

**University of Arkansas for Medical Sciences
Office of the University Registrar
GUS Course Catalog Form**

This form should be used for courses offered at UAMS. If a course addition will change the curriculum for one or multiple degree plans, you will be asked to update a curriculum template for each degree program affected. Please remember to submit a copy of the syllabus with this form.

Course Changes and Additions Submission Timeline

Fall Semester	February 1 st (same calendar year)
Spring Semester	September 1 st (preceding calendar year)
Summer Semester	December 1 st (preceding calendar year)

This request is for a: New Course Course Change Course Retirement (skip to p. 4)

College: Graduate School

Department/Program: Department of Biomedical Informatics

Course Title: Genomics and Metagenomics

Course Description: This graduate course teaches methods for comparison of genomes and metagenomes. Students completing this course should be able to locate reference genomes, computationally compare genomes of interest and clearly communicate the results of the investigation using three different formats: a journal club report critiquing a recently published paper, a poster, and finally by writing a scientific paper which is formatted and suitable for publication.

Course Instructor: David Ussery, PhD

Course Instructor Email: DWUssery@uams.edu Course Instructor Phone: (501) 603-1766

Additional Instructors: None

Click here to enter additional instructor names and email addresses

Click here to enter additional instructor names and email addresses

GENERAL COURSE INFORMATION

First term course will be offered/changed: Fall Spring Summer

First year course will be offered/changed: 2017

Meeting dates differ from standard semester? Yes No

If yes, describe meeting pattern: (i.e. last 4 weeks of semester, 8 Wednesdays beginning 2nd week, etc.)

Grading Basis: Letter Grade Number of Units: 3

If Variable Credit, list the maximum number of units: *Choose an item.*

Component Type: *Lecture*

Repeat for credit? Yes No

If yes, limit to number of enrollments allowed per student: None

Preferred Catalog Number: *Click here to enter text.*

*Note: Preferred Catalog Numbers are not guaranteed to be used.

ENROLLMENT CONTROLS

PREREQUISITES

Subject Area	Catalog #	Course Title	Course ID (if known)
		Molecular Cell Biology or equivalent	MBIM 6104
		R/BioConductor or equivalent	Course ID
		Biochemistry or equivalent	Course ID
			Course ID

CO-REQUISITES

Subject Area	Catalog #	Course Title	Course ID (if known)
			Course ID
<i>Subj. Area</i>	<i>Catalog #</i>	<i>Course Title</i>	<i>Course ID</i>
<i>Subj. Area</i>	<i>Catalog #</i>	<i>Course Title</i>	<i>Course ID</i>
<i>Subj. Area</i>	<i>Catalog #</i>	<i>Course Title</i>	<i>Course ID</i>

Please list any other non-course prerequisites attached to this course (e.g. minimum GPA, exam, year in program)
[Click here to enter text.](#)

Minimum Number of Students to Enroll: No Minimum

Maximum Number of Students who may Enroll: No Maximum

Is enrollment in this course limited to certain groups of students (i.e. PhD students only)? Yes No

Please describe enrollment limits by groups: No Maximum

Is advisor or instructor consent required for students to take this course? Instructor Consent

INSTRUCTION MODE

Please provide information about the first semester this course will be offered. You will have the opportunity to change this information if this form is provided prior to the last date for scheduling requests.

INSTRUCTION INFORMATION

Instruction Mode: *Online - 75-99% some face/face*

FOR ONLINE COURSES ONLY: Will this course be offered to students out of state? Yes No

Please select all locations where this course will be taught:

Main Campus

Northwest Campus

UAMS Southwest

Other

If "Other" Location, please describe: *Click here to enter text.*

EXAM AND PROGRESSION

Will the course have a final exam? Yes No

Will the final exam occur during the normally scheduled course time? Yes No

Is there a minimum grade required for the student to progress? Not Required

ADDITIONAL INFORMATION

Are any degrees affected by this course addition? Yes No

If "Yes," please list all degrees affected by this change: *Click here to enter text.*

Does this course address/include:

Service Learning ¹ :	Partially <input type="checkbox"/>	100% <input type="checkbox"/>	Does not address <input checked="" type="checkbox"/>
Inter-professional Education ² (IPE)	Partially <input type="checkbox"/>	100% <input type="checkbox"/>	Does not address <input checked="" type="checkbox"/>
Cultural competency ³	Partially <input type="checkbox"/>	100% <input type="checkbox"/>	Does not address <input checked="" type="checkbox"/>
Patient-Family Centered Care ⁴	Partially <input type="checkbox"/>	100% <input type="checkbox"/>	Does not address <input checked="" type="checkbox"/>
Interdisciplinary Education ⁵	Partially <input checked="" type="checkbox"/>	100% <input type="checkbox"/>	Does not address <input type="checkbox"/>

ADDITIONAL INFORMATION:

Click here to enter text.

