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

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

- [X] Add course
- [ ] Eliminate course (No outline needed)
- [ ] Change title
- [ ] Change credit hours from: _____ to _____
- [ ] Change course number from: _____ to _____
- [ ] Change description

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

B	I	O	M					Biological Network Ana
prefix				number				title (20 characters)

Introduction to Biological Network Analysis
catalog name (40 characters)

Scheduled offering: [X] Fall [X] 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 course provides an introduction to network/Graph theory, how it can be applied to biological data and statistical analysis of biological networks; graphs; basic definitions and concepts, families of graphs, describe creating network graphs and analysis of network graph characteristics, statistical models for Network graphs and network topology inference.

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: **Introduction to biological network analysis**

COURSE DESCRIPTION:

The aim of this course is to provide an introduction to network/Graph theory, how it can be applied to biological data and statistical analysis of biological networks. The course will start with an overview of graphs; basic definitions and concepts, families of graphs, describe creating network graphs and analysis of network graph characteristics, statistical models for Network graphs and network topology inference. The course will concentrate on building correlation networks as an example.

PRE-REQUISITES: Basic statistical concepts and R programming skills.

GENERAL INFORMATION:

CREDITS: 1

SEMESTER: Spring??

LOCATION: Campus and Online (hybrid)

FACULTY: Sudeepa Bhattacharyya

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 will be able to:

- Understand basic concepts behind graph theory and network graph characteristics
- Understand the concepts behind modeling and inference of observed network graphs
- Understand the basics of network topology inference
- Construct and visualize a correlation network from a given dataset.

MAJOR TOPICS:

Basic introduction of complex systems and why we need networks
Graph concepts and special types of graphs
Creating Network graphs
Various tools to visualize network Data
Statistical models for network graphs
Network Topology inference
Biological networks

ASSIGNMENTS:

1. Computer exercises, with assigned data set.
2. Project, with assigned data set.
3. Prepare and present the project.

TEXTBOOK:

Statistical Analysis of Network Data with R. Eric D. Kolaczyk, Gabor Csardi.
ISBN: 978-1-4939-0982-7

STUDENT EVALUATION & GRADING

Assignment **40%**
There will be 2 computational assignments that student need to submit to demonstrate their understanding of Network analysis

Presentation of assigned project **60%**
An assigned project based on constructing a correlation network based on a given gene expression dataset and its visual representation using R and open source tools.

TOPICS AND ASSIGNMENTS BY WEEK:

Week 1:	Introduction to complex systems and why we need networks
Week 2:	Biological Networks
Week 3:	Properties of biological Networks
Week 4:	Graph Theory
Week 5:	Creating and manipulating Network graphs
Week 6:	Elements of Network Visualization
Week 7:	Descriptive analysis of network graph characteristics
Week 8:	Descriptive analysis of network graph characteristics
Week 9:	Statistical models for Network Graphs
Week 10:	Statistical models for Network Graphs
Week 11:	Network Topology Inference
Week 12:	Construction of a correlation network
Week 13:	Construction of a correlation network
Week 14:	Network Visualization using R and open source tools
Week 15:	Project presentation

6. **Program Approvals:**

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

Fred Prior 10/25/16
(Signature) Chairperson, Academic Department or Area Date

College Dean (Dean McGehee for College of Medicine) Date 11/17/2016

7. **Graduate School Approvals**

Eric C Peters 11/17/2016
Chairperson, Graduate Council Date

Dean of the Graduate School Date 11/17/2016