifying brain regions that are activated by a task).

This course will discuss how fMRI and other brain imaging modalities can be translated to impact clinical care.

Auditing

Students, post-docs, clinicians and faculty are welcome to audit this class at no charge.
This class showcases some of the state-of-the-art facilities in South Carolina. Individuals
who audit a class will not receive course credit and are not required to complete any
assessments.

Prerequisites

This is an upper level undergraduate course as well as a graduate course. Familiarity with computers, neuroscience and neurology are helpful, but not required. We will use the Unix command line extensively, and many neuroimaging tools have steep learning curves. These tools will be unfamiliar to most students, so each student will need to commit to developing skills using these tools.

Learning Outcomes

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- Understand the basic elements of neuroimaging.
- Understand strengths and limitations of complementary tools used in cognitive neuroscience.
- Ability to evaluate how contemporary methods can be used to understand cognitive functions.
- Practice software for viewing, preprocessing and statistically analyzing brain imaging data.
- Practice writing in the form of scientific report that relates behavioral and biomedical constructs.
- Awareness of neurological conditions (epilepsy, stroke, tumor, AVM) and clinical neuroimaging modalities (CT, MRI, PET, SPECT).

Course Materials

Textbook: Functional Magnetic Resonance Imaging by Huettel, Song, and McCarthy. Any edition. ISBN-13: 978-0878932863.

Course Requirements

Lectures and Practicals will cover all aspects of modern neuroimaging, from data acquisition through inference.

Course Format

This is a lab-based course. Attendance for the face-to-face lectures and labs are required. To succeed in a lab-based class, you must be extremely motivated and well organized. You will need to purchase the required textbook listed above by the first day of the course. Other course materials are available via Blackboard ("Bb"). Regular Internet access is essential for successful completion of the course.

The typical lecture class structure will consist of learning modules, which include:

PowerPoint Lectures

The typical labs will include:

Analyzing data using FSL

We will also have a field trip to the Prisma Health Richland Hospital to see an MRI scanner in action.

This is an entirely lab-based course. By registering for this course you are committing to joining the lectures and labs at the designated time. This will allow you to ask questions and learn interactively. All assignments can be done at the computer lab, but can also be done on your personal computer (though installation of FSL can be laborious). You will need to devote time outside the class lecture hours to complete the assignments.

It is important to understand that this is not a self-paced class or an independent study. You will have assigned deadlines, and work must be submitted on time. You may not save up your assignments to complete in the last weeks or days of the semester. One critical part of this class is regular interaction with other students and with the instructors. Each assignment sequence must be completed on schedule – you can't work ahead or get behind and be successful.

Course Communication

I will be communicating with you regarding grades and assignments. If you need to get in touch with me, I am happy to discuss in class, after class, or at a mutually agreed office hour. Generally, I will reply to emails within 24 hours and will provide feedback on assignments within 72 hours. You may also post questions pertaining to the course on the Blackboard Discussion Board. These questions will be answered within 24 hours.

If you are having trouble with this course or its material, you should contact me as early as possible so we can discuss contingencies and remediation.

Announcements will be posted to this course whenever necessary. If there is any other information, I think is important, I will send it to your email address you have in Blackboard. It is your responsibility to ensure that your email account works properly in order to receive email.

Below is how you check your email address in Blackboard:

- Access blackboard.sc.edu
- Click your name on the main Blackboard navigation panel on the left
- Review your email address. By default, Blackboard uses your university-issued email address

Your email address in Blackboard coincides with your preferred university email. If you are unsure of your preferred email, check your account (myaccount.sc.edu). For more information on setting your preferred university email, please see the How To Change Your Primary University Email Address (https://scprod.service-now.com/sp?id=kb article view&sysparm article=KB0011464) Knowledge Base article.

Module Schedule

All course deadlines are listed in Eastern Time Zone. Blackboard will record all deadlines in this timezone. If you are in a different timezone, plan accordingly. Each week will begin on a [insert day of week] and will end on [insert day of week].

