Division of Applied Science & Management
School of Science
Winter, 2016

COURSE OUTLINE

BIOL 202

GENETICS

45 **HOURS LECTURE, 39 HOURS LAB**
3 **CREDITS**

PREPARED BY: _____ DATE: _____
Tara Stehelin, Instructor

APPROVED BY: _____ DATE: _____
Margaret Dumkee, Dean

YUKON COLLEGE
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Course Outline prepared by Tara Stehelin, June 18, 2015.

Yukon College
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Division of Applied Science & Management
Genetics
Credit Course
Winter, 2016

GENETICS

INSTRUCTOR: **Tara Stehelin B. Sc., M.Sc., PhD Candidate, Lab instructor: TBA**
OFFICE HOURS: **Fridays, 11:00 – 12:30, or by appointment**
OFFICE LOCATION: A2806 **CLASSROOM:** TBA
E-MAIL: tstehelin@yukoncollege.yk.ca
TIME: Lecture M/W 10:30 – 12:00, Lab Thurs 9:00 – 12:00
TELEPHONE: **DATES:**

COURSE DESCRIPTION

This core second-year biology course examines patterns of inheritance, genes, and gene functioning from DNA to phenotype. Mendelian patterns of inheritance and exceptions will be discussed and expanded on from introductory material in first-year Biology (Biology 101 and 102). Current topics in molecular techniques, transmission, stem cells, and ethics will also be discussed. Lab exercises will focus on basic quantitative techniques of analysing genetic frequencies and basic methodology in conducting genetic experiments, as well as practise employing rigid scientific process.

PREREQUISITES:

Successful completion of both Biology 101 and 102 (grade of "C" or higher in both) or equivalent.

EQUIVALENCY OR TRANSFERABILITY

Under review

LEARNING OUTCOMES:

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

- describe the processes and functions of mitosis and meiosis in transmitting DNA to other cells
- explain, with illustrative examples, Mendelian genetics and exceptions such as gene interaction, epistasis, pleiotropy and X-linkages
- assess and describe the transmission of genes from parent to daughter cells and processes of molecular genetics such as DNA replication, transcription, translation, as well as

prokaryotic and eukaryotic gene expression
- describe the principles of quantitative and population genetics used to describe evolution of traits
- know and critically assess, genetic techniques such as recombination, cloning, and gene therapy used in modern genetics

Lab learning outcome:

- Students will be able to demonstrate lab techniques relating to quantitative genetics such as polymerase chain reactions, accurate predictions of phenotypic ratios and statistical assessments of results

DELIVERY METHODS:

Material will be presented in two lectures and one lab session per week. Attendance in the laboratory is mandatory. **Students must pass the lab and lecture portions independently.** Students will be expected to read and understand scientific articles relating to course material

COURSE FORMAT: two 1.5 hour-lectures per week, and one 3-hour lab per week

ASSESSMENTS

Attendance
Attendance is mandatory in laboratory sessions and strongly recommended in lectures. Students that do not attend a lab session will receive a zero for that day's activities, unless the instructor is informed of the absence before the start of that class.

Participation
Students are encouraged to engage in discussion relating to the course topics, especially during laboratory sessions. A portion of lab assignment marks will be related to a student's participation in classroom discussion and presentations.

Assignments

Lab Assignments: Assignments are given during laboratory sessions and graded on the basis of understanding and applying principles involved as well as the correctness of answers to solutions. For discussion and presentations marks are awarded for appropriate involvement in classroom discussions or clearly presented results of laboratory exercises.

Tests: On Lecture material: Two midterms on lecture material will be given during regularly scheduled class time. The final examination will be held at the end of the term and covers material from the entire course, although it will focus mostly on material since the last midterm. The examination date will be announced as soon as confirmed by administration.

On Laboratory material: Quizzes on laboratory material are given most lab sessions (except the

first lab) and cover material from the lab exercises the week before and from that day's lab. There are eight lab quizzes. There is no final lab exam.

