



Portland, Maine 04106

Semester: Spring 2022

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Title: Genetics

Course Number: BIOL 212

Credit Hours: 4

Contact Hours: 90

Section: O1

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## Course Syllabus for Genetics (BIOL 212)

### Course Description

The two major branches of genetics, molecular and classical genetics, are studied in detail. The course starts with a review of classical, or Mendelian, genetics and then progress to modern molecular genetics where we will focus on the structure and function of genes at the molecular level, including discussions on recombinant DNA and DNA analysis techniques. Other topics include transposable elements, bacterial and viral genetics. The laboratory experiments are designed to provide students with hands-on activities to further elucidate the concepts discussed in lecture. Additionally, field trips to local research institutions and biotechnology companies will be scheduled during lab time.

The lab course will focus on several long-term experiments that will stretch over multiple lab periods. Good laboratory technique, including calculations and careful documentation will be stressed.

Prerequisites: BIOL 128. This is a 4 credit hour course that meets for two 75 minute lectures and a 3-hour laboratory each week.

### Required textbook:

Introduction to Genetic Analysis, 12th ed, by A.J.F. Griffiths, J. Doebley, C. Peichel, and D.A. Wassarman  
WH.Freeman McMillan, 2020 ISBN : 9781319114787

### Course objectives:

Upon completion of this course the student will be able to:

- Describe fundamental principles of genetics in eukaryotes and prokaryotes.
- Understand the molecular nature of the genome, DNA, RNA, and genetic coding.
- Be able to apply molecular techniques and statistics to study human and population genetics.
- Understand the basic principles of recombinant DNA and genetics engineering.
- Employ proper laboratory technique, calculations and documentation skills.
- Be able to conduct laboratory work from written procedures rather than student manuals.
- Gain familiarity with DNA manipulations such as DNA isolation, analysis and cloning.
- Have experience working with several model genetic systems including bacteria, plants, flies and worms.

### Learning outcomes for science courses at SMCC:

SMCC students recognize the methodology and content of science and its relevance. SMCC students:

1. apply scientific methodology to the study of the natural world.
2. participate in hands-on and interactive lab activities.
3. demonstrate the ability to make scientifically-informed decisions.

## Student Evaluation and Grading

The grading for this class is broken up into 4 areas:

Exams	(2 exams, each worth 12.5% semester score)	25% of grade
Homework, weekly	(lowest score will be dropped)	25% of grade
Seminar & literature research presentation at Thinking Matters		25% of grade
Lab quizzes & assignments		25% of grade

Grades will be available in Brightspace under Grades at any point during the semester, and there will be a column where an estimate of your semester average is calculated.

**Semester Average = [(average of exam scores) x 0.25] + [(average of weekly homework score) x 0.25] + (average of lab quiz scores) + (score for seminar attendance and Thinking Matters presentation)**

Letter grades are assigned following the policy in the SMCC handbook:

93 & higher	A	80-82	B-	67-69	D+
90-92	A-	77-79	C+	63-66	D
87-89	B+	73-76	C	below 63	F
83-86	B	70-72	C-		

## Assessment Details

**Exams (25%):** The exams will cover the material covered in the chapter and in class up until the day of the exam. Any aspect of the material covered in lecture, lab or assigned reading can be expected on an exam.

**Homework (25%):** Each week, approximately, a homework assignment to accompany a chapter will be assigned online. These do not have a time limit, but they will have a due date.

**Presentation of literature research at a meeting, Thinking Matters (25%):** Each student is responsible for attending one science seminar in the local area (online) and writing a 1-page report (5%). Writing an abstract and submitting it to the University of Southern Maine for Thinking Matters will count for another 5%. Deadline for abstract is February 19. An outline for your poster or presentation will be assessed for another 5%. Your poster or talk at Thinking Matters on April 18 at University of Southern Maine will be assessed for the last 10%.

For more information about Thinking Matters, visit [usm.maine.edu/thinking-matters](http://usm.maine.edu/thinking-matters)

We may also present our posters at an SMCC Science Poster session (tentatively scheduled for May 4).

**Lab quizzes (25%):** The lab exercises will be assessed with quizzes and by turning in some assignments graded by the instructor. You will be notified of the dates and the criteria for grading. Attendance and participation in lab will be a part of this grade.

## How To Contact Your Professor

The quickest way to contact your instructor and get a response is by sending an e-mail through campus e-mail. My campus e-mail is [dpmoore@smccme.edu](mailto:dpmoore@smccme.edu).

