



## COURSE INFORMATION SHEET

### **Biology 211 Principles of Genetics** (Schedule for Fall 2012)

**Instructor:** Wendy Hutchins, MLT, PhD

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**Lecture venue and time:** A2145, Wednesdays and Fridays, 11:15 – 12:30 pm

**Laboratory venue and time:** A2145, Wednesdays, 2:30 to 5:00 pm

**Final Exam:** A2145, Friday, Dec 7, 9:00 am

**Course prerequisites:** Biology 133

#### **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 prokaryotes and the molecular aspects of gene structure, function and regulation. Then moves on to eukaryotes and the study of gene inheritance. Following selected topics of applied genetics will be discussed. Students taking this course are required to enroll in Bio 211L, which encompass the laboratory accompaniment for this course. Lectures and laboratories are intertwined with some lectures and discussions falling into laboratory periods and some labs begun or completed in lecture times.

#### **Course objectives:**

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.
4. Able to present and discuss issues regarding genetics.

#### **Required textbook:**

Genetics: a conceptual approach. 4<sup>th</sup> Edition (2010). Pierce, B.A. W.H. Freeman and Co. New York.

- 3<sup>rd</sup> Edition (2008) is acceptable, but be aware of any change in page numbers, tables or figures.

Biology Labs On-Line: Biology Labs Online offers a series of interactive, inquiry-based biology simulations and exercises designed for college biology students. You can get a 1 day free trial for the lab exercises for this course. Otherwise, access to each lab for longer will cost \$7.00 USD. <http://www.biologylab.awlonline.com/index.html>

**Supporting textbook:**

Introduction to Genetic Analysis. 9<sup>th</sup> Edition (2008). Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. W.H. Freeman and Co. New York.

**Attendance:**

There are no penalties for non-attendance for 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.

**Lecture and laboratory schedule:**

Date	Topic	Chapter
Sept 5	Introduction. Central Dogma. Prokaryotes. Intro to Term paper 1: Prokaryotes and antimicrobial resistance.	1, 8, Appendix A4, A5
Lab	Lec: DNA, DNA Replication and Recombination Lab: DNA isolation and visualization	10, 12
Sept 7	Transcription and RNA	13, 14.3, 14.4
Sept 12	Genetic Code and Translation	15
Lab period	Lec: Bacterial Genetic Systems Lab 1 part 1: Transformation	8 19
Sept 14	<b>Quiz 1.</b> Central Dogma basics Lab 1 part 2: Transformation	
Sept 19	Control of Gene Expression in Prokaryotes <b>Lab 1 report due at start of period</b>	16
Lab period	Lab 2: Lac operon	16
Sept 21	Gene Mutations and DNA Repair. Transposition. <b>Lab 2 report due at start of period</b>	18, 11.4
Sept 26	No class	
Lab period	No lab	
Sept 28	<b>Lab 3: Basic Bioinformatics. Please bring your laptop.</b>	20, 26.4
Oct 3	Genomics and Proteomics	20, 26.4

	(Lab 3: Basic Bioinformatics if not complete)	
Lab period	Quiz 2. Mutations and Gene Expression Lec: Molecular Genetic Analysis and Biotechnology Lab 3 report due at end of lab period	19
Oct 5	Central Dogma and Differences in Eukaryotes	11.3, 12.4, 13.4, 14, 15.4
Oct 10	Control of Gene Expression in Eukaryotes	17
Lab period	Term paper 1 due: Presentations about the genetics of antimicrobial resistance Controversial Genetic Experiments <a href="http://dsc.discovery.com/tv-shows/curiosity/topics/10-controversial-genetic-experiments.htm">http://dsc.discovery.com/tv-shows/curiosity/topics/10-controversial-genetic-experiments.htm</a>	
Oct 12	Chromosomes and Cellular Reproduction. Chromosome Structure	2, 11.1, 11.2
Oct 17	Chromosome Variation	9
Lab period	Quiz 3. Eukaryotic Basics Intro to Term paper 2: Gene of Interest/Topic of Interest	19
Oct 19	Basic Principles of Heredity: monohybrids, Lab 4 part 1: corn	3
Oct 24	Basic Principles of Heredity: dihybrids and trihybrids	3
Lab period	Lab 4 part 2: Statistics in Genetics	
Oct 26	Sex Determination and Sex-Linked Characteristics	4
Oct 31	Extensions and Modifications of Basic Principles	5
Lab period	Lab 5: FlyLab <a href="http://www.biologylab.awlonline.com/index.html">http://www.biologylab.awlonline.com/index.html</a> Lab 4 report due at start of lab period	Appendix A2, A3
Nov 2	Quiz 4: Transmission genetics	
Nov 7	Molecular Genetic Analysis and Biotechnology DNA WhoDunnit? <a href="http://www.blackherbals.com/controversial_genetic_technology.htm">http://www.blackherbals.com/controversial_genetic_technology.htm</a>	19
Lab period	Lab 6: PCR, Restriction digests, RFLP, and mapping Lab 5 report due at start of lab period	
Nov 9	Pedigree Analysis, Applications, and Genetic Testing	6
Nov 14	Linkage, Recombination, and Eukaryotic Gene Mapping	7
Lab period	Lab 7: PedigreeLab Lab 6 report due at start of lab period	