In order to complete all of the module assignments, you will spend about 9 hours per week on the course material for a total of approximately 145 hours of course-related activities using Blackboard, discussion boards and blogs, and reading and reflecting on the texts. A list of weekly responsibilities/deadlines follows:

- Regular Homework where you will complete brain imaging analyses using the computer lab or your home computer.
- Written final essay (and presentation for graduate students).

Technology Requirements

Lectures and labs will be conducted in the computer lab, and basic software is provided. All the software is free, so you can also install this on a well specified computer, though the method is laborious

The PowerPoint lecture presentations, links to articles, assignments, quizzes, and rubrics are located on the Blackboard site for the course. To participate in learning activities and complete assignments, you will need:

- Access to a working computer that has a current operating system with updates installed, plus speakers or headphones to hear lecture presentations (transcripts provided);
- Reliable Internet access and a USC email account;
- A current Internet browser that is compatible with Blackboard (Google Chrome is the recommended browser for Blackboard);
- Microsoft Word as your word processing program; and
- Reliable data storage for your work, such as a USB drive or Office365 OneDrive cloud storage.

If your computer does not have Microsoft Word, Office 365 ProPlus package is available to you free of charge and allows you to install Word, Excel, PowerPoint, Outlook, OneNote, Publisher, and Access on up to 5 PCs or Macs and Office apps on other mobile devices including tablets. Office 365 also includes unlimited cloud storage on OneDrive. To download Office 365 ProPlus, log into your student (University) email through a web browser, choose Settings (top right corner), and select software. If you have further questions or need help with the software, please contact the Service Desk (Servicedesk.php).

Technical Skills Needed

Technical skills are needed in this course. This class has a lab-based practical component. All work in this course must be completed and submitted online through Blackboard. Therefore, you must have consistent and reliable access to a computer and the Internet. The minimum technical skills you have include the ability to:

- Organize and save electronic files;
- Learn how to use the Amazon web client, Linux command line terminal, and process files. The practicals provide guidance, but you will need to take initiative to become familiar with these commands.
- Use USC email and attached files; Check email and Blackboard daily;

• Download and upload documents; Locate information with a browser.

Technical Support

The weekly labs provide you with a forum to ask questions and get technical help. Web pages and youtube videos are available both on the course web page and at the fsl course web page https://fsl.fmrib.ox.ac.uk/fslcourse/

If you have problems with your computer, technology, IT-related questions, support, including Blackboard, please contact the Division of Information Technology (DoIT) Service Desk at (803) 777-1800 or submit an online request through the Self-Service Portal (https://scprod.service-now.com/sp) or visit the Carolina Tech Zone (https://scprod.service-now.com/sp) or visit the Carolina Tech Zone (https://www.sc.edu/about/offices and divisions/university technology services/suppor t/ctz.php). The Service Desk is open Monday – Friday from 8:00 AM – 6:00 PM (Eastern Time). If you are located in the Columbia, SC area, the Thomas Cooper Library at UofSC has computers for you to use in case you encounter computer issues/problems. If you are not located in the Columbia, SC area, most regional campuses and public libraries have computers for public use. If you have a laptop computer, you can also bring it with you to class for assistance.

Course Assignments and Grading

The final grade is weighted 30% quizzes, 40% on homework assignments and 30% on the essay. Letter grades assigned as follows A = 90-100%, B = 80-90%, C = 70-80%, D = 60-70%, F = <60%. Graduate students (PSYC888) must also present a research article as a class presentation. This presentation is scored as pass or fail that modifies the grade on the essay by x1.0 (pass) or x0.5 (fail), so that a perfect essay (100%) with a failed presentation (x0.5) yields a weighted score of 50%. Material from this article will be included in the quiz, so underdraduates will want to pay careful attention to this presentation. Homework description: Students will submit regular homework assignments, which are due at noon on their due date. Assignments are due in the students' dropbox folder unless otherwise specified. Essay description: Students will write an essay that describes the merits, limitations and potential of a current or potential technique used to infer brain function. Essays should extend beyond the information in the course. Examples include: ERP vs fMRI, MEG, functional connectivity, Independent Component Analysis, Adaptation Designs.

