

COURSE APPROVAL DOCUMENT
Southeast Missouri State University

Department: Biology

Course No. BI421/621

Title of Course: Bacterial Genetics

Date: 8/17/2018

Please check: New
 Revision

I. Catalog Description (Credit Hours of Course): Introduction to the genetics of bacteria and archaea. Examination of both traditional and modern methods. Three one-hour lectures; one two-hour lab. (4)

II. Prerequisite(s): BI310, CH341

Co-requisite(s): BI021

III. Purposes or Objectives of the Course (optional):

IV. Course Learning Outcomes (Minimum of 3):

- A. Students will identify the processes behind mutations and other genetic changes.
- B. Students will identify and distinguish genetic regulatory mechanisms at different levels.
- C. Students will plan basic experiments using common methods in bacterial genetics.

V. Names of Faculty Qualified to Teach the Proposed Course:

A. Dr. Jeremy Ellermeier

B. Dr. James Champine

VI. Course Content or Outline (Indicate number of class hours per unit or section):

- | | |
|---|---|
| A. Introduction and history | 1 |
| B. Bacterial Chromosome | 1 |
| C. DNA Replication | 1 |
| D. Gene Expression | 4 |
| E. Genetic analysis | 3 |
| F. Plasmids | 1 |
| G. Conjugation | 2 |
| H. Transformation | 1 |
| I. Bacteriophage | 5 |
| J. Transposons and Mutagenesis | 2 |
| K. Homologous Recombination | 3 |
| L. DNA Repair | 2 |
| M. Gene Regulation | 6 |
| N. Genetic Networks | 1 |
| O. Bacterial Cell Biology | 2 |
| P. Using Bacterial Genetics in Research | 3 |
| Q. Genomics | 3 |
| R. Student Presentations | 2 |
| S. Exams | 2 |

Attach the following:

- copy of example class syllabus and course schedule.
- memo from Library Dean assessing available and needed library holdings and resources.
- memo(s) from Department Chairs in affected departments stating possible issues and/or conflicts are resolved.

Signature: *James E. Champine*
Chair

Date: 10/17/18

Signature: *Budley DeKey*
Dean

Date: 10/17/18

COURSE APPROVAL DOCUMENT
Southeast Missouri State University

Department: Biology

Course No. BI021

Title of Course: Bacterial Genetics Lab

Date: 8/17/2018

Please check: New
 Revision

I. Catalog Description (Credit Hours of Course): Lab associated with BI421 and BI621. (0)

II. Prerequisite(s): BI310, CH341

Co-requisite(s): BI421 or BI621

III. Purposes or Objectives of the Course (optional):

IV. Course Learning Outcomes (Minimum of 3):

- A. Students will identify the processes behind mutations and other genetic changes.
- B. Students will identify and distinguish genetic regulatory mechanisms at different levels
- C. Students will plan basic experiments using common methods in bacterial genetics.

V. Names of Faculty Qualified to Teach the Proposed Course:

- A. Dr. Jeremy Ellermeier
- B. Dr. James Champine

VI. Course Content or Outline (Indicate number of class hours per unit or section):

- | | |
|---------------------------------------|---|
| A. Safety | 2 |
| B. DNA Isolation | 2 |
| C. Bacteriophage and Genetic Analysis | 4 |
| D. Transposon Mutagenesis | 6 |
| E. β -galactosidase Assays | 4 |
| F. Sequencing samples | 2 |
| G. Gene deletions | 8 |
| H. Reports | 2 |

Attach the following:

- copy of example class syllabus and course schedule.
- memo from Library Dean assessing available and needed library holdings and resources.
- memo(s) from Department Chairs in affected departments stating possible issues and/or conflicts are resolved.

Signature: _____

Chair

Date: 10/17/18

Signature: _____

Dean

Date: 10/17/18

Bacterial Genetics

BI421/621/021

Syllabus

Spring 2019

Instructor:

Dr. Jeremy Ellermeier

jellermeier@semo.edu

573-651-2384

Office: Rhodes Hall 311

Office Hours: T/R 1:00 p.m. – 2:30 p.m. or by appointment

Email is the best method to reach me. Please allow ample time for a response. I will generally respond to emails between 8:30 and 10 am. I will respond to email at other times; however, that is not guaranteed. If you send an email at 3 p.m., you may not get a response until the next morning.