¹ A structured learning experience that combines community service with preparation and reflection. Students engaged in service-learning provide community service in response to community-identified concerns and learn: the context in which the service is provided, the connection between their service and their academic coursework, and their roles as citizens.

² Defined as students of two or more professions engaged in learning with, from and about each other.

³ An ability to interact effectively with people of different cultures and ethnic backgrounds. Comprises four components: Awareness of one's own cultural worldview, attitude towards cultural differences, knowledge of different cultural practices and worldviews, and cross-cultural skills. Developing cultural competence results in an ability to understand, communicate with, and effectively interact with people across cultures.

⁴ An approach to the planning, delivery, and evaluation of health care that is grounded in mutually beneficial partnerships among health care providers, patients, and families. It redefines the relationships in health care. The core concepts include: Dignity and respect, information sharing, participation, and collaboration.

⁵ Defined as the degree to which individuals have the capacity to obtain, process and understand basic health information and services need to make appropriate health decisions.

COURSE RETIREMENT ONLY – Course Additions and Changes can skip to pg. 5

College: *Choose an item.*

Department/Program: *Click here to enter text.*

Course Title: *Click here to enter the current title.*

Catalog Name and Number: *Click here to enter text.*

Course ID (if known): *Click here to enter text.*

What semester and year will this course be retired? *Click here to enter text.*

Are any degrees affected by this course retirement? Yes No

If "Yes," please list all degrees affected by this change (updated Curriculum Templates for any degree that will change as a result of this retirement are required to be submitted to the Office of the University Registrar):



Click here to enter text.

ADDITIONAL INFORMATION:

Click here to enter text.

APPROVALS

Proposal will not be processed without all required signatures.

	David Ussery, PhD
Course Instructor signature	
	Enter Associate Dean Name
Associate Dean signature	
Today's Date: October 7, 2016	Preparer's Name: Tremaine Williams
Preparer's Email: twilliams@uams.edu	

Please submit this form and a copy of the syllabus to:

Angela Wilson, Registrar

Email: awilson5@uams.edu

Mail Slot #767

Questions? 501-526-6612

<p>Office use only</p> <p>Received: _____</p> <p>Entered into GUS <input type="checkbox"/></p> <p>Entered into Schedule of Courses <input type="checkbox"/></p> <p>Curriculum Registrar Initials: _____</p> <p>Schedule Registrar Initials: _____</p>	<p>Notes/Follow-up:</p>
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**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
(No outline needed) | <input type="checkbox"/> Change credit hours from: _____ to _____ | |
| | <input type="checkbox"/> Change course number from: _____ to _____ | |
| | _____ Change description | |

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

B I O M		<u>Genomics and Metagen</u>
prefix	number	title (20 characters)

Genomics and Metagenomics
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.

Teaches methods for comparison of genomes and metagenomes. Students should be able to locate reference genomes, computationally compare genomes of interest and clearly communicate the results using: a journal club report critiquing a recently published paper, a poster, and by writing a scientific paper which is suitable for publication.

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 plans. This graduate course teaches methods for comparison of genomes and metagenomes.

SYLLABUS

COURSE NUMBER: ?????

COURSE TITLE: Genomics and Metagenomics

COURSE DESCRIPTION:

This graduate course teaches methods for comparison of genomes and metagenomes. Students completing this course should be able to locate reference genomes, computationally compare genomes of interest and clearly communicate the results of the investigation using three different formats: a journal club report critiquing a recently published paper, a poster, and finally by writing a scientific paper which is formatted and suitable for publication.

