BIOSC 1280 MICROBIAL GENETIC ENGINEERING
SPRING TERM 2017
SYLLABUS AND COURSE POLICIES

LECTURERS:　　Dr. Karen Arndt　　　　　　Dr. Graham Hatfull
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LECTURES:　　　Mon., Wed., Fri. 11:00 – 11:50 a.m.
　　　　　　　　　　Langley Hall, Room A214

COURSE DESCRIPTION

Microbes – both prokaryotic and eukaryotic – are critical to our understanding of the fundamentals of biology at the molecular level as well as for understanding human diseases. Microbes such as bacteria and yeast are advantageous in that they can be grown to very large numbers in small volumes, making them ideal for genetic approaches that require the isolation of mutants with informative phenotypes and for understanding the roles that genes perform. In this course we will discuss fundamental aspects of microbial genetics in bacteria and yeast and how this information can be used to understand pathogenic and inherent human diseases.

LEARNING OBJECTIVES

Upon completing this course, you will be able to apply the theories of classical and modern molecular genetic analysis of prokaryotic and eukaryotic microorganisms to current problems in microbial genetics.

PREREQUISITES

Completion of BioSc1850 Microbiology, with a grade of C or better. Please consult with the instructors if you have not satisfied this requirement or the prerequisites for BioSc1850.

TEXTBOOKS

Required

Molecular Genetics of Bacteria, fourth edition (2013), by Larry Snyder, Joseph Peters, Tina Henkin and Wendy Champness. Published by ASM Press, Washington D.C. This textbook contains readings and problems that are **required** for successful completion of the prokaryotic section of the course. This book is on reserve in Langley Library.

Suggested

Additional suggested reading will be provided throughout the course. To supplement the yeast section of the course, readings from a general Genetics textbook will be recommended.

COURSE EXPECTATIONS AND REQUIREMENTS

Assignments: Regularly throughout the course, you will be given scientific papers to read. You will be required to write a brief synopsis of either the whole paper or a component (as instructed). In addition, you will periodically receive problems sets to test your mastery of the material.

Attendance: Attendance at all lectures is critical to success in the course.

Participation: You are expected to participate in class discussions of both lecture material and assignments.

EXAMINATIONS

There will be a total of three examinations. The first two are **midterm exams** given during regular class meetings and will primarily focus on the material covered since the beginning of class or the prior exam. The **final exam** will be given on Saturday, April 29, 2017 at 10:00 until 11:50 am. **The Final Exam will include material from the entire course.** If you are not able to be present for any one of the exams, you must notify the instructors prior to the exam in writing.

GRADING

Your **final grade** will be based on the **two mid-term exams, one comprehensive final exam**, **homework assignments, and participation in class discussion**. Each mid-term exam will contribute 100 points, the final exam will contribute 200 points and take home assignments will contribute 60 points to your final grade. Participation in class discussion is worth a total of 40 points. Each exam will contain multiple-choice, true-or-false, short answer, and long answer questions.

Make-up Policy: Make-up exams will only be provided if a legitimate excuse is given for missing an exam; specific arrangements should be made with the instructors prior to the scheduled exam. A doctor's notice is required for a medical excuse.

UNIVERSITY POLICIES:

Academic Integrity

Cheating/plagiarism will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity, from the February 1974 Senate Committee on Tenure and Academic Freedom reported to the Senate Council, will be required to participate in the outlined procedural process as initiated by the instructor. A minimum sanction of a zero score for the quiz or exam will be imposed.

View the complete policy at www.cfo.pitt.edu/policies/policy/02/02-03-02.html.

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Office of Disability Resources and Services, 140 William Pitt Union, 412-648-7890/412-624-3346 (Fax), as early as possible in the term. Disability Resources and Services will verify your disability and determine reasonable

accommodations for this course. For more information, visit
www.studentaffairs.pitt.edu/drsabout.

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Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

E-mail Communication Policy

Each student is issued a University e-mail address (*username@pitt.edu*) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to http://accounts.pitt.edu, log into your account, click on ***Edit Forwarding Addresses***, and follow the instructions on the page. Be sure to log out of your account when you have finished. (For the full E-mail Communication Policy, go to www.bc.pitt.edu/policies/policy/09/09-10-01.html.)

