

## **INSTRUCTIONS FOR COMPLETION OF THE UAMS GRADUATE SCHOOL COURSE APPROVAL FORM**

1. Please save this PDF to your computer for editing.
2. The form has been designed with fields for your responses, and these are indicated in blue and gray shading. Please complete all fields. Use the "tab" key to move between fields. A 'beep' will sound if you attempt to enter a response that contains more characters than is permitted. **IF YOU NEED HELP IN ANY OF THE FIELDS, PRESS THE F1 KEY AND A HELP WINDOW WILL OPEN.**
3. Print the document, and then obtain the appropriate signatures before submitting the form to the Graduate Office.

**COURSE APPROVAL FORM, Graduate School  
University of Arkansas for Medical Sciences**

This form and attached materials are due in the Graduate School Office on the first Monday of the month. All forms will be submitted to the UAMS Graduate Council Curriculum Committee for review and approval prior to consideration by the Graduate Council.

This form is not required for minor stylistic or editorial corrections to the title or course descriptions. These may be made when revising the catalog copy.

1. **Program:** Department of Biomedical Informatics

B	I	O	M				
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*Department* *Alpha (Department) Code*

2. **Action proposed** (indicate one or more items): Effective term: Fall 2017

- |  |   |  |
|--|---|--|
| <input checked="" type="checkbox"/> Add course                   | <input type="checkbox"/> Change title                                 |  |
| <input type="checkbox"/> Eliminate course<br>(No outline needed) | <input type="checkbox"/> Change credit hours from: _____ to _____     |  |
|  | <input type="checkbox"/> Change course number<br>from: _____ to _____ |  |
|  | <input type="checkbox"/> Change description                           |  |

3. **Course ID, title and description:**

B   I   O   M		Neuroimaging Info
prefix	number	title (20 characters)

Neuroimaging Informatics & Connectomics  
catalog name (40 characters)

Scheduled offering:  Fall  Spring  Summer  On demand

To cross list a course, use the Course Cross Listing Form.

Describe the course in sentence form using **50 words or less as it is to appear in the catalog**. List prerequisites, co-requisites and possible off-site instructional opportunities or requirements.

This graduate course will explore in depth the use of advanced imaging techniques and quantitative analysis approaches in Neuroscience research. The focus is distinct from clinical imaging and standard clinical practice. Pre-clinical and advanced imaging techniques not yet approved for the clinic will be explored.

4. **Justification:**

Justify this change in terms of course needs or curriculum improvement. State the effect of this change on any degree programs. Identify the courses to be eliminated, if any, if this course is approved. (Course Approval Forms must also be submitted for these courses) Identify any existing course or courses that would extensively overlap or be duplicated if the proposed curricular change occurs. Provide statements of concurrence with the change from the chairperson(s) and dean(s) of the programs/areas offering the affected courses.

There will be no change to degree programs.

## SYLLABUS

**COURSE NUMBER:** ?????

**COURSE TITLE:** Neuroimaging Informatics & Connectomics

**COURSE DESCRIPTION:**

This graduate course will explore in depth the use of advanced imaging techniques and quantitative analysis approaches in Neuroscience research. The focus is distinct from clinical imaging and standard clinical practice. Pre-clinical and advanced imaging techniques not yet approved for the clinic will be explored. Image creation, quantitative analysis and management technologies will be presented drawing on the primary literature and making full use of unique imaging resources such as the Human Connectome Project's ConnectomeDB and Workbench.

**PRE-REQUISITES:** BIOM \_\_\_\_ Anatomy for Imaging and PHYO 5013 General Physiology or equivalent.  
BIOM \_\_\_\_ Research Imaging Informatics  
BIOM \_\_\_\_ Introduction to biological network analysis

**GENERAL INFORMATION:**

**CREDITS:** 3

**SEMESTER:** Spring or Fall

**LOCATION:** Campus or hybrid (online lectures, campus labs)

**FACULTY:** Fred Prior, Linda Larson-Prior

**SPECIAL ASSISTANCE:** Students who believe they may need accommodations in this class based on mental or physical impairments must contact the Students with a disability that need accommodations should contact the Associate Dean for Academic Affairs at (501) 686-5730 to schedule an appointment to discuss your needs. Please make arrangements as soon as possible so accommodations can be made in a timely manner.

