



## BIO 211

# Principles of Genetics

Semester: Fall, 2014

Days: Wednesdays and Fridays,  
9:45 – 11 am.

Room: A2141

Lab – day: Wednesdays, 4 – 6:30 pm

Lab–Room: A2151

Number of credits: 3

Prerequisite:

Bio 133

Instructor: Jessmi Ling

Email: [jling@ambrose.edu](mailto:jling@ambrose.edu)

Phone: 403-410-2000 (2919)

Office: A2158

Office hours: By appointment

### Course Description:

This course examines the principles of heredity, Mendelian laws, recombination, and basic concepts of gene structures and function.

Genetics is a study of the structure and function of the genetic material of organisms. This course introduces students to the fundamentals of genetic information and analysis. The course begins with linking genes to phenotype, and therefore the study of gene inheritance. Following which, topics are discussed in a gradual shift toward the molecular aspects of gene structure, function and regulation. Students taking this course are required to enroll in Bio 211L, which encompass the laboratory accompaniment for this course.

### Further Course Information:

Course prerequisite is Biology 133

### Important Dates:

First day of classes: September 3, 2014

Registration revision period: September 14, 2014

Last day to request revised examination: October 27, 2014

Last day to withdraw from course: November 12, 2014

Last day to apply for time extension for coursework: November 24, 2014

Last day of classes: December 9, 2014

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## Expected Learning Outcomes:

I The course will cover both classical and molecular genetics. It is the aim of the course that students acquire the following skills:

1. Understand the principles of gene inheritance and statistical analysis.
2. Understand the molecular basis of genetics.
3. Understand techniques used in the study of genetics, and introduction to genetic engineering.
4. Able to present and discuss issues regarding genetic analysis.

**Final Exam: December 13, 2014**

**Time: 9:00 AM – 12:00 PM**

**Room: A2141**

## Outline:

Date	Topic	Chapter
Wed. Sept 3 Lab 1	Course introduction. Lab 1: PBS Cracking Your Genetic Code documentary. Documentary worksheet A due <b>Sept 10</b> .	1
Fri. Sept 5	DNA: Chemistry and structure, DNA-interacting proteins. Ch 10. Chromosome structure. Ch 11a.	10, 11a
Wed. Sept 10 Lab 2	DNA: Replication (synthesis). Lab 2: Cloning Lab Series Part A. <ul style="list-style-type: none"><li>- Overview of cloning lab series.</li><li>- Purification of plasmid DNA.</li><li>- Cloning series worksheet A due <b>Sept 17</b>.</li></ul>	12a
Fri. Sept 12	Transcription of DNA.	13
Wed. Sept 17 Lab 3	RNA molecules and RNA processing. Lab 3: Cloning Lab series Part B. <ul style="list-style-type: none"><li>- Isolation of <i>gfp</i> and preparation of pET28a vector.</li><li>- Cloning series worksheet B due <b>Sept 24</b>.</li></ul>	14
Fri. Sept 19	The genetic code and translation.	15

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Wed. Sept 24 No lab.	Spiritual Emphasis Day	
Fri. Sept 26	<b>Test 1 (Ch 10, 11a, 12a, 13, 14, 15)</b>	
Wed. Oct 1 Lab 4	Bacterial genetic systems. Lab 4: Cloning Lab series Part C. - Construction of recombinant plasmid and transformation of <i>E. coli</i> . - Cloning series worksheet C due <b>Oct 8</b> .	9a
Fri. Oct 3	Viral genetic systems. Lab: Identify transformants, subculture for expression lab.	9b
Wed. Oct 8 Lab 5	Control of gene expression in prokaryotes. Lab 5: Cloning Lab series Part D. - Expression of <i>gfp</i> from pGLO and pET28a- <i>gfp</i> . - Cloning series worksheet D due <b>Oct 15</b> . - Cloning series summary report due <b>Nov 3 (Monday)</b> .	16
Fri. Oct 10	Control of gene expression in eukaryotes.	17
Wed. Oct 15 Lab	Gene mutagenesis and DNA repair. Transposons and transposition. No wet lab.	18a 18b
Fri. Oct 17	Organelle DNA	11b
Wed. Oct 22 Lab 7	<b>Test 2 (Ch 9, 11b, 16, 17, 18)</b> Lab 6: DNA Polymorphism (Worksheet due on <b>Oct 29</b> )	
Fri. Oct 24	Chromosomes and cellular reproduction. Mechanism of DNA recombination.	2, 12b
Wed. Oct 29	Basic principles of heredity.	3

