

# **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

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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 _____ |  |
|  | _____ Change description  |  |

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

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\_\_\_\_\_ Bioconductor for Genomic  
*prefix* *number* *title (20 characters)*

Bioconductor for Genomic Scale Data Analysis  
*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 course introduces students to tools required for analysis of high-throughput genomic data using Bioconductor. The focus will be on two main technologies: next generation sequencing and microarrays. The class will cover installation of Bioconductor, common data structures including Expression Sets, Summarized Experiments container for multiple assays.

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 current degree plans.

## SYLLABUS

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

**COURSE TITLE:** Bioconductor for Genomic Scale Data Analysis

**COURSE DESCRIPTION:**

The aim for this graduate course is to introduce students to tools required for analysis of high-throughput genomic data using Bioconductor. The focus will be on two main technologies: next generation sequencing and microarrays. The class will cover installation of Bioconductor, common data structures including Expression Sets, Summarized Experiments container for multiple assays, G Ranges objects used across several types of analyses, computing on genomic regions and genomic annotations with Bioconductor. An introduction to statistical concepts and methodologies in the analysis of data based on microarrays and next generation sequencing platforms will be covered. Lastly the course will introduce reproducible reports and workflows using Rmarkdown.

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

**GENERAL INFORMATION:**

**CREDITS:** 1

**SEMESTER:** Spring, Fall

**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:**

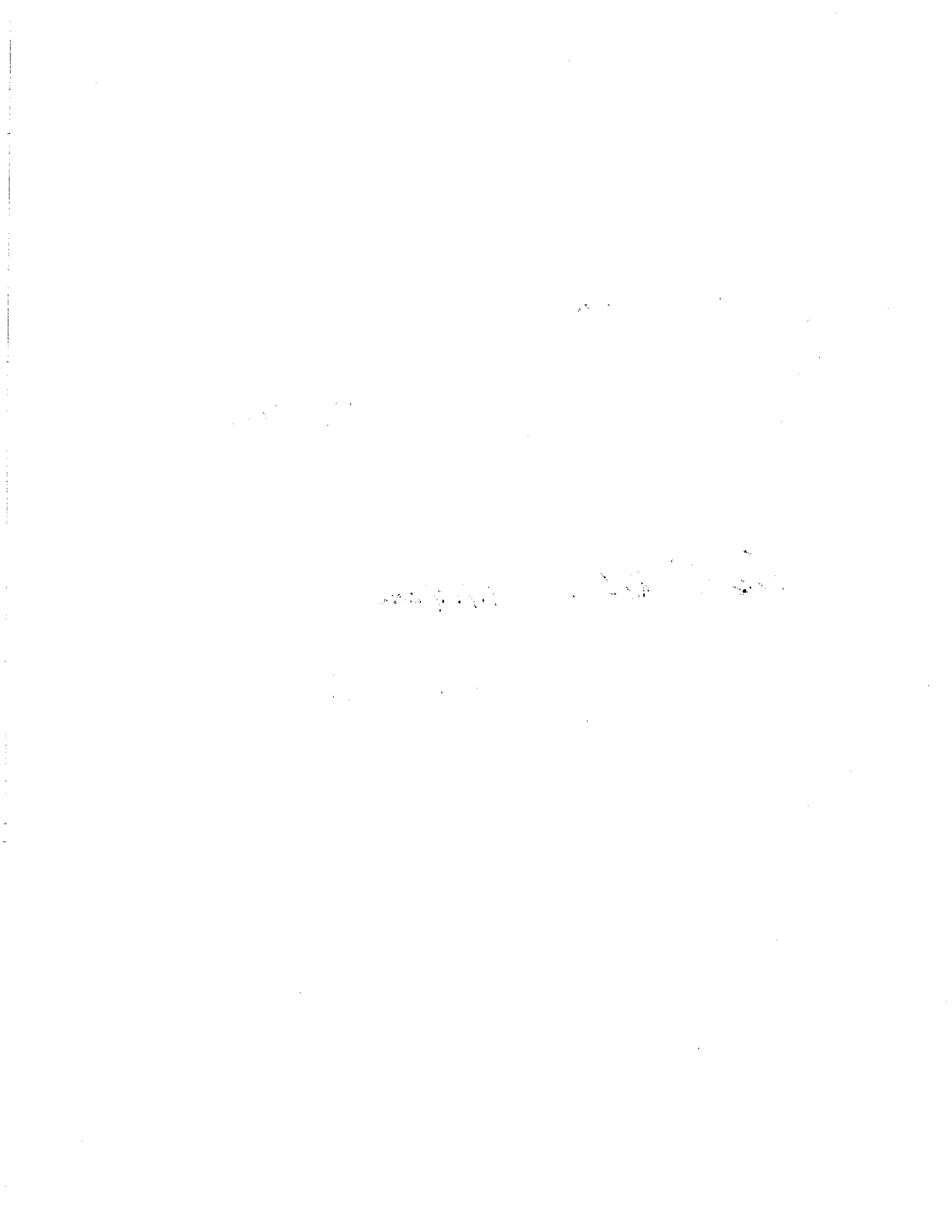
**Presentation of assigned project**

55%

An assigned project based on downloading NGS or microarray data (based on student's choice) from public repositories, importing in R and Bioconductor and perform preliminary analysis.

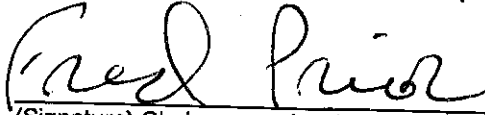
**TOPICS AND ASSIGNMENTS BY WEEK:**

- Week 1: Introduction to R; objects, functions, basic data manipulation
- Week 2: Introduction to Bioconductor, Biobase; constructing ExpressionSets, data manipulation in ExpressionSets
- Week 3: Biostings and BSgenome
- Week 4: Brief exploration of a small genome
- Week 5: Introduction to IRanges and GRanges
- Week 6: Introduction to IRanges and GRanges, cont'd (extracting and manipulating genomic features)
- Week 7: The SummarizedExperiment container:
- Week 8: Introduction to Sequence analysis: typical workflow
- Week 9: Introduction to Sequence analysis: typical workflow (con't)
- Week 10: Introduction to microarray data analysis in Bioconductor
- Week 11: Statistical analysis
- Week 12: Statistical analysis
- Week 13: Data visualization
- Week 14: Reproducible research using Rmarkdown
- Week 15: Project presentation



6. Program Approvals:

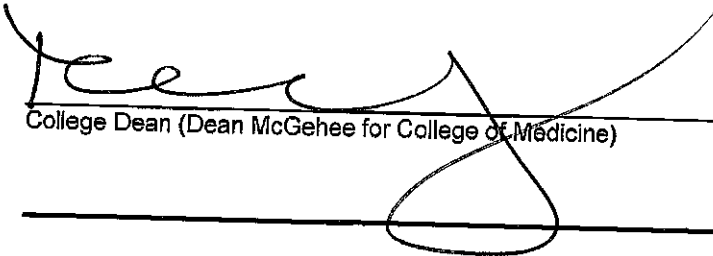
Fred Prior, PhD, Department of Biomedical Informatics  
(Print or type) Chairperson, Academic Department or Area



10/26/16

(Signature) Chairperson, Academic Department or Area

Date



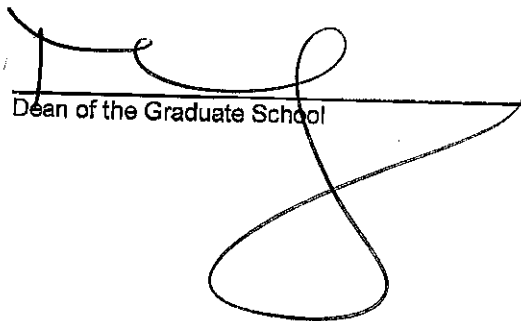
College Dean (Dean McGeehee for College of Medicine)

11/17/2016  
Date

7. Graduate School Approvals

  
Chairperson, Graduate Council

11/17/2016  
Date



Dean of the Graduate School

11/17/2016  
Date