Turnitin

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of Turnitin.com page service is subject to the Usage Policy and Privacy Pledge posted on the Turnitin.com site.

BioSc1280 Microbial Genetic Engineering: Spring 2017
Drs. Arndt and Hatfull
Mon., Wed., Fri., 11:00-11:50am   Langley A214

Day	Date	Topic	Instructor	Chapter
		Introduction to Bacterial and Yeast Genetics		
Wed.	1/4	Introduction and Perspectives	GFH/KMA	
		Unit 1: Essentials of Bacterial Genetics		
Fri.	1/6	Mutants and mutations: The currency of microbial genetics	GFH	3
Mon.	1/9	Transformation and Transfection: Getting DNA into cells	GFH	6
Wed.	1/11	Bacterial genomes and genomics	GFH	4
Fri.	1/13	The microbiome Transcriptomics, Ribo-Seq	GFH	
Mon.	1/16	**Dr. Martin Luther King's Birthday. No class**		
Wed.	1/18	Regulation of gene expression	GFH	12
		Unit 2: Essentials of Yeast Genetics		
Fri.	1/20	Yeast life cycle	KMA	
Mon.	1/23	Yeast genome inheritance and organization	KMA	
Wed.	1/25	Yeast plasmids and transposons	KMA	
Fri.	1/27	Gene expression and its regulation in a model eukaryote	KMA	
Mon.	1/30	The yeast transcriptome	KMA	
Wed.	2/1	**First Mid-term Exam**		
		Unit 3: The Microbiome		
Fri.	2/3	Bacterial diversity and evolution	GFH	Intro
Mon.	2/6	Plasmids	GFH	4
Wed.	2/8	Plasmids	GFH	4
Fri.	2/10	Conjugation	GFH	5
Mon.	2/13	Transduction: Generalized and Specialized	GFH	7/8
		Unit 4: Viral attack and defense		
Wed.	2/15	Phages and phage systems – Lytic phages	GFH	7
Fri.	2/17	Phages and phage systems – Lysogeny	GFH	7
Mon.	2/20	CRISPR-Cas	GFH	7
Wed.	2/22	CRISPR-Cas	GFH	**7**
Fri.	2/24	Toxin-Antitoxin systems	GFH	4
		Unit 5: Yeast: The Fundamentals of Inheritance and Mutant Isolation		
Mon.	2/27	Mendelian inheritance/ mitosis and meiosis refresher	KMA	
Wed.	3/1	Tetrad analysis: the basics	KMA	
Fri.	3/3	Tetrad analysis: gene mapping	KMA	
3/5-3/12		**Spring Recess. No Class**		
Mon.	3/13	Mutant hunts and cloning genes	KMA	
Wed.	3/15	Mutant hunts and cloning genes	KMA	
Fri.	3/17	**Second Mid-term Exam**		
		Unit 6: Bacterial Genome Engineering		
Mon.	3/20	Bacterial Transposons – What are they?	GFH	9
Wed.	3/22	Bacterial Transposons – How can we use them?	GFH	9
Fri.	3/24	Gene replacement by homologous recombination	GFH	10
Mon.	3/27	Recombineering	GFH	10
Wed.	3/29	CRISPR-Cas revisited	GFH	
		Unit 7: The Genetic Landscape of a Model Eukaryote		
Fri.	3/31	Genetic interactions—What are they?	KMA	
Mon.	4/3	Genetic interactions--- What can we learn from them?	KMA	
Wed.	4/5	Genomic toolbox for a model eukaryote	KMA	
Fri.	4/7	Systematic vs. classical genetics	KMA	
Mon.	4/10	Genetics in a genomic era: dissecting interaction networks	KMA	
		Unit 8: Putting Yeast to Work: Improving Human Health		
Wed.	4/12	Quantitative traits	KMA	
Fri.	4/14	Proteomic toolbox for a model eukaryote	KMA	
Mon.	4/17	Yeast as a model human: understanding cancer	KMA	
Wed.	4/19	Yeast as a model human: protein-folding based diseases	KMA	
Fri.	4/21	**Catch-up & Review session**	GFH/KMA	
FINAL EXAM: Saturday, April 29, 2017 10:00 – 11:50 AM				