Lab 8	Lab 7: Mono and dihybrid crosses (Worksheet due on <b>Nov 5</b> )	
Fri. Oct 31	Sex determination and sex-linked characteristics.	4
Wed. Nov 5	Extensions and modifications of basic principles.	5
Lab 9	Lab 8: Statistics in genetics (Worksheet due on <b>Nov 12</b> )	
Fri. Nov 7	Pedigree analysis, applications and genetic testing.	6
Wed. Nov 12	Linkage, recombination and eukaryotic gene mapping.	7
Lab 10	Lab 9: Dr. Rod Remin's talk – Genetics and Animal Breeding. Summary of Dr. Remin's talk due <b>Nov 21 (Friday)</b> .	
Fri. Nov 14	Chromosome variation.	8
Wed. Nov 19	<b>Test 3 (Ch 2, 3, 4, 5, 6, 7, 9, 12b)</b>	
Lab 11	Epigenetics.  Lab 10: PBS Ghost in Your Genes documentary. Documentary worksheet B due <b>Nov 26</b> .	21
Fri. Nov 21	Genomics and proteomics.	20
Wed. Nov 26	Developmental genetics and immunogenetics.	22
Lab 12	Cancer genetics.  Lab 11: Case study – Bioinformatics and colon cancer. Case study worksheet due <b>Dec 3</b> .	23
Fri. Nov 28	Quantitative Genetics.	24
Wed. Dec 3	Population Genetics.  No Lab	25
Fri. Dec 5	Evolutionary Genetics.	26
TBA	<b>Final Exam. 9 am – noon. A2141.</b>	

### Requirements:

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Tests consist of short answer questions based on topics covered during lectures. The tests are not cumulative. Each test carries 15% of the total course marks. The final exam consists mostly of short-answer questions. Other formats, such as multiple-choice, fill-in-the-blanks, match words, may be interspersed throughout the exam sheet. Questions are derived from topics covered during lectures and corresponding chapters from the required textbook. The first half of the final exam will cover topics from the whole course (cumulative), while the second half will consist of short-answer questions from chapters 20 to 26.

There will be no exam or tests for the laboratory component. However, the theory and problems behind the lab topics may be included in any of the tests and final exam. Students must earn at least 60% of the laboratory component marks to pass Bio 211L and have the marks added to the final marks for grading.

### **Submission of Assignments:**

Due dates for assignments are provided in the lecture and laboratory schedule. Format for each assignment are specified in the assignment sheets. Late submissions are not accepted unless sufficient reason is provided in a written request for extension to the instructor prior to the due date. Note that any request for extension is not automatically granted. Each request is assessed individually and the length of extension, if any, will vary. The instructor's decision on the extension is final.

### **Attendance:**

There are no penalties for absence from any lectures. However, attendance is compulsory for all laboratory exercises, presentations, tests and exams. Allocated marks will not be awarded if student is absent from any laboratory, presentation, test or exam without notice and sufficient reason.

### **Evaluation:**

Marks distribution for grading:

Tests (3 x 15%)	45%
Final exam	30%
Lab component	25%

Marks for the laboratory component are distributed as follows:

1. Cloning Lab Series:
    - a. Worksheets A – D (4 × 5%) 20%
    - b. Summary report 20%
  2. Monohybrid and dihybrid crosses 10%
  3. Statistics in genetics 10%
  4. Genetic recombination/complementation 10%
  5. DNA polymorphism 10%
  6. Dr. Remin's talk 3%
  7. Case study worksheets 7%
    - a. Bioinformatics and colon cancer
  8. Documentary worksheets 10%
    - a. Ghost in your genes
    - b. Cracking your genetic code
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## Grade Summary:

The available letters for course grades are as follows:

A+	93.0 – 100%	C+	66.0 – 69.9%
A	86.0 – 92.9%	C	62.0 – 65.9%
A-	82.0 – 85.9%	C-	58.0 – 61.9%
B+	78.0 – 81.9%	D+	54.0 – 57.9%
B	74.0 – 77.9%	D	50.0 – 53.9%
B-	70.0 – 73.9%	F	Below 49.9%

Because of the nature of the Alpha 4.00 system, there can be no uniform College-wide conversion scale. The relationship between raw scores (e.g. percentages) and the resultant letter grade will depend on the nature of the course and the instructor's assessment of the level of each class, compared to similar classes taught previously.

Please note that final grades will be available on student registration system. Printed grade sheets are no longer mailed out.

## Textbooks:

Genetics: a conceptual approach. 5<sup>th</sup> Edition (2014). Pierce, B.A. W.H. Freeman and Co. New York. ISBN-13: 978-1-4641-0946-1.

You may use the older edition, but please note any updates. Lectures, tests and exams are based off the newer edition.

Genetics: a conceptual approach. 4<sup>th</sup> Edition (2012). Pierce, B.A. W.H. Freeman and Co. New York. ISBN-13: 978-1-4292-3250-0.

