

BIOL 4580(6580), Molecular Genetics
Summer Semester II 2021, Section A (CRN# 52597, 4 Credit hours) & 6580 (CRN# 52598)
Department of Biology, College of Science & Math, Valdosta State University

Lecture (BC 1202): T & R 11:10 a.m. – 2:10 p.m.

Laboratory (BC 2071): T & R 2:30 p.m. - 5:20 p.m.

Instructor: Dr. Brian C. Ring
Office: BC 2084
Office hours: **W** 12:00 p.m. – 3:00 p.m. in office or via Microsoft Teams
Phone: 249-4841 (Dept. office 333-5759)
Email: bcring@valdosta.edu

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. Due to this course being taught under CDC guidelines please be aware of precautions. **It is the responsibility of students to attend during scheduled lecture and review times. Previous recordings of past lectures are also provided in BV.** If you miss **more than 2 laboratory** sessions you will fail this course as per University policy. In the event that a student will miss a lab, s/he should notify the instructor in writing by email and be prepared to provide documentation of the excused absence. It is the instructor's prerogative to accept the excuse or not. **ABSOLUTELY NO LECTURES OR LABORATORIES CAN BE "MADE UP"**

Lecture & Presentation Sessions: (75%) Students will be graded on their performance during lecture time based on the following criteria: **Short online quizzes and 3 exams.**

Quizzes (15%) will be provided as we cover each chapter or lecture and are due at the end of each week taken

in BlazeView (BV, Sundays by 11 PM). Use the time when your not in lecture to complete the quizzes online. These quizzes will help you prepare for exams. Please follow the schedule in BV and it is recommended you use the app to keep track of calendar dates on your phone or digital device.

Lecture Exams (60%) 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 primarily short answer or may be a combination of online multiple choice and short answer (TBD).

Laboratory: (25%) Two exams worth 10% each and molecular mysteries (5%). 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 1-4). The second lab exam is based on our results of inquiry based research. In addition, a series of molecular mysteries will provided for you to solve and require you to upload a written response in BV using Turn it in monitoring. These postings are worth 5% of the laboratory grade. **NOTE:** Additional inquiry based labs will be provided for graduate students enrolled (BIOL 6580).

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 Weight	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 Quizzes	15%	D	60-69%	
Lab Molecular Mysteries	5%	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 information, 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 (**3/11/2021**). As detailed above, attendance is mandatory.

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 10 (R)	Course Introduction & Objectives	--	NONE
2	June 15 (T)	Central Dogma & Phage Lambda The Master Elements of Control	Pg. 1-10 Chpt. 1	L1: Common Units & Measures
	June 17 (R)	Protein-DNA Interactions & Gene Control	Chpt. 2	L2: Common Stock Solutions
3	June 22 (T)	Control Circuits- Setting the Switch	Chpt. 3	L3: Dilution Chemistry & Pipetting
	June 24 (R)	Catch-up & Review	--	Lab Exam 1
4	June 29 (T)	Lecture Exam 1	--	Molecular Mystery 1: Human Genetic Diseases L4: Genomic DNA Isolation from cheek cells
	July 01 (R)	How Do We Know?- The Key Experiments	Chpt. 4	L5: Human gDNA Quantification
	July 01 (R)	Midterm- Last Day to Drop	--	Molecular Mystery 2: Sars-Cov2 Detection & Vaccines
5	July 06 (T)	2004: New Developments	Chpt. 5	L6: Lambda Genetic Screens
	July 08 (R)	Catch-up & Review		L6 (Cont): Lambda Genetic Screens
6	July 13 (T)	Lecture Exam 2	--	L7: Lambda Mutant Genomic DNA Isolation
	July 15 (R)	DNA Replication & Biotechnology Techniques I	Paper 1 & 2	L8: Lambda Quantification & Sequence Preparation
7	July 20 (T)	Molecular Biotechnology Techniques II	Paper 3 & 4	L9: Sequence Analysis
	July 22 (R)	Continued		Catch-up & Review
8	July 27 (T)	Catch-up & Review	--	Lab Exam 2
	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) Inquiry Based Laboratory Experiments & "Molecular Mysteries" will be posted on D2L BV for you to solve and post by the due dates listed in BV.