

BIOL 4580, Molecular Genetics
Summer Semester II 2020, Section 1A (CRN# 52597, 4 Credit hours)
Department of Biology, College of Science & Math, Valdosta State University

Lecture (Online synchronous): T & R 11:10 a.m. – 2:10 p.m. via BlazeView Collaborate Ultra

Laboratory (Online asynchronous): T & R 2:30 p.m. - 5:20 p.m. via BlazeView Collaborate Ultra

Instructor: Dr. Brian C. Ring
Office: BC 2084
Office hours: **W** 12:00 p.m. – 3:00 p.m. via BlazeView Collaborate Ultra
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Pre-Requisites: BIOL 3200 or permission of instructor.

Course Description: The study of the molecular nature of eukaryotic genomes, with emphasis on biotechnology. The lecture will focus on using modern molecular genetic techniques as a means to understanding complex eukaryotic genomes. Emphasis will be placed on reading current, relevant scientific literature. The laboratory will involve hands-on experience in which the student will learn the latest technology of molecular genetic analysis and manipulation.

Course Outcomes: Upon completion of this course the student should be able to:

- 1) Comprehend the central dogma of molecular biology as illustrated through elegant experimental studies of the phage lambda (**BO3, BO4, & GE4, & GE7**);
- 2) Understand how genomes are experimentally investigated using bio techniques such as molecular biology, genomics, gene expression, and transgenics (**BO3, BO4, & GE4**);
- 3) Develop practical laboratory knowledge and skills through inquiry based experimentation employing molecular genetic techniques (**BO1, BO4, GE5 & GE7**).

These course outcomes support the VSU Biology Department Outcomes # 1, 3, & 4 and the University General Educational Outcomes # 4, 5 & 7 as listed in the VSU Undergraduate Catalogue (see below).

VSU Biology Department Objectives:

BO1. Develop and test hypotheses, collect and analyze data, and present the results and conclusions in both written and oral formats.

BO3. Demonstrate an understanding of the cellular basis of life.

BO4. Relate the structure and function of DNA/RNA to the development of form and function of the organism and to heredity.

VSU General Educational Outcomes:

GE4. Students will express themselves clearly, logically, and precisely in writing and in speaking, and they will demonstrate competence in reading and listening.

GE5. Students will demonstrate knowledge of scientific and mathematical principles and proficiency in laboratory practices.

GE7. Students will demonstrate the ability to analyze, to evaluate, and to make inferences from oral, written, and visual materials.

Required Materials:

- Text:** 1) Mark Ptashne. *A Genetic Switch: Phage Lambda Revisited*. 2004. 3rd Ed. Cold Spring Harbor Laboratory Press (ISBN # 0879697164)
2) Additional Primary Articles: **TBA** (see schedule below)

Laboratory Manual: None; mainly handouts or laboratory protocols and papers. **TBA**

Graded Course Components: Your final grade will be based on your performance and participation in lecture and the laboratory as outlined below.

Lecture Online Sessions: (70%) Students will be graded on their performance during lecture time based on the following criteria: **Short online quizzes and 3 exams**. Quizzes will follow each chapter or lecture and are due at the end of each week (Sundays by 11 PM). Please follow the schedule in BV and it is recommended you use the app to keep track of calendar dates.

Lecture Exams will cover material from lecture and will be based upon our discussion of the Phage Lambda Genetic Switch and various journal articles assigned in class. Exams are composed of a combination of online questions and

short answer and may be taken under Lock Down Browser conditions.

Due to this course being moved to online during this summer, all lectures will be recorded and posted on BlazeView (BV). **It is the responsibility of students to attend during scheduled lecture and review times. If you are unable to attend the live sessions, then it is your responsibility to review the recordings.**

Laboratory: (30%) Two exams worth 10% each. Exams are composed of multiple choice and/or short answer covering what we learned in the laboratory. The first lab exam is the practical introduction to molecular genetics chemistry in the lab (labs 1-3). The second lab exam is based on a series of molecular mysteries that will be supplied in BV. The molecular mysteries will require you to upload a written response in BV using Turn it in monitoring. These postings are worth 10% of the laboratory grade.

Grade Calculation & Distribution: Final grades will be based on a percentage of your cumulative points relative to the total points possible. See below chart.