PRE-REQUISITES: A background in molecular biology and computing is essential for this course.
MBIM 6104 Molecular Cell Biology or equivalent
_____ Biochemistry or equivalent
_____ R/BioConductor or equivalent

GENERAL INFORMATION:

CREDITS: 3

SEMESTER: Fall

LOCATION: Campus and Online (hybrid)

FACULTY: David Ussery

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:

- Know where to find up-to-date lists of the most recently sequenced genomes.
- Know how to process a metagenome sample, and where to find metagenomic data.
- Compare two or three genomes to each other; compare twenty or more genomes and easily find trends and genomes which are significantly different.
- Compare hundreds and then thousands of genomes, identifying key trends.
- Be able to describe how one can compare millions of genomes.
- Calculate the core- and pan-genome sets of genes for a given species or taxonomic group.
- Be able to classify the likely species that a genome sequence reflects, based on rRNA trees, average amino acid identities (AAI), k-mer frequencies, and shared gene families.
- Read, understand and critique a paper published in the field of genomics.
- Prepare a poster to display results from a comparative genomics project.
- Write a scientific manuscript comparing a set of genomes / metagenomes.

MAJOR TOPICS:

Introduction to Genomics

Definition of Genomics as a discipline
 History of Genetics and Genomics
 Three Generations of Sequencing Technology
 Careers and Professional organizations in Genomics
 Major challenges in high-throughput genome comparison

Systems Biology – or ‘other –omics’

Metagenomics
 Transcriptomics (introduction, microarrays, RNAseq, function of non-coding RNAs)
 Proteomics (introduction, with emphasis on protein families and function prediction)
 Metabolomics (introduction, with emphasis on genome-scale metabolic models).

Cross-cutting Concepts, Principles and Theories

Fundamentals of Biological Sequences as Information
 Methods for Biological Sequence Analysis
 Taxonomic Classification of Genomic Sequences
 Pan- and core-genomics
 Genomic-based clinical diagnosis

ASSIGNMENTS:

1. Write an “elevator speech” to explain genomics to people who do not work in the discipline.
2. Present a journal club about an article comparing genomes

3. Prepare and present a poster about the comparison of genomes.
4. Write a short scientific manuscript about the comparison of genomes.
5. For each week during the first part of the course, there will be computer exercises, with assignments for each week.

ATTENDANCE: Attendance is required for all classes. Excused absences may be obtained only by permission from the course director.

TEXTBOOK:

COMPUTING FOR COMPARATIVE GENOMICS: Bioinformatics for Microbiologists, by David W. Ussery, Stefano Borini, and Trudy M. Wassenaar (Computational Biology series, Volume 8; Springer-Verlag London Limited, 2009; 2nd edition to be published in 2017).

STUDENT EVALUATION & GRADING

Journal Club	20%
Over the course of the first half of the semester, students will make a journal club style presentation about articles in the field of genomics and metagenomics. The grade will be based on how well the students have understood the paper and the quality of their presentation.	
Take-home exam (online)	20%
There will be one take-home exam, allowing the students opportunities to prove their excellence and understanding of the lectures.	
Poster presentation	20%
A poster presentation of a project comparing at least a dozen genomes; metagenomics sets can be included as well, but reference genomes are essential. Grades will be determined by the quality of the work presented.	
Written Manuscript suitable for publication	40%
The written manuscript will describe the genome comparisons from the poster (or alternative subject, if approved by the instructor). The grade will be based on quality of the manuscript, including formatting, clarity, as well as understanding of the underlying concepts.	

COURSE EVALUATION: At the end of the course, students will be provided with a Course Evaluation Form to anonymously assess the content and delivery of the course. Faculty will assess the course each term and make any appropriate modifications and updates.

TOPICS AND ASSIGNMENTS BY WEEK:

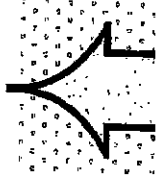
- Week 11: Work on poster projects
Take-home exam
Assignment: Outline poster, including topic and potential figures.
- Week 12: Poster party!
Assignment: Present poster.
- Week 13: Manuscript preparation – lectures on how to write papers
Assignment: Outline manuscript (one page)
- Week 14: Manuscript work
- Week 15: Assignment: Final manuscript due.

Course Approval Form

6. Program Approvals:

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

Fred Prior Digitally signed by Fred Prior Date: 2016.10.05 15:03:48 -05'00' 10/5/16
(Signature) Chairperson, Academic Department or Area Date



Thomas J. McGehee 10-20-16
College Dean (Dean McGehee for College of Medicine) Date

7. Graduate School Approvals

Eric C. Peterson 10/20/16
Chairperson, Graduate Council Date

Robert J. ... 10-20-16
Dean of the Graduate School Date