

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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Alpha (Department) Code
Department

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

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

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

| | | | | | | | | | | |
|---|---|---|---|---|--|--|--|--|-----------------|---|
| <table border="1"><tr><td>B</td><td>I</td><td>O</td><td>M</td><td></td><td></td><td></td><td></td></tr></table> prefix | B | I | O | M | | | | | _____ number | <u>Comparative Microbial</u> title (20 characters) |
| B | I | O | M | | | | | | | |

Comparative Microbial Genomics
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 teach about the comparison of massive availability of genome sequence of microbes and other organisms. The course is designed to enable student to use computational tools through lectures and hands-on practical to extract biological meanings and discover novel features from the genomic data.

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: Comparative Microbial Genomics

COURSE DESCRIPTION:

The aim for this graduate course is to teach about the comparison of massive availability of genome sequence of microbes and other organisms. The course is designed to enable student to use computational tools through lectures and hands-on practical to extract biological meanings and discover novel features from the genomic data.

PRE-REQUISITES: Genomics and Metagenomics

GENERAL INFORMATION:

CREDITS: 3 (+ lab)

SEMESTER: Spring, Fall

LOCATION: Campus and Online (hybrid)

FACULTY: David W. Ussery/Intawat Nookaew

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:

This graduate course covers an in-depth coverage of the field of Comparative Microbial Genomics, with an emphasis on Bacterial genomics. Starting with a discussion of the flow of biological information and visualization of individual bacterial chromosomes, the course continues with methods for comparing dozens of genomes, expanding to hundreds of genomes, and then millions of genomes. The course covers the use of microbial genomic information in clinical diagnostics and public health (biosurveillance).

MAJOR TOPICS:

Introduction: Sequences as biological information
DNA structural atlases of bacterial chromosomes
Genome sequences as unique identifiers for taxonomy
Gene Finding (both non-coding RNAs and proteins)
16S rRNA trees
Microbial Metagenomics
Average amino acid identities for clustering species
Repeats in bacterial genomes
Evolution of Bacterial genomes.

ASSIGNMENTS:

1. Computer exercises, with assigned data set.
2. Student Projects, with assigned data set of genomes.
3. Prepare and present a comparative genomics project.

TEXTBOOK:

Computing for Comparative Microbial Genomics: Bioinformatics for Microbiologists. Ussery, David Wayne, Wassenaar, Trudy M., Borini, Stefano. ISBN 978-1-84800-255-5

STUDENT EVALUATION & GRADING

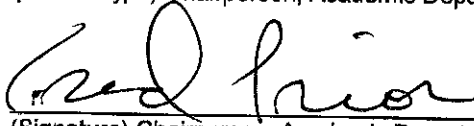
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|--|------------|
| Assignment | 30% |
| There are weekly sets of computer exercises introducing tools for comparative genomics. Students will submit their results each week to show that they have completed the exercises, on a set of assigned genomes. | |
| Presentation of Comparative Genomics project | 40% |
| The student will choose a set of about a dozen bacterial (or viral) genomes for comparative genomic analysis. Grades will be determined by the quality of the work presented. | |
| Final exam | 30% |
| A take home final exam will give to the student. | |

TOPICS AND ASSIGNMENTS BY WEEK:

- Week 1: Introduction to bioinformatics and comparative genomics
Sequences as Biological Information: Cells Obey the Laws of Chemistry and Physics (Chapter 1)
- Week 2: Introduction to bioinformatics and comparative genomics
Introduction to Bioinformatics (Chapter 2)
Project discussion and planning.
- Week 3: Introduction to bioinformatics and comparative genomics
Three Generations of Sequencing (Chapter 3)
- Week 4: Introduction to bioinformatics and comparative genomics
The Human Genome Project (Chapter 3)
- Week 5: Introduction to Genome Atlases
Part 1. DNA structure, and repeat content (Chapters 3 and 7)
- Week 6: Computer Exercises: Hands-on computational work
- Week 7: Introduction to Genome Atlas:
Part 2. DNA repeat content and blast atlas (Chapter 7 and 8)
- Week 8: Computer Exercises: Hands-on computational work
- Week 9: Gene regulation (Chapter 10)
Project discussion
- Week 10: A Brief History of *E. coli*
Proteomic and Blast Matrices (Chapter 11)
- Week 11: Computer Exercises: Hands-on computational work
- Week 12: Bacterial Pan- and Core-genomes
Evolution of Bacterial genomes (Chapter 12, 14)
- Week 13: Computer Exercises: Hands-on computational work
- Week 14: Poster presentation of the assigned project
- Week 15: Poster presentation of the assigned project

6. Program Approvals:

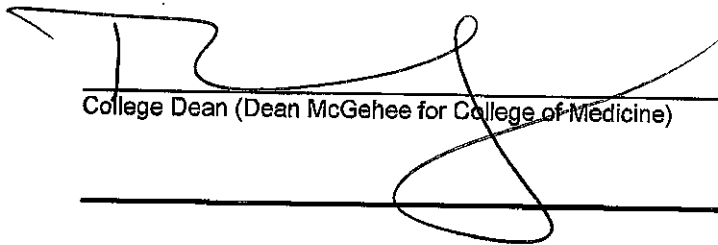
Fred Prior, PhD, Department of Biomedical Informatics
(Print or type) Chairperson, Academic Department or Area



10/25/16

(Signature) Chairperson, Academic Department or Area

Date



College Dean (Dean McGehee for College of Medicine)

Date

11/17/2016

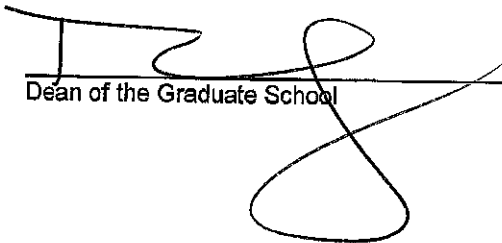
7. Graduate School Approvals



Chairperson, Graduate Council

11/17/2016

Date



Dean of the Graduate School

Date

11/17/2016