Grade Calculation		Grade Distribution		
Category	Possible Points	Letter	Percentage	Point Range
Lecture Exam 1	20%	A	90-100%	N/A
Lecture Exam 2	20%	B	80-89%	
Lecture Exam 3	20%	C	70-79%	
Lecture Quiz	10%	D	60-69%	
Lab Discussions	10%	F	≤ 59%	
Lab Exam 1	10%			
Lab Exam 2	10%			
Total	100%			

Notes on grading: Students should note that a grade of "A" in this course represents an exemplary command of the material covered. To obtain this grade of excellence, it is recommended that students study daily, be prepared to participate in class discussion and laboratory sessions, and clarify with their instructor any problems regarding course material, as they arise. Additionally, the instructor may implement an overall curve based on class performance at the **end of the course.**

Mid-term and Attendance: Students will have several lecture and laboratory assignments to determine their overall grade by the Mid-Term and decide whether to withdraw at the deadline date (**7/3/2020**).

Student identification: Students should have in their possession at all times their VSU student identification card. In order to verify the identification of students officially enrolled in the course, it is the instructor's prerogative to request official student photo identification cards at any time during lecture or during exams.

Academic Dishonesty (e.g. cheating or plagiarism): A student cheating or plagiarizing will be penalized by receiving a zero for the assignment and will be reported to the dean of students. Refer to the Student Code of Ethics in the VSU Student Handbook.

Privacy Act (FERPA): The Family Educational Rights and Privacy Act (FERPA) prohibit the public posting of grades by Social Security number or in any manner personally identifiable to the individual student. No grades can be given by email or over the telephone, as positive identification cannot be made by this manner.

Students with Disabilities: Students requesting classroom accommodations or modifications because of a documented disability must let me know and must also contact the Access Office for Students with Disabilities located in room 1115 Nevins Hall. The phone numbers are 245-2498 (voice) and 219-1348 (tty).

TENTATIVE LECTURE & LABORATORY OUTLINE:

Week:	Date:	Topics:	Text/ Paper:	Lab Topics
1	June 11 (R)	Course Introduction & Objectives	--	NONE
2	June 16 (T)	Central Dogma & Phage Lambda The Master Elements of Control	Pg. 1-10 Chpt. 1	L1: Common Units & Measures
	June 18 (R)	Protein-DNA Interactions & Gene Control	Chpt. 2	L2: Common Stock Solutions
3	June 23 (T)	Control Circuits- Setting the Switch	Chpt. 3	L3: Dilution Chemistry & Pipetting
	June 25 (R)	Catch-up & Review	--	Lab Exam 1- Open All Day
4	June 30 (T)	Lecture Exam 1- Open All Day	--	Molecular Mystery 1: Human Genetic Diseases
	June 02 (R)	How Do We Know?- The Key Experiments	Chpt. 4	MM 2: DNA Forensic Case
	July 03 (M)	Midterm- Last Day to Drop	--	
5	July 07 (T)	2004: New Developments	Chpt. 5	MM 3: Human IVF Babies
	July 09 (R)	Catch-up & Review		MM 4: Coronavirus Detection
6	July 14 (T)	Lecture Exam 2- Open All Day	--	MM 5: CRISPR Genome Editing
	July 16 (R)	DNA Replication & Biotechnology Techniques I	Paper 1 & 2	MM 6: Forward Genetics
7	July 21 (T)	Molecular Biotechnology Techniques II	Paper 3 & 4	MM 7: Human Ancestry
	July 23 (R)	Continued		Catch-up & Review
8	July 28 (T)	Catch-up & Review	--	Lab Exam 2- Open All Day
	July 29 (W)	Final Lecture Exam 3- Open All Day		10:15 – 12:15

NOTES: Papers, protocols, and lab handouts will be posted on D2L Blazeview. Lab schedule subject to change but available for you to work asynchronously online. See BV for details.

The following two major goals will be accomplished in the laboratory and assessed on each lab exam:

- 1) Practice and employ basic molecular biology laboratory skills in labs 1-3.
- 2) Individual "Molecular Mysteries" will be posted on D2L BV for you to solve and post by the end of the lab sessions.