Times and Places:

Lecture: Rhodes 316

M/W/F 11:00 – 11:50 a.m.

Lab: Rhodes 315

R 8:00 – 9:50 a.m.

Credit Hours:

4 Credit Hours (Lecture/Lab)

Required Textbook:

Molecular Genetics of Bacteria, 4th Edition, ASM Press

Snyder, Peters, Henkin, Champness

Course Description and Objectives:

Introduction to the genetics of bacteria and archaea. Examination of both traditional and modern methods. Three one-hour lectures; one two-hour lab. Prerequisites: BI310 and CH341 (4)

This course is designed to help you comprehend the genetics of bacteria and archaea. A number of important areas within the field of bacterial genetics will be addressed such as basis of mutations, regulatory actions in bacteria and archaea, historical experiments, and modern techniques. Comprehension is essential. Reading the text and other assigned readings before lecture will aid you in understanding the content and allow you to participate in class discussion.

The Course Learning Outcomes for class are as follows:

1. Students will identify the processes behind mutations and other genetic changes.
2. Students will identify and distinguish genetic regulatory mechanisms at different levels
3. Students will plan basic experiments using common methods in microbial genetics.

Policies and Expectations of Students:**Evaluation -**

Missed exams and quizzes can only be made up if the absence was an emergency and/or excused. Emergencies must have validation such as a doctor's excuse or note from your academic advisor and must be attached to make up. Missed (excused) lecture and lab exams/quizzes must be made up within the week. You must contact me BEFORE the next class period to schedule the makeup otherwise forfeiting the opportunity for make-up. **There will be 2 hour exams and a comprehensive final exam.** Homework is collected at the beginning of class on the due date. Show up on time to ensure your homework is not counted as late. Homework turned in up to 24 hours late will be graded on a 50% scale. After 24 hours, late homework will not be accepted.

Score resolution = You have one week following return of exam or quiz to dispute marks or overall score.

Undergraduate Grades:

Lecture Exams	300
Lecture Quizzes/Homework	50
Lab Notebook	50
Lab Report	<u>50</u>
Lecture Total	450

Lecture Point Totals:

A – 90% and above
B – 80% - 89%
C – 70% - 79%
D – 60% - 69%
F – 59% and below

Graduate Grades:

Lecture Exams	300
Lecture Quizzes/Homework	50
Presentations on Lab Experiments	50
Lab Notebook	50
Lab Report	<u>50</u>
Lecture Total	500

Lecture Point Totals:

A – 90% and above
B – 80% - 89%
C – 70% - 79%
F – 59% and below

Do not rely on Moodle to calculate your grade for you. Total up your own points and refer to the chart on the syllabus to determine your standing in the class.

Attendance –

Attendance at each Lecture meeting is expected, you should tell me if you are going to miss a lecture to ensure you have covered all assignments or quizzes. You should identify students in the class who can pick up handouts for you and provide a copy of their notes.

Coursework and Conduct -

Take notes in lecture. Reading assignments should be completed BEFORE the lecture portion for which they are assigned. Keep all returned graded papers until you get your final grade. Assignments will be passed out in class. If you miss a class period, it is your responsibility to find out if you missed an assignment.

Students are expected to demonstrate high professional standards. Cheating WILL NOT be tolerated. Anyone caught cheating on an exam, quiz, or assignment will receive a grade of 0 for it and be referred to the Department of Biology Chair, Dr. James Champine, for disciplinary action. Unanswered questions or unresolved issues involving this class may be taken to Dr. Champine (573-651-2170, jchampine@semo.edu).

Please make every effort to be on time. If you must come late or leave early please do so quietly. Please turn off your cell phone. If your cell phone goes off once, we will all give you dirty looks. If your cell phone goes off a second time, you will be dismissed from class for the day.

Office hours – Room 311 Rhodes Hall

Come to the office hours with specific questions. Do not ask me if something will be on the test. The answer to that question will always be “Maybe”. Come to me for help. I really do want to help you learn, but I cannot know you are struggling unless you reach out to me.