Nov 16	Organelle DNA	21
Nov 21	Developmental Genetics	22
Lab period	Lec: Population Genetics Lab 8: PopLab and EvolutionLab <b>Lab 7 report due at start of lab period</b>	25
Nov 23	Immunogenetics. Viral Genetic Systems	22, 8
Nov 28	Cancer Genetics	23
Lab period	Quantitative Genetics and Breeding <b>Lab 8 report due at start of lab period</b>	24
Nov 30	Questions?	
Dec 7	<b>Final Exam</b> Term paper 2 due: Presentations about the topic of interest.	

### Mark distribution:

Quizzes	5% each	total	20%
Lab reports	5% each	total	40%
Term paper 1			20%
Term paper 2			20%

Quizzes will consist of short answer questions and problems based on topics covered during lectures. The quizzes are not cumulative. There will be no exam or tests for the laboratory components. However, the theory and problems behind the lab topics will be included in the quizzes.

Lab reports: Lab reports will be structured so that much can be done during a lab. Questions will be posed in the lab procedures that can be answered as you go. Some discussion will be expected

Term paper 1: The general topic is the molecular genetics of a bacterial antimicrobial resistance mechanism. Each student will have a different mechanism with different genetic origins and phenotypic expressions. Questions to be answered should include how the mechanism confers antibiotic resistance to the microbe, what genetic mechanism gave rise to the mechanism, and the mechanism (s) of gene regulation.

Term paper 2: Each student will be given a different gene of interest from a "single" gene defect disease. The first half/two thirds of the report should cover a description of the gene, mutation(s), effect of the mutation(s), inheritance, gene regulation, cell biology of the normal function of the gene product and pathophysiology of the mutation(s). The last section of the report should cover a controversy surrounding the gene of interest, both pro and con arguments and finally, provide your opinion about this controversy with substantiation of your arguments. Some controversies will be provided specific to some of the chosen genes.

**Grading scheme:**

A+	93 – 100%	C+	66 – 69%
A	86 – 92%	C	62 – 65%
A–	82 – 85%	C–	58 – 61%
B+	78 – 81%	D+	54 – 57%
B	74 – 77%	D	50 – 53%
B–	70 – 73%	F	Below 50%

**Important dates:**

Registration revision period: Wednesday (September 7) – Sunday (September 18).

Last day to enter course without permission, last day to withdraw from a course, change to audit and receive tuition refund: Sunday (September 18).

Community days (Spiritual emphasis days): Wednesday (September 28) and Thursday (September 29).

Graduation application deadline: Friday (October 14).

Last day to withdraw from courses without academic penalty: Monday (November 14)

Last day to request revised time for a final exam: Monday (November 28).

Last day to apply for time extension for coursework: Monday (November 28).

***Please note that final grades will be available on your student portal. Printed grade sheets are no longer mailed out.***

**Other Syllabus Features:**

*It is the responsibility of all students to become familiar with and adhere to academic policies as stated in the Student Handbook and 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).*

*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 appropriate deadline (as listed in the Academic Calendar <http://www.ambrose.edu/publications/academiccalendar>). Course extensions are only granted for serious issues that arise “due to circumstances beyond the student’s control.”*

*We are committed to fostering personal integrity and will not overlook breaches of integrity such as plagiarism and cheating. 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 and the Student Handbook 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.*

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

*Course changes, including adding or dropping a course, may be made during the Registration Revision period, as outlined in the Calendar of Events. All course changes must be recorded on a Registration form, available from the Office of the Registrar. Due to circumstances such as class size, prerequisites or academic policy, the submission of a Registration form does not guarantee that a course will be added or removed from a student's registration. Students may change the designation of any class from credit to audit up to the date specified in the Calendar of Events, although students are not entitled to a tuition adjustment or refund after the Registration Revision period.*

*Withdrawal from courses after the Registration Revision period will not be eligible for tuition refund. Students intending to withdraw from some or all of their courses must submit a completed Registration form to the Registrar's office. The dates by which students may voluntarily withdraw from a course without penalty are listed in the Calendar of Events. A grade of 'W' will be recorded on the student's transcript for any withdrawals from courses made after the end of the Registration Revision period and before the Withdrawal Deadline (also listed in the Calendar of Events). 'W' grades are not included in grade point average calculations. A limit on the number of courses from which Academic a student is permitted to withdraw may be imposed. 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.*

*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 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 Ambrose. Students are expected to be familiar with the policy statements in the current academic calendar and the student handbook 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.*