General Assignment Information

- All coursework (assignments, exams, etc.) is secured in Blackboard with a username and password.
- All assignments will be posted with a clear due date, late penalties apply.
- All online quizzes and tests are secured in Blackboard with a password.
- Complete rubrics will be provided in Blackboard.

Formatting

All written assignments are required to be submitted using Microsoft Word or Google Docs. There are no exceptions to this rule. Documents should be proofread to avoid spelling and grammatical mistakes. Additionally, all written assignments will be evaluated based on "quality" and not simply "quantity." All written assignments should adhere to the following guidelines:

- Spacing: one and a half;
- Font: either Tahoma or Arial in 12 point (size);
- Title of assignment centered on first page, followed by student name in next line;
- Documentation for all references and quotations using APA style; and
- Accurate spelling and grammar.

Academic Success

Successful online learners:

- 1. Do not procrastinate;
- 2. Are open to sharing professional experiences online;
- 3. Enhance online discussions;
- 4. Have good written communication skills;
- 5. Use proactive communication;
- 6. Are self-motivated and self-disciplined;
- 7. Have a commitment to learning;
- 8. Have critical thinking and decision-making skills;
- 9. Believe quality learning can take place in an online environment; and
- 10. Have good time management skills.

Disability Services

Student Disability Resource Center (http://www.sa.sc.edu/sds/): The Student Disability Resource Center (SDRC) empowers students to manage challenges and limitations imposed by disabilities. Students with disabilities are encouraged to contact me to discuss the logistics of any accommodations needed to fulfill course requirements (within the first week of the semester). In order to receive reasonable accommodations from me, you must be registered with the Student Disability Resource Center (1705 College Street, Close-Hipp Suite 102, Columbia, SC 29208, 803-777-6142). Any student with a documented disability should contact the SDRC to make arrangements for appropriate accommodations.

Student Success Center

In partnership with UofSC faculty, the Student Success Center (SSC) offers a number of programs to assist you in better understanding your course material and to aid you on

your path to success. SSC programs are facilitated by professional staff, graduate students, and trained undergraduate peer leaders who have previously excelled in their courses. Resources available to you in this course may include:

- Peer Tutoring: You can make a one-on-one appointment with a <u>Peer Tutor</u>
 (www.sc.edu/success). Drop-in Tutoring and Online Tutoring may also be
 available for this course. Visit their website for a full schedule of times, locations,
 and courses.
- Supplemental Instruction (SI): SI Leaders are assigned to specific sections of
 courses and hold three weekly study sessions. Sessions focus on the most
 difficult content being covered in class. The SI Session schedule is posted
 through the SSC website each week and will also be communicated in class by
 the SI Leader.
- Peer Writing: Improve your college-level writing skills by bringing writing
 assignments from any of your classes to a Peer Writing Tutor. Similar to
 Tutoring, you can visit the website to make an appointment, and to view the full
 schedule of available drop-in hours and locations.
- Success Consultations: In Success Consultations, SSC staff assist you in developing study skills, setting goals, and connecting to a variety of campus resources. Throughout the semester, I may communicate with the Student Success Center regarding your progress throughout the semester, which indicates your instructor is concerned about your progress in this course. If contacted by the Student Success Center, please schedule a Success Consultation right away. Referrals are not punitive, and any information shared by your professor is confidential and subject to FERPA. Student Success Center services are offered to all UofSC undergraduates at no additional cost. Please call 803-777-1000, visit www.sc.edu/success, or come to the Student Success Center in the Thomas Cooper Library (Mezzanine Level) to check schedules and make appointments.

SSC services are offered to all UofSC undergraduates at no additional cost. You are invited to call the Student Success Hotline at (803) 777-1000, visit the SSC website (www.sc.edu/success), or stop by the SSC in the Thomas Cooper Library on the Mezzanine Level to check schedules and make appointments.