From the Bulletin

Attendance

Students are expected to attend all classes and to complete all assignments for courses in which they are enrolled. An absence does not relieve the student of the responsibility to complete all assignments. If an absence is associated with a university-sanctioned activity, the instructor will provide an opportunity for assignment make-up. However, it is the instructor’s decision to provide, or not to provide, make-up work related to absences for any other reason.

A student not present for class during the entire initial week of a scheduled course may be removed from the course roster unless the student notifies the instructor by the end of the first week of an intention to attend the class. Questions regarding the removal process should be directed to the Registrar.

Academic Honesty

Academic honesty is one of the most important qualities influencing the character and vitality of an educational institution. Academic misconduct or dishonesty is inconsistent with membership in an academic community and cannot be accepted. Violations of academic honesty represent a serious breach of discipline and may be considered grounds for disciplinary action, including dismissal from the University. Academic dishonesty is defined to include those acts which would deceive, cheat, or defraud so as to promote or enhance one’s scholastic record. Knowingly or actively assisting any person in the commission of an above-mentioned act is also academic dishonesty. Students are responsible for upholding the principles of academic honesty in accordance with the “University Statement of Student Rights” found in the STUDENT HANDBOOK. The University requires that all assignments submitted to faculty members by students be the work of the individual student submitting the work. An exception would be group projects assigned by the instructor. In this situation, the work must be that of the group. Academic dishonesty includes:

Plagiarism. *In speaking or writing, plagiarism is the act of passing someone else’s work off as one’s own. In addition, plagiarism is defined as using the essential style and manner of expression of a source as if it were one’s own. If there is any doubt, the student should consult his/her instructor or any manual of term paper or report writing. Violations of academic honesty include:*

- 1. Presenting the exact words of a source without quotation marks;*
- 2. Using another student’s computer source code or algorithm or copying a laboratory report; or*
- 3. Presenting information, judgments, ideas, or facts summarized from a source without giving credit.*

Cheating. *Cheating includes using or relying on the work of someone else in an inappropriate manner. It includes, but is not limited to, those activities where a student:*

- 1. Obtains or attempts to obtain unauthorized knowledge of an examination’s contents prior to the time of that examination.*
- 2. Copies another student’s work or intentionally allows others to copy assignments, examinations, source codes or designs;*
- 3. Works in a group when she/he has been told to work individually;*
- 4. Uses unauthorized reference material during an examination; or*
- 5. Have someone else take an examination or takes the examination for another*

When there is credible evidence of cheating on an assignment or test the student will receive a grade of zero on that assignment.

Civility

Every student at Southeast is obligated at all times to assume responsibility for his/her actions, to respect constituted authority, to be truthful, and to respect the rights of others, as to respect private and public property. In their academic activities, students are expected to maintain high standards of honesty and integrity and abide by the University's Policy on Academic Honesty. Alleged violations of the Code of Student Conduct are adjudicated in accordance with the established procedures of the judicial system.

Disabilities

Southeast Missouri State University and Disability Support Services remain committed to making every reasonable educational accommodation for students with disabilities. Many services and accommodations which aid a student's educational experience are available for students with various types of disabilities. It is the student's responsibility to contact Disability Support Services to become registered as a student with a disability in order to have accommodations implemented. Accommodations are implemented on a case by case basis. For more information visit the following site: www.semo.edu/lapdss or contact Disability Support Services at 573-651-2273

Lecture schedule is subject to change based on class needs. **Exam dates will not change.**

