



BIOL-203 – Genetics

University Arts and Science

Effective Term & Year: Fall 2022
Course Outline Review Date: 2026-04-01

Program Area: Math and Sciences

Description:

Genetics is the study and understanding of inheritance and development of organisms. This course will provide an introduction to genes and gene function. Mendelian and extra-mendelian genetics and molecular genetics review and expand on these topics explored in first year biology. Topics in transmission, molecular and quantitative genetics will also be discussed. Lab material will include descriptive aspects, techniques, data analysis and experimentation.

Program Information:

This course is required as part of the core courses for a science degree in biology. Once this course is mastered, one would be prepared for related third and fourth year courses at the university level. The topics covered in genetics make this course useful for students who are considering applying to medical school or a career in biotechnology, molecular biology, microbiology or other related fields.

Delivery Methods: On-campus (Face-to-Face)

Credit Type: College of the Rockies Credits

Credits: 3

Course type/s: Lab Sciences, Sciences

Instructional Activity and Hours:

Activity	Hours
Classroom, Directed Studies or Online Instruction	45

Seminar/Tutorials	
Laboratory/Studio	45
Practicum/Field Experience	
Co-op/Work Experience	
Other	
Total	90

Course Requisites:

- Completed the following:
 - [BIOL101](#) – Introduction to Biology 1 (3)
 - [BIOL102](#) – Introduction to Biology 2 (3)

Flexible Assessment: Yes

In some cases students may be able to apply for recognition of prior learning outside the classroom. This flexible assessment process provides equivalent course credit. It is a rigorous process that may include external evaluation, worksite assessment, demonstration, standardized test, self-assessment, interview, products/portfolio, and challenge exam, or other measures as appropriate. Tuition fees apply. Contact an education advisor for more information.

Course Transfer Credit:

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see <https://www.bctransferguide.ca/> or <https://transferalberta.alberta.ca> . For more transfer credit information, please visit <https://www.cotr.bc.ca/Transfer>

All requests for course transfer credit from institutions in British Columbia or elsewhere should go to the College of the Rockies Enrolment Services office.

Textbook Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

Essentials of Genetics, 2015, Klug, Cummings, Spencer and Palladino, 11th Ed, Pearson

Lab Outlines – Biology 203

Please see the instructor's syllabus or check COTR's online text calculator <https://textbook.cotr.bc.ca/> for a complete list of the currently required textbooks.

Learning Outcomes:

Upon the successful completion of this course, students will be able to:

- Critically assess information on transmission, molecular, quantitative and evolutionary genetics at an introductory collegiate level as well as use and appreciate techniques involved in modern genetic research.
- Determine the benefits of using model organisms and choose appropriate model organisms based on questions explored in genetic research.
- Calculate the map unit distance between two or more loci on a single chromosome.
- Categorize chromosomes based on the location of their centromere and find chromosomal abnormalities in given human cell samples.
- Describe the mechanisms of creating mutations in the genome via external mutagens and DNA replication errors.
- Evaluate the severity of genetic mutations based on the resulting gene product.
- Describe the types of repeat sequences in the genome and evaluate the differences between DNA samples of individuals using current molecular techniques.
- Estimate allelic frequencies in a population using the Hardy-Weinberg Law.
- Describe current genetic techniques such as Sanger sequencing, Next Generation Sequencing, cloning using prokaryotic and eukaryotic vectors, creating genetically modified organisms, DNA fingerprinting, restriction enzyme digests, and site-directed mutagenesis including using CRISPR-Cas9.
- Communicate the significance of scientific findings to the general public.

LAB LEARNING OUTCOMES

- Perform genetic crosses in a model organism to evaluate linkage and mendelian inheritance.
- Extract DNA from cells.
- Perform modern molecular genetic techniques such as PCR, restriction digest analysis, cloning, CRISPR-Cas9 gene editing and/or genetic sequence analysis.
- Connect the concepts of mutation, evolution, and genetic drift. Use the Hardy-Weinberg equation to calculate allelic frequencies and compare frequencies between populations

Course Topics:

- Mitosis and Meiosis
- Basic Mendelian Genetics
- Transmission Genetics
- Molecular Genetics
- Quantitative and Evolutionary Genetics
- Special Topics – Epigenetics – DNA Forensics – Genomics and Personalized Medicine – Stem Cells

See instructor's syllabus for the detailed outline of weekly readings, activities and assignments.

Evaluation and Assessments

Assessment Type: On-Campus (face-to-face)

Assessment Type	% of Total Grade
Lecture Assignments	10
Midterm Exam(s)	25
Final Exam	30
Lab Assignments/Exams	35

Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	<50

Pass requirements: None

Evaluation Notes: A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses.

Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior approval will receive a "0" on the exam.

Academic Policies:

College of the Rockies policies related to courses can be found at <https://cotr.bc.ca/about-us/college-policies/> and include the following:

- Policy 2.4.3 Students with Documented Disabilities
 - Policy 2.4.4 Student Conduct (plagiarism, other cheating, behavioral misconduct)
 - Policy 2.5.8 Academic Performance
 - Policy 2.5.3 Grade Appeal
 - Policy 2.4.9 Student Concerns Re Faculty
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Course Changes:

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.