

Course Proposal Submitted to the College of Science Curriculum Committee (COSCC)

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FOR ALL COURSES (required)

Course Number and Title: BIOL 412

Date of Departmental Approval: September 14, 2016

FOR INACTIVATED/REINSTATED COURSES (required if inactivating/reinstating a course)

- Reason for Inactivating/Reinstating:

FOR MODIFIED COURSES (required if modifying a course)

- Summary of the Modification:

FOR NEW COURSES (required if creating a new course)

- Reason for the New Course:
This is one of two new courses that have been developed to support the new Concentration in Bioinformatics within the BS Degree in Biology and to promote student research.
 - Relationship to Existing Programs:
None
 - Relationship to Existing Courses:
None
 - Semester of Initial Offering:
Fall 2017
 - Proposed Instructors:
Dr. Anne Scherer
 - Insert Tentative Syllabus Below
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Instructor: Dr. Anne Scherer

Phone: 703-993-4530

Email: aschere2@gmu.edu

Office: Rm 1217 Exploratory Hall

Office Hours: MW 10:30-12am; TR 1:30-2:45pm; or by apt.

Text: There is no required text book for this course. A pdf version of the lab manual and some papers will be made available on Blackboard for download.

Also Required: Laptop/access to computer with software used for this course.

Course Description:

Bacteriophages, viruses that infect bacteria, are the most abundant organisms in the biosphere. This course explores the genomes of mycobacteriophages (bacteriophages that infect mycobacteria) using bioinformatics tools. In this course, two mycobacteriophage genomes will be annotated and compared to other sequenced mycobacteriophage genomes. Bioinformatics tools will be used to learn more about bacteriophage protein function, immunity and genome structure. Each student in the course will formulate a comparative genomics question and use learned bioinformatics techniques to answer that question. The results of these experiments will be conveyed in the form of a research paper and oral presentation. This class is designed to give students the opportunity to actively participate in the process of scholarship and research in addition to learning valuable genomic and bioinformatics skills.

Course Outcomes:

In this course you will:

- Formulate a question regarding comparative genomics and use bioinformatics techniques to answer the question
- Decide on a plan of attack for answering your question
- Report your findings in the form of a research paper and oral presentation using appropriate scholarly conventions
- Place your findings into the context of the field
- Increase your knowledge of bacteriophage primary literature
- Learn practical computer skills used in many disciplines of the biological sciences
- Think critically about data presented in a primary journal articles and be able to draw your own conclusions

A Few Notes About This Course:

- PowerPoint lecture slides will be available on Blackboard. Reading assignments and the annotation guide will also be available for download on Blackboard.
- I will use class e-mail lists to notify the entire class of something, so you **MUST** check your GMU e-mail regularly.

| Date | Lecture/Lab Topic | Reading | Assignment(s) Due |
|-------|--|---|---|
| 8/30 | Intro to Phage Biology/Genomics | | |
| 9/01 | Gene Structure/Bacteriophage Diversity | Mycobacterium Diversity Paper (Pope et al., 2015) | |
| 9/06 | Genome Sequencing | Phamerator Paper (Cressawn et al., 2011) | Phage Diversity Questions Due at Beginning of Class |
| 9/08 | Annotation Software/Software Download /Paper (questions work in groups) | | Annotation Exercise Due at End of Class |
| 9/13 | Bacteriophage Immunity | Bacteriophage Immunity Paper (Broussard et al., 2013) | |
| 9/15 | Bacteriophage Immunity Lab/Journal Club | | |
| 9/20 | Annotation Basics | | |
| 9/22 | Genome Annotation | | Bacteriophage Immunity Paper Assignment Due |
| 9/27 | Genome Annotation | | |
| 9/29 | Meetings with Dr. S to Discuss Independent Project | | |
| 9/30* | <i>Last day to drop a class (but you wouldn't want to do that, would you?)</i> | | |
| 10/04 | Genome Annotation | | |
| 10/06 | Genome Annotation | | |
| 10/11 | No Class: Columbus Day Break *Monday classes meet on Tuesday | | |
| 10/13 | Genome Annotation | Paper TBA | |
| 10/18 | Bioinformatics Paper Introduction | | |
| 10/20 | Journal Club | | |
| 10/25 | Genome Annotation | | |
| 10/27 | Genome Annotation | | Bioinformatics Paper Assignment Due |
| 11/01 | Genome Annotation | | |
| 11/03 | Genome Annotation | | |

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|-------|--|--|--------------------------------|
| 11/08 | Genome Annotation | | |
| 11/10 | Meetings with Dr. S to Discuss Independent Project | | Outline for research paper due |
| 11/15 | Genome Annotation | | |
| 11/17 | Genome Annotation | | |
| 11/22 | Genome Annotation | | |
| 11/24 | No Class: Thanksgiving Day Break | | |
| 11/29 | Independent Projects | | |
| 12/01 | Independent Projects | | |
| 12/06 | Independent Projects | | |
| 12/08 | Independent Projects | | |
| 12/15 | Oral Presentation of Independent Project | | Research Paper Due |

Class Etiquette and Attendance:

You will be expected to come to class on time and participate while you are in class. Some classes will start out with a lecture, but the bulk of class will be group work and class discussion. For this reason, class participation will be a large part of your final grade. Please do not bring your cell phones to class. Each unexcused absence will lead to an automatic deduction of one percentage point from your class participation grade. In addition, you will not be allowed to turn in any in-class assignments that you missed due to an unexcused absence. An excused absence (illness, death in the family, natural disaster etc.) requires documentation and will be made up outside of class.

Talking on your cell phone or texting will automatically lead to loss of participation points. Please also limit your class discussion to science. It is not fair for only some of the individuals in the class to do all of the work.

Exams:

There is only one exam in this course. It will be a take-home exam and will test your knowledge of bacteriophage genome organization and annotation. Your exam should be entirely your own work. You are not allowed to collaborate with other students on any part of this exam. Any student failing to turn in his/her own work will receive an honor code violation.

Grading:

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|---------------------------------------|-----|
| Midterm Exam | 15% |
| Journal Club/Annotation Assignments | 20% |
| Class Participation | 25% |
| Independent Project Research Paper | 20% |
| Outline | 5% |
| Rough Draft (Intro and Methods) | 5% |
| Final Draft | 10% |
| Oral Presentation of Research Project | 20% |

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|----------------------|---------------|---------------|--------------|--------------|
| Final Grades: | 93-100% = A | 87-89.9 = B+ | 75-79.9 = C+ | 60-69.99 = D |
| | 90-92.99 = A- | 83-86.99 = B | 70-74.99 = C | <60 = F |
| | | 80-82.99 = B- | | |

Honor Code:

GMU is an Honor Code university; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit to those people in the proper, accepted form. When doing journal club assignments and your take-home exam, the work must be yours. It is totally unacceptable to copy the work of another student in this course in any form. Any student failing to turn in his/her own work will receive an honor code violation.

Disabilities Accommodations:

If you have a learning or physical difference that may affect your academic work, you will need to furnish appropriate documentation to the Office of Disability Services. If you qualify for accommodation, the ODS staff will give you a form detailing appropriate accommodations for your instructor. In addition to providing me with the appropriate form, please take the initiative to discuss your accommodation with me at the beginning of the semester and as needed during the term. Because of the range of learning differences, I need help in determining the most effective ways to assist you. If you have contacted the Office of Disability Services and are waiting to hear from a counselor, please let me know.