Writing Center

Writing Center (http://artsandsciences.sc.edu/write/university-writing-center)

This course has many of writing assignments. The University Writing Center is an important resource you should use! It's open to help any UofSC student needing assistance with a writing project at any stage of development. The main Writing Center is in Byrnes 703.

University Library Resources

University Libraries Resources (sc.edu/libraries)

- University Libraries has access to books, articles, subject specific resources, citation help, and more. If you are not sure where to start, please <u>Ask a Librarian!</u> <u>Assistance is available at sc.edu/libraries/ask</u>.
- Remember that if you use anything that is not your own writing or media (quotes from books, articles, interviews, websites, movies everything) you must cite the source in MLA (or other appropriate and approved) format.

Blackboard and Technology

Blackboard and Technology

(https://sc.edu/about/offices and divisions/division of information technology/end use r services/available technology resources/)

As a student in this course, you have access to support from the Division of Information Technology (DoIT) for Blackboard and computer issues. The service desk can be reached at 803-777-1800.

Counseling Services

Counseling Services

(https://sc.edu/about/offices and divisions/student health services/medical-services/counseling-and-psychiatry/index.php): The University offers counseling and crisis services as well as outreach services, self-help, and frequently asked questions.

Mental Health

If stress is impacting you or getting in the way of your ability to do your schoolwork, maintain relationships, eat, sleep, or enjoy yourself, please reach out to any of our mental health resources. Counseling & Psychiatry offers individual and group counseling and psychiatric services. You can schedule an appointment at (803) 777-5223 or on MyHealthSpace. You can also call after-hours for crisis counseling. Wellness Coaching can help you improve in areas related to emotional and physical wellbeing, such as sleep, resiliency, balanced eating and more. Wellness Coaching appointments can be made by calling 803-777-6518. or on MyHealthSpace. Most of these services are offered at no cost as they are covered by the Student Health Services tuition fee. For all available mental health resources, check out sc.edu/mentalhealth.

Course Policies and Procedures

Attendance is required. If you can not meet a deadline, you should discuss this with Dr Rorden at a class at least 3 days prior to the due date. Otherwise, failing to meet a deadline will be penalized 10% per day unless medical documentation can be provided. If you are struggling, please discuss alternatives as soon as possible (e.g. incomplete

grade with asynchronous submission). In general, lab classes are hard to complete after term. Standard university policy applies to academic integrity.

The <u>Undergraduate Studies Bulletin</u>

(https://academicbulletins.sc.edu/undergraduate/policies-regulations/undergraduate-academic-regulations/#text) is the official document of record concerning undergraduate academic programs and regulations.

All graduate students are subject to the academic policies, regulations, and academic standards of both The Graduate School and the department, school and/or college in which enrolled.

<u>UofSC graduate bulletin (https://academicbulletins.sc.edu/graduate/policies-regulations/graduate-academic-regulations/#text)</u>

Attendance Policy

Success in this course is dependent on your active participation throughout the course. You are expected to attend all lectures and labs. By enrolling, you are committing to reserving class and lab times for attendance. Standard university policies apply (10% rule). Please contact Dr Rorden about any absences (e.g. death in family, illness, etc.).

Academic Integrity

You are expected to practice the highest possible standards of academic integrity. Any deviation from this expectation will result in a minimum academic penalty of your failing the assignment, and will result in additional disciplinary measures. This includes improper citation of sources, using another student's work, and any other form of academic misrepresentation.

The first tenet of the Carolinian Creed is, "I will practice personal and academic integrity."

Below are some websites for you to visit to learn more about University policies:

Carolinian Creed (http://www.sa.sc.edu/creed)

Academic Responsibility (http://www.sc.edu/policies/staf625.pdf)

Office of Student Conduct and Academic Integrity

(https://www.sa.sc.edu/academicintegrity/)

Information Security Policy and Standards

(https://sc.edu/about/offices_and_divisions/division_of_information_technology/security/policy/universitypolicy/)

Plagiarism

Using the words or ideas of another as if they were one's own is a serious form of academic dishonesty. If another person's complete sentence, syntax, key words, or the specific or unique ideas and information are used, one must give that person credit through proper citation.