DATE	DAY	TOPIC	READINGS
14-Jan-18	M	Syllabus and Intro	Intro
16-Jan-18	W	Bacterial Chromosome	Chapter 1
18-Jan-18	F	DNA Replication in Bacteria and Archaea	
21-Jan-18	M	MLK Day – No Class	
23-Jan-18	W	Bacterial Gene Expression: Transcription	Chapter 2
25-Jan-18	F	Bacterial Gene Expression: Transcription	Jacob and Monod, 1961
28-Jan-18	M	Bacterial Gene Expression: Translation	
30-Jan-18	W	Bacterial Gene Expression: Protein Folding	
1-Feb-18	F	Genetic Analysis: Mutation Types	Chapter 3
4-Feb-18	M	Genetic Analysis: Isolation of Mutations	
6-Feb-18	W	Genetic Analysis: Isolation of Suppressors	Das <i>et al.</i> , 1976
8-Feb-18	F	Plasmids	Chapter 4
11-Feb-18	M	Conjugation	Chapter 5
13-Feb-18	W	Conjugation	
15-Feb-18	F	Exam 1	
18-Feb-18	M	Transformation	Chapter 6
20-Feb-18	W	Bacteriophage: Lytic Growth	Chapter 7
22-Feb-18	F	Bacteriophage: Genetics	
25-Feb-18	M	Bacteriophage: Generalized Transduction	Zinder and Lederberg, 1952
27-Feb-18	W	Lysogeny: Phage λ	Chapter 8
1-Mar-18	F	Lysogeny: Other Phage and Genetic Tricks	
4-Mar-18	M	Overview of Transposons	Chapter 9
6-Mar-18	W	Transposon Mutagenesis	Larsen <i>et al.</i> , 2002
8-Mar-18	F	Homologous Recombination	Chapter 10

11-Mar-18	M	Spring Break – No Class	
13-Mar-18	W	Spring Break – No Class	
15-Mar-18	F	Spring Break – No Class	
18-Mar-18	M	Gene Deletions using Homologous Recombination	Datsenko and Wanner, 2000
20-Mar-18	W	DNA Repair	Chapter 11
22-Mar-18	F	DNA Repair	
25-Mar-18	M	Gene Regulation: Operons and Transcription	Chapter 12
27-Mar-18	W	Gene Regulation: Posttranscriptional	Englesberg <i>et al.</i> , 1965
29-Mar-18	F	Gene Regulation: Posttranslational	
1-Apr-18	M	Exam 2	
3-Apr-18	W	Gene Regulation: Reporter fusions	Slauch and Silhavy, 1991
5-Apr-18	F	Global Gene Regulation	Chapter 13
8-Apr-18	M	Global Gene Regulation	
10-Apr-18	W	Genetic Networks	Ellermeier <i>et al.</i> , 2005
12-Apr-18	F	Bacterial Cell Biology	Chapter 14
15-Apr-18	M	Bacterial Cell Biology	
17-Apr-18	W	Using Bacterial Genetics in Research	Handout
19-Apr-18	F	University Holiday – No Class	
22-Apr-18	M	Using Bacterial Genetics in Research	
24-Apr-18	W	Genomics: Sequencing of Genomes	Genomics Handout
26-Apr-18	F	Genomics: RNA seq, Tn-Seq	
29-Apr-18	M	Genomics: ChIP-Seq, Microarrays	
1-May-18	W	Grad Student Presentations	
3-May-18	F	Grad Student Presentations and Review	
9-May-18	W	10 A.M. – Final Exam	

Lab schedule is subject to change based on class needs.

DATE	DAY	TOPIC	READINGS
17-Jan-19	R	Lab Intro and Safety	
24-Jan-19	R	Chromosomal DNA Isolation	
31-Jan-19	R	Growing P22 Lysate	
7-Feb-19	R	P22 Transduction / Linkage Analysis Day 1	
14-Feb-19	R	Transposon mutagenesis Day 1 / Linkage Analysis Day 2	Larsen <i>et al.</i> , 2002
21-Feb-19	R	Transposon mutagenesis Day 2 / Linkage Analysis Day 3	
28-Feb-19	R	Transposon mutagenesis Day 3	
7-Mar-19	R	β -Galactosidase Assays on Transposon Insertion Strains	
14-Mar-19	R	Spring Break – No Class	
21-Mar-19	R	Sequencing from Transposon	
28-Mar-19	R	Analysis of Sequencing Data and Ordering Oligos	Datsenko and Wanner, 2000
4-Apr-19	R	Set up PCR for λ Red Deletion	
11-Apr-19	R	Purification of PCR and Transformation for λ Red Deletion	
18-Apr-19	R	Growing Lysate and Transduction into <i>lacZ</i> Fusion Strain	
25-Apr-19	R	β -Galactosidase Assays	

2-May-19	R	Wrap-Up / Turn in Notebooks and Written Lab Report	
-----------------	----------	--	--