If you would like to meet in person (using Zoom), we can arrange an appointment or you can talk with me during office hours. My office hours are Tuesday, from 11 to noon, and Friday, 10 to noon.

## Teacher Evaluation

If you have a question or a suggestion about the course format in general or an exam question in particular, please feel free to contact me directly. I do like to hear how the course could be improved.

Students should complete evaluations for each course attended at SMCC. Evaluations are submitted online and can be accessed through the student portal. Students can access the course evaluations beginning one week before the end of classes. The deadline for submission of evaluations occurs Monday at 5 PM following the last day of class. An email will be sent to your email account when course evaluations are available.

## **Policies for all courses at Southern Maine Community College:**

### **1. ADA (Americans with Disabilities Act):**

Southern Maine Community College is an equal opportunity/affirmative action institution and employer. For more information, please call (207) 741-5798. If you have a disabling condition and wish to request accommodations in order to have reasonable access to the programs and services offered by SMCC, you must register with the Disability Services Coordinator, Sandra Lynham, who can be reached at 741-5923. Further information about services for students with disabilities and the accommodation process is available upon request at this number. Course policies about online testing are modified to suit each individual's accommodations.

### **2. SMCC Pay-for-Print Policy:**

Each semester students receive a \$20 printing credit. The balance resets at the end of the semester and any remaining credits are removed. The College's pay-for-print system monitors printing on all printers (including those in general access labs, library printers, Tutoring Services, Campus Center Lounge and technology labs). Be sure to log OUT of the system when you've finished your printing, to prevent unauthorized access to your account. Students can check the number of pages they have printed by using the Printing Balance tool available on SMCC computers (located in the lower right corner of the screen, near the clock). Departments with work study students who need to print documents for the department should contact the Help Desk at 741-5696 to have a special account set up. To find ways to reduce your printing charges, please go to the IT Help tab on My SMCC. If you have questions about the pay-for-printing policy or your printing charges, please contact the Help Desk at 741-5696 or send an e-mail to [helpdesk@smccme.edu](mailto:helpdesk@smccme.edu).

**Refunds** Print jobs are eligible for a refund in the event of mechanical or electronic error on the part of the printer, print server, or software used to submit the job. Jobs are not eligible for a refund in cases where the job was not set up correctly, was submitted multiple times, or the student is not satisfied with the result. To request a refund, please bring the offending print to the IT Department in the basement of the Ross Technology Center. Refunds will be granted in the form of a credit to the student's account.

### **3. Add/Drop Policy:**

Students who drop a course during the one-week "add/drop" period in the fall and spring semesters and the first three days of summer sessions receive a 100% refund of the tuition and associated fees for that course. Please note any course that meets for less than the traditional semester length, i.e., 15 weeks, has a pro-rated add/drop period. There is no refund for non-attendance.

### **4. Withdrawal:**

A student may withdraw from a course only during the semester in which s/he is registered for that course. The withdrawal period is the second through twelfth week of the Fall and Spring semesters and the second through ninth week of twelve-week Summer courses. This period is pro-rated for shorter-length courses, usually 75 percent of course meeting times; please check with the Registration Office. To withdraw from a course, a student must complete and submit the appropriate course withdrawal form, available at the Registration Office. This process must be completed either in person or by using SMCC e-mail accounts.

### **5. Plagiarism:**

If an instructor suspects that a student has knowingly committed a violation defined in the Maine Community College System Policy on Student Grade Appeals and Academic Misconduct, the instructor has the authority to review the alleged misconduct and determine the grade that the student should receive for the assignment and the course. The instructor may assign a failing grade for the assignment or course and may require the student to complete additional work for the course. The instructor may consult with the department chair and/or the College's chief academic officer prior to making such decisions. If a student seeks to challenge an instructor's determination, the student should submit a grade appeal. Grade appeal forms are available in the Advising Office on the South Portland Campus or in the administrative offices in the Learning Commons on the Midcoast Campus. An instructor may also refer the matter to the College's disciplinary officer for review under the procedures of the MCCS Student Code of Conduct.

### **6. The Learning Commons:**

The library, tutoring and writing centers, and reference/research assistance (typically located on the second floor of South Portland's Campus Center and in the Midcoast's LL Bean Learning Commons and Health Science Center) will be fully available online during the fall 2021 semester. Here you can find free academic support through individually scheduled and drop in, online tutoring. You can also find information literacy/research librarians, and professional academic strategy/planning mentoring online. The physical space of the Learning Commons will be available at this time, and they can also work with you to set up zoom classrooms for small group study. Services are offered by appointment or as drop-in assistance.