Class Conduct/Netiquette

Professionalism will be expected at all times, but most especially with your interactions online. Because the university classroom is a place designed for the free exchange of ideas, we must show respect for one another in all circumstances. We will show respect for one another by exhibiting patience and courtesy in our exchanges. Appropriate language and restraint from verbal attacks upon those whose perspectives differ from your own is a minimum requirement. Courtesy and kindness is the norm for those who participate in my class.

Our discussion board is a way for you to share your ideas and learning with your colleagues in this class. We do this as colleagues in learning, and the Discussion Board is meant to be a safe and respectful environment for us to conduct these discussions.

Some Netiquette Rules:

- Treat one another with respect. It will be expected that we will not attack one another personally for holding different opinions.
- Do not use all CAPITAL LETTERS in emails or discussion board postings. This is considered "shouting" and is seen as impolite or aggressive.
- Begin emails with a proper salutation (Examples: Dr. Name; Ms. Name; Hello Professor Name; Good afternoon Mr. Name). Starting an email without a salutation or a simple "Hey" is not appropriate.
- When sending an email, please include a detailed subject line. Additionally, make sure you reference the course number (Ex. ENGL 287) in the message and sign the mail with your name.
- Use proper grammar, spelling, punctuation, and capitalization. Text messaging language is not acceptable.
- Use good taste when communicating. Profanity should be avoided.
- Re-Read, think, and edit your message before you click "Send/Submit/Post."

Please remember when posting to be respectful and courteous to your colleagues, and limit your posts to discussions of this course and its assignments.

Late Work/Make-up Policy

All assignments, quizzes, and exams are due by the deadline as posted on the course schedule.

Please plan accordingly, and complete these assignments in advance of their deadlines to ensure any unanticipated circumstances do not result in a missed assignment. User error does not qualify you for any kind of makeup or retake opportunity.

Completing and submitting the assignments or quizzes responses by the due date is the sole responsibility of you. If you receive an incomplete score because of failure to submit the assignment or test by the due date, then your score for that assignment will be recorded as "zero."

You will be allowed to access the assignments an unlimited number of times until the due date/time, and take quizzes one time each on or before the due date/time as indicated on the course calendar. If you are concerned about missing a deadline, you may want to do any of the following:

- Post your assignment the day before the deadline; or
- Begin quizzes as soon as they are made available online.

Late quizzes will be accepted if the following two requirements are met:

- 1. You must contact me in advance of the exam's deadline to make arrangements for its completion.
- 2. You must complete the exam within the week following its due date.

Late assignments and quizzes will be subject to the following penalty: 10% will be deducted from your grade for the first day late, and an additional 5% will be deducted on each subsequent day.

Be Careful: The clock on your computer may be different than the clock in Blackboard. If the clock is different by one second, you will be locked out of the assignment or quiz. Plan accordingly. I recommend that you submit your assignments, quizzes, and exams well before deadline.

Incomplete Grades

You may assigned an 'I' (Incomplete) grade if you are unable to complete some portion of the assigned course work because of an unanticipated illness, accident, work-related responsibility, family hardship, or verified learning disability. An Incomplete grade is not intended to give you additional time to complete course assignments or extra credit unless there is indication that the specified circumstances prevented you from completing course assignments on time.

Instructional Methods

The course will be taught using multiple instructional methods. These methods will include lecture videos, YouTube videos, MRI facility tours, group projects and video presentations with an associated critical discussion. Typically, course topics will be introduced via a 2-3 lecture format incorporating interpretive discussions. Directly following the lecture presentation, you will review an article from the primary literature

that either illustrates current research into the topic or explore a related or relevant additional concept. Literature discussions will utilize small group discussions on Blackboard followed by online presentations.

Diversity and Inclusion

The university is committed to a campus environment that is inclusive, safe, and respectful for all persons, and one that fully embraces the Carolinian Creed. To that end, all course activities will be conducted in an atmosphere of friendly participation and interaction among colleagues, recognizing and appreciating the unique experiences, background, and point of view each student brings. You are expected at all times to apply the highest academic standards to this course and to treat others with dignity and respect.