**COURSE OBJECTIVES:**

Upon successful completion of this course, the student is able to:

- Read and critique the primary literature
- Understand neuroimaging research results
- Analyze fMRI data
- Analyze EEG/MEG data
- Understand connectomics at multiple scales
- Utilize the services of ConnectomeDB and Connectome Workbench

## **MAJOR TOPICS:**

### **Introduction to Neuroimaging for Connectomics**

Basic Concepts

Use of neuroimaging modalities in connectomics

Overview of neuroimaging tracers

### **Introduction to Connectomics**

Basic Concepts

Connection matrices and metrics

### **Micro-scale connectomics**

Neuroimaging for micro-scale connectomics

Analytic strategies in micro-scale connectomics

Neuroinformatics for micro-scale connectomics

### **Meso-scale Connectomics**

Neuroimaging for meso-scale connectomics

Analytic strategies in meso-scale connectomics

Neuroinformatics for meso-scale connectomics

### **Macro-scale Connectomics**

Neuroimaging for macro-scale connectomics

Analytic strategies in macro-scale connectomics

Neuroinformatics for macro-scale connectomics

### **Connectopathy**

Quantitative vs. qualitative image analysis

## **TEXTBOOK:**

**(MMC) Micro-, Meso- and Macro-Connectomics of the Brain (Research and Perspectives in Neurosciences) 1st ed. 2016 Edition, Henry Kennedy (Editor), David C. Van Essen (Editor), Yves Christen (Editor) ISBN-10: 3319277766**

**(NI) Neuroimaging – Methods, Peter Bright (Editor), 2012, ISBN-978-953-51-0097-3, Open Access, <http://www.intechopen.com/books/neuroimaging-methods>**



- Week 3: Basic concepts in connectomics: choices in matrix structure  
Reading Assignment: MMC – chapter 8  
Journal club: discussion led by faculty
- Week 4: Nanoscale and Microscale Connectomics  
Overview of Abstract/Final paper topic choices  
Reading Assignment: MMC chapter 1, JC  
Journal club: Student led discussion
- Week 5: Microscale Connectomics: Imaging modalities  
Reading Assignment: MMC chapter 3, JC  
Journal club: Student led discussion
- Week 6: Microscale Connectomics: Analytic Strategies  
Reading Assignment: JC  
Journal club: Student led discussion  
*Assignment:* Abstract due final class of the week
- Week 7: Microscale Connectomics: Visualization and Informatics  
Reading Assignment: JC  
Journal club: Student led discussion
- Week 8: Mesoscale Connectomics  
Reading Assignment: JC  
Journal club: Student led discussion
- Week 9: Mesoscale Connectomics  
Reading Assignment: JC  
Journal club: Student led discussion
- Week 10: Mesoscale Connectomics  
Reading Assignment: JC  
Journal club: Student led discussion
- Week 11: Macroscale Connectomics  
Reading Assignment:  
Journal club: Student led discussion
- Week 12: Macroscale Connectomics  
Reading Assignment: JC  
Journal club: Student led discussion
- Week 13: Macroscale Connectomics: Visualization and Analysis  
Reading Assignment: JC  
Journal club: Student led discussion
- Week 14: Connectopathies: Basic Concepts  
Reading Assignment: JC

Journal club: Student led discussion

Week 15:     Connectopathies  
              Reading Assignment: JC  
              *Assignment:* Final Paper Due

6. Program Approvals:

Fred Prior, PhD, Department of Biomedical Informatics  
(Print or type) Chairperson, Academic Department or Area

Fred Prior 11/02/2016  
(Signature) Chairperson, Academic Department or Area Date

[Signature] 11 | 17 | 2016  
College Dean (Dean McGehee for College of Medicine) Date

7. Graduate School Approvals

[Signature] 11/17/2016  
Chairperson, Graduate Council Date

[Signature] 11 | 17 | 2016  
Dean of the Graduate School Date