EVALUATION

On lecture material:

Midterms worth 20% each X 2 = 40%	
Final exam worth 25%	
Total Lecture:	**65%**

Laboratory Assignments 17.5%	
Laboratory Quizzes/participation in lab exercises 17.5%	
Total laboratory:	**35%**

There is no final exam for the laboratory portion of the course. A portion of lab assignment marks (the equivalent of one week's lab assignment mark) will be assigned based on appropriate participation in classroom discussions and short presentations on results of laboratory exercises.

REQUIRED TEXTBOOKS/MATERIALS:

Essentials of Genetics, 2013, W. S. Klug, M. R. Cummings, C. A. Spencer and M. A. Palladino, 8th Edition, Pearson

With *supplemental material* (provided) from: Pierce, B. A. 2014. Genetics, a conceptual approach, 5th edition. W. H. Freeman and Company, NY.

Laboratory material will be handed out during the first lab session in the form of three-hole punched pages.

Plagiarism

Plagiarism is a serious academic offence. Plagiarism occurs when students present the words of someone else as their own. Plagiarism can be the deliberate use of a whole piece of another person's writing, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material. Whenever the words, research or ideas of others are directly quoted or paraphrased, they must be documented according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.). Resubmitting a paper which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the College.

YUKON FIRST NATIONS CORE COMPETENCY

Yukon College recognizes that a greater understanding and awareness of Yukon First Nations history, culture and journey towards self-determination will help to build positive relationships

among all Yukon citizens. As a result, to graduate from ANY Yukon College program, you will be required to achieve core competency in knowledge of Yukon First Nations. For details, please see www.yukoncollege.yk.ca/yfnccr.

ACADEMIC ACCOMMODATION

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in section 8.0 of the Yukon College Academic Regulations (available on the Yukon College website). It is the student's responsibility to seek these accommodations. If a student requires an academic accommodation, he/she should contact the Learning Assistance Centre (LAC) at (867) 668-8785 or lassist@yukoncollege.yk.ca.

TOPIC OUTLINE/SYLLABUS

UNIT TOPIC		WEEK
Introduction	Ch. 1	
Comparing Mitosis and Meiosis	Ch. 2	1
Basic Mendelian Genetics	Ch. 3	2
Monohybrid, dihybrid, and trihybrid crosses	(review)	
Human genetics: pedigrees		3
Exceptions to Mendel's Laws	Ch. 4	
Sex-linked inheritance		4
Sex Determination		
Errors in meiosis, chromosome alteration and genetic disorders	Ch. 6	5
Transmission Genetics		
Linkage and chromosome mapping	Ch. 7	6
Linkage maps		
Midterm I		
Molecular Genetics		
Structure of DNA (review of Biol 102)	Ch. 9	
Replication	Ch. 10	7
Transcription	Ch. 12	8
Translation of RNA to protein	Ch. 13	
Mutation of genes, DNA repair	Ch. 14 in part	
Lac Operon, Prokaryotic and Eukaryotic Gene Expression	Ch. 15	9
(Supplemental material from B. A. Pierce 2014, Chapters 9, 16, and 17)		

Midterm II		
The Genetics of Cancer	Ch. 16	
Recombination of genes	Ch. 8 and 17	
Ethics and applications of genetic engineering	Ch. 19	
Quantitative Genetics	Ch. 21	10
Evolutionary Genetics		
Population Genetics	Ch. 22	11
Human population genetics		12
Review		13
Final exam		

Lab Topics

Week 1 – Introduction to the lab and sterile techniques

Week 2 – Mitosis and Meiosis

Week 3 – Mendelian Genetics – monohybrid and dihybrid crosses and the chi-square

Set up for sex-linked crosses with *Drosophila*

Week 4 – The sex-linked cross using *Drosophila*

Week 5 – Linked genes

Week 6 – Lab exam #1

Week 7 – Exceptions to Mendelian Genetics: polygenetic inheritance

Week 8 – Separation of DNA and RNA segments, restriction enzymes

PCR amplification of DNA part I

Week 9 – Complementation in Yeast

PCR amplification of DNA part II

Week 10 – Lab exam #2