Accessibility, Disability, and Triggers [credit to <u>Dr. David Moscowitz</u>] I am committed to ensuring course accessibility for all students. If you have a documented disability and expect reasonable accommodation to complete course requirements, please notify me at least one week before accommodation is needed. Please also

provide <u>SDRC</u> (https://sc.edu/about/offices_and_divisions/student_disability_resource_c enter/) documentation to me before requesting accommodation. Likewise, if you are aware of cognitive or emotional **triggers** that could disrupt your intellectual or mental health, please let me know so that I can be aware in terms of course content.

Diversity, Ethics, and the Carolinian Creed [credit to Dr. David Moscowitz]

This course works to foster a climate free of harassment and discrimination, and it values the contributions of all forms of diversity. The decision to enter university and pursue advanced study is a choice that entails commitment to personal ethics expressed in the Carolinian Creed (www.sa.sc.edu/creed): "I will discourage bigotry, while striving to learn from differences in people, ideas and opinions." Likewise, the Student Code of Conduct (STAF 6.26 (http://www.sc.edu/policies/ppm/staf626.pdf) stresses, "The University of South Carolina strives to maintain an educational community that fosters the development of students who are ethical, civil and responsible persons."

Title IX and Gendered Pronouns [credit to Dr. David Moscowitz]

This course affirms equality and respect for all gendered identities and expressions. Please don't hesitate to correct me regarding your preferred gender pronoun and/or name if different from what is indicated on the official class roster. Likewise, I am committed to nurturing an environment free from discrimination and harassment. Consistent with Title IX policy, please be aware that I as a responsible employee am obligated to report information that you provide to me about a situation involving sexual harassment or assault.

Values [credit to Dr. David Moscowitz]

Two core values, inquiry and civility, govern our class. **Inquiry** demands that we all cultivate an open forum for exchange and substantiation of ideas. Strive to be creative,

to take risks, and to challenge our conventional wisdom when you see the opportunity. **Civility** supports our inquiry by demanding ultimate respect for the voice, rights, and safety of others. Threatening or disruptive conduct may result in course and/or university dismissal. Civility also presumes basic *courtesy*: please be well rested, on time, and prepared for class, which includes time for a restroom stop *before* (not during) class and silencing all personal devices.

My perspective is that we never cease being students of this world, so I believe that attentive, reflective people always have something to learn from others. Good discussions can be energetic and passionate but are neither abusive nor offensive. Vibrant, vigorous inquiry derives from discussions that:

- challenge, defend, and apply different ideas, theories, perspectives, and skills,
- extend a body of knowledge into different arenas and applications, and

result in a synergy that compels us to seek resolution to these discussions.

Expectations of the Instructor

I am expected to facilitate learning, answer questions appropriately, be fair and objective in grading, provide timely and useful feedback on assignments and treat you as I would like to be treated.

Copyright/Fair Use Statement

I will cite and/or reference any materials that I use in this course that I do not create. You, as students, are expected to not distribute any of these materials, resources, quizzes, tests, homework assignments, etc. (whether graded or ungraded). The material and code I have created for this course are shared using the BSD 2 Clause license.

Course Schedule

The web page contains the core lectures. Typically, there will be a lecture on Tuesday and a Lab on Thursday.

- Aug 18
- Aug 23
- Aug 25
- Aug 30
- Sep 1
- Sep 6
- Sep 8
- Sep 13

- Sep 15
- Sep 20
- Sep 22
- Sep 27
- Sep 29
- Oct 4
- Oct 6
- Oct 11
- Oct 13 Fall Break (no classes)
- Oct 18
- Oct 20
- Oct 25
- Oct 27
- Nov 1
- Nov 3
- Nov 8 General Election Day (no classes)
- Nov 10
- Nov 15
- Nov 17
- Nov 22
- Nov 24 Thanskgiving (no classes)
- Nov 29
- Dec 1