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## Policies:

All students have received an Ambrose e-mail account upon registration. It is the student's responsibility to check this account regularly as the Ambrose email system will be the professor's instrument for notifying students of important matters (Cancelled class sessions, extensions, requested appointments, etc.) between class sessions. If students do not wish to use their Ambrose accounts, it is highly recommended that they forward all messages from the Ambrose account to the other account.

During the **Registration Revision Period** students may to enter a course without permission, change the designation of any class from credit to audit and /or voluntary withdraw from a course without financial or academic penalty. These courses will not appear on the student's transcript. Courses should be added or dropped on the student portal by the deadline date, please consult the List of Important Dates. After that date, the original status remains and the student is responsible for related fees.

Students intending to withdraw from a course after the Registration Revision Period must apply to the Office of the Registrar by submitting a Request to Withdraw from a Course by the **Withdrawal Deadline**, please consult the List of Important Dates. Withdrawal from courses after the Registration Revision period will not be eligible for tuition refund. A grade of "W" will appear on the student's transcript.

Students wishing to withdraw from a course, but who fail to do so by the applicable date, will receive the grade earned in accordance with the course syllabus. A student obliged to withdraw from a course after the Withdrawal Deadline because of health or other reasons may apply to the Registrar for special consideration.

Students, who find a conflict in their exam schedule must submit a **Revised Examination** Request form to the Registrar's Office by the deadline date, please consult the List of Important Dates. Requests will be considered for the following reasons only: 1) the scheduled final examination slot conflicts with another exam; 2) three final exams within three consecutive exam time blocks; 3) the scheduled final exam slot conflicts with an exam at another institution; 4) extenuating circumstances. Travel is not considered a valid excuse for re-scheduling or missing a final exam.

### Electronic Etiquette

Students are expected to treat their instructor, guest speakers, and fellow students with respect. It is disruptive to the learning goals of a course or seminar and disrespectful to fellow students and the instructor to engage in electronically-enabled activities unrelated to the class during a class session. Please turn off all cell phones and other electronic devices during class. Laptops should be used for class-related purposes only. Please do not use iPods, MP3 players, or headphones. Do not text, read, or send personal emails, go on Facebook or other social networks, search the internet, or play computer games during class. The professor has the right to disallow the student to use a laptop in future lectures and/or to ask a student to withdraw from the session if s/he does not comply with this policy. Repeat offenders will be directed to the Dean. If you are expecting communication due to an emergency, please speak with the professor before the class begins.

### Academic Policies

It is the responsibility of all students to become familiar with and adhere to academic policies as stated in the Academic Calendar. Personal information, that is information about an individual that may be used to identify that individual, may be collected as a requirement as part of taking this class. Any information collected will only be used and disclosed for the purpose for which the collection was intended. For further information contact the Privacy Compliance Officer at [privacy@ambrose.edu](mailto:privacy@ambrose.edu).

### Extensions

Although extensions to coursework in the semester are at the discretion of the instructor, students may not turn in coursework for evaluation after the last day of the scheduled final examination period unless they have received permission for a "**Course Extension**" from the Registrar's Office. Requests for course extensions or alternative examination time must be submitted to the Registrar's Office by the deadline date, please consult the List of Important Dates. Course extensions are only granted for serious issues that arise "due to circumstances beyond the student's control".

### Appeal of Grade

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An appeal for change of grade on any course work must be made to the course instructor within one week of receiving notification of the grade. An appeal for change of final grade must be submitted to the Office of the Registrar in writing within 30 days of receiving notification of the final grade, providing the basis for appeal. A review fee of \$50.00 must accompany the appeal to review final grades. If the appeal is sustained, the fee will be refunded.

### **Academic Integrity**

We are committed to fostering personal integrity and will not overlook breaches of integrity such as plagiarism and cheating. Academic dishonesty is taken seriously at Ambrose University College as it undermines our academic standards and affects the integrity of each member of our learning community. Any attempt to obtain credit for academic work through fraudulent, deceptive, or dishonest means is academic dishonesty. Plagiarism involves presenting someone else's ideas, words, or work as one's own. Plagiarism is fraud and theft, but plagiarism can also occur by accident when a student fails or forgets to give credit to another person's ideas or words. Plagiarism and cheating can result in a failing grade for an assignment, for the course, or immediate dismissal from the university college. Students are expected to be familiar with the policies in the current Academic Calendar that deal with plagiarism, cheating, and the penalties and procedures for dealing with these matters. All cases of academic dishonesty are reported to the Academic Dean and become part of the student's permanent record.

Students are strongly advised to retain this syllabus for their records.

### **Other**

*Any added features in the syllabus are optional. You may or may not wish to include elements such as a bibliography, reading list, schedule of lectures/topics, or reporting form.*