To access services: visit My Learning in My Maine Guide, or select the "tutoring needed" button if it appears inside your Brightspace course.

Whether on Site or online, students have consistently reported that the Learning Commons is a friendly, risk-free, and helpful place to seek academic support. It has also been shown that those who make use of the Learning Commons do better in a course than those who do not. We strongly encourage you to take advantage of this valuable and enjoyable resource.

### **7. COVID contingency plan:**

While the syllabus represents current plans, there may be changes during the semester in response to the on-going Covid-19 pandemic. Depending on the progression of the virus, it is possible that the College may have to suspend face-to-face instruction for part of the semester. If we must stop face to face instruction anytime during the semester, your instructor will contact you via your SMCC email or the Brightspace course homepage to discuss next steps for the course.

## Schedule of Weekly Assignments

(Note: the lab schedule will be adjusted during the semester)

<u>Week</u>	<u>Dates</u>	<u>Chapter</u>	<u>Lab Exercises</u>
1	Jan 18 Jan 20	<b>Chapter 1:</b> The birth of genetics <b>Chapter 2:</b> Single gene inheritance	Lab safety, scientific methods, notebooks, micropipettor practice, use of balances. Lab math
2	Jan 25 Jan 27	<b>Chapter 2:</b> Single gene inheritance <b>Chapter 3:</b> Independent assortment of genes <b>Poster topic is due</b>	<i>Drosophila</i> genetics: phenotypes Worksheets on genetic crosses
3	Feb 1 Feb 3	<b>Chapter 3:</b> Independent assortment of genes <b>Poster figures and references are due</b>	<i>Drosophila</i> genetics: preparing flies Recombinant DNA: ligating gene into plasmid
4	Feb 8 Feb 10	<b>Chapter 4:</b> Mapping eukaryotic chromosomes <b>First draft of abstract is due</b>	<i>Drosophila</i> genetics: parental crosses Recombinant DNA: transforming <i>E. coli</i>
5	Feb 15 Feb 17	<b>Chapter 5:</b> The genetics of bacteria and their viruses <b>Second draft of abstract is due</b>	Recombinant DNA: culturing the transformants
6	Feb 22 Feb 24	<b>Chapter 6:</b> Allele interactions <b>Poster abstract due at USM on Feb 28</b>	<i>Drosophila</i> genetics: F1 crosses Recombinant DNA: extracting plasmid DNA and setting up restriction enzyme digests
7	Mar 1 Mar 3	<b>Chapter 7:</b> DNA structure & replication	Recombinant DNA: analyzing restriction digest using agarose gel electrophoresis <i>Drosophila</i> genetics: F1 crosses
8	Mar 8 Mar 10	<b>Chapter 8:</b> RNA transcription & processing	Presenting poster second draft, peer critique <i>Drosophila</i> cytogenetics: polytene chromosomes <i>Arabidopsis</i> genetics: plant the seeds
9	Mar 22 Mar 24	<b>Chapter 9:</b> Proteins and their synthesis <b>Midterm Exam</b>	<i>Drosophila</i> genetics: analysis of F2 generation <i>C. elegans</i> genetics: start cultures, practice picking
10	Mar 29 Mar 31	<b>Chapter 10:</b> Genetic engineering <b>Poster is due this week at USM</b>	<i>C. elegans</i> genetics: start RNAi from feeding Presenting poster first draft, peer critique
11	Apr 5 Apr 7	<b>Chapter 11:</b> Regulation of gene expression in bacteria	<i>C. elegans</i> genetics: observe phenotype, isolate RNA from worms, reverse transcribe to cDNA
12	Apr 12 Apr 14	<b>Chapter 12:</b> Regulation of gene expression in eukaryotes	<i>C. elegans</i> genetics: analyze cDNA levels with quantitative PCR
13	Apr 19 Apr 21	<b>Chapter 13:</b> Genetic control of development <b>Thinking Matters, Friday, April 22</b>	<i>Arabidopsis</i> genetics: observe the plants, isolate DNA, restriction digest with methylation sensitive enzyme.
14	Apr 26 Apr 28	<b>Chapter 14:</b> Genomes and genomics	<i>Arabidopsis</i> genetics: PCR of restriction digests
15	May 3 May 5	<b>Chapter 15:</b> The dynamic genome, transposable elements	<i>Arabidopsis</i> genetics: gel electrophoresis and bioinformatics
16	May 10 May 12	Make up days, or review all of the chapters <b>Final Exam</b>	