Biology 431 – Genetics

Term: Spring 2006
Room: Castle 120
Credit: 3 semester hours
Instructor: Michael Dohm
Office: Henry 6
Phone: 739-8543 (x543)

Days: Mon, Wed, Fri
Time: 11:00 – 11:50AM

Office Hours: M 1PM – 4PM or by appointment
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Required textbook: *Introduction to Genetic Analysis*, 8th ed., by Griffiths et al., 2005

Course description: Genetics is a one semester introduction to the study of genes (the unit of heredity) and genomes (the arrangement of genetic units and material) of organisms, including humans. Our focus will include patterns of inheritance (heritability, mutation), the relationship between genes, gene expression, environment, and phenotypes, molecular genetics (gene structure), genetic markers (minisatellites including short tandem repeats, "STRs," used in forensics), the structure of genomes (mapping), and aspects of population and evolutionary genetics (variability, genetic drift, natural selection). Interestingly, most of the technology now in use to study genes and genomes are based on just two fundamental principles of molecular biology: (1) the hydrogen bonding of complementary nucleotide sequences and (2) interactions between specific proteins with specific nucleotide sequences. Application of these two principles will appear throughout the course.

Since the late 1980s, the discipline of genetics has witnessed a revolution in methods and discovery. The impact of this revolution can be seen in the food we may purchase, the way our diseases may be treated, and how we view ourselves. Through lecture and discussion, we will explore these topics and reflect upon how the technology and resources of modern genetics influences the environment and human society.

Course objectives: This course will introduce students to the principles of Mendelian (i.e., "classical") genetics, molecular genetics, and to bioinformatics. In addition, students will enhance abilities to discuss potential benefits and risks of genetic technology to the environment and or to human health and society. On completion of this course, students will be expected to demonstrate an understanding of

1. Inheritance patterns and chromosomal basis of heredity.
2. The relationship between genes, environment, and phenotype.
3. The mechanistic basis of variability.
4. The roles of natural selection and genetic drift in molecular evolution.
5. DNA (deoxyribonucleic acid) structure and replication.
6. The relationship between gene as a structure and the gene as information.
7. Use of bioinformatic tools for sequence alignment and homology searches.
8. Gene isolation and manipulation techniques employed to understand genome structure.

Course requirements: Regular quizzes (25 minutes) will be given during lecture; students may use one page (8 ½ X 11 in) of prepared notes, but may not use the text book during quiz. A total of seven (7) quizzes will be given, each worth 20 points. The lowest quiz score will be dropped from consideration of final grade. Two mid-term exams (100 points each) will be given (closed notes, closed book). See Reminders and notices below for information about attendance and quiz/exam policy. A cumulative final exam (150 points) will be used to evaluate and determine student grades. Regular homework will be suggested, but not graded. The homework will be based on selected problems from each assigned chapter. Participation in topic discussion also will be evaluated (30 points). A total of 500 points may be earned throughout the semester; each item has the following value.

Item	How many?	How often may I expect this item (approx)?	How many points is each item worth?	Total points from this item towards my final grade
Quizzes (lowest score dropped)	7	every 1-2 weeks	20	120
Exams	2	every 7 weeks	100	200
Cumulative final	1	Wed, May 3	150	150
Discussion participation	A lot!	throughout semester	varies	30

Final grade: Your letter grade will be based on the following point distribution.

Points earned	Percent of total	Letter grade
450 – 500	90 – 100%	A
400 – 449	80 – 89%	B
350 – 399	70 – 79%	C
300 – 349	60 – 69%	D
≤ 299	≤ 60%	F

Reminders and notices:

1. Class begins each time exactly at 11AM – please be on time. Chronic tardiness will be viewed as absence from class.
2. Regular attendance is expected and essential for your progress in this class. Although our textbook is excellent, the text covers an enormous amount of information. The goal of lecture and discussion will be to provide the needed context to remove barriers to your understanding of the material. Your lecture attendance and participation in discussion will help all of us benefit from our combined understanding of the material.
3. No make up quiz or exam will be granted in the event of an absence. If a student cannot attend a class in which a quiz has been scheduled, the student must notify the instructor no later than the class prior to the scheduled quiz. For example, if a quiz is scheduled for Monday, then student must approach and receive permission for the absence no later than the Friday class prior to that Monday. In the event of illness, a Doctor's note will be expected.
4. You are encouraged to work together; however, all graded material must be your own. You are also expected to have read and to abide by the "Student Rules of Conduct" which are available in your copy of Chaminade University's Student Handbook

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Tentative schedule (revised:1/10/06) subject to change at discretion of instructor

Date	Day	Notice	Topic	Chapter*
Jan-9	Mon	Class Starts	Introduction	Ch1
Jan-11	Wed		Introduction	Ch1
Jan-13	Fri	No Class: Instructor at EAC Meeting		
Jan-16	Mon	No Class; ML King; Father Chaminade Day		
Jan-18	Wed		Patterns of Inheritance	Ch2
Jan-20	Fri		Patterns of Inheritance	Ch2
Jan-23	Mon		Chromosomal Basis of Inheritance	Ch3
Jan-25	Wed		Chromosomal Basis of Inheritance	Ch3
Jan-27	Fri		Chromosomal Basis of Inheritance	Ch3
Jan-30	Mon	Quiz01	Mapping, linkage, recombination	Ch4
Feb-1	Wed		Mapping, linkage, recombination	Ch4
Feb-3	Fri		Mapping, linkage, recombination	Ch4
Feb-6	Mon		Mapping, linkage, recombination	Ch4
Feb-8	Wed	Quiz02	Population Genetics	Ch19
Feb-10	Fri		Population Genetics	Ch19
Feb-13	Mon		Quantitative Genetics	Ch20
Feb-15	Wed		Quantitative Genetics	Ch20
Feb-17	Fri	Quiz03	Gene to Phenotype	Ch6
Feb-20	Mon	No Class; President's Day		
Feb-22	Wed		Gene to Phenotype; Exam Review	Ch6
Feb-24	Fri	Exam01		
Feb-27	Mon		DNA Structure & Replication	Ch7
Mar-1	Wed		DNA Structure & Replication	Ch7
Mar-3	Fri		DNA Structure & Replication	Ch7
Mar-6	Mon	Quiz04	RNA Transcription & Processing	Ch8
Mar-8	Wed		RNA Transcription & Processing	Ch8
Mar-10	Fri	Quiz05	Proteins	Ch9

Date	Day	Notice	Topic	Chapter*
Mar-13	**Mon**		**Proteins**	**Ch9**
Mar-15	**Wed**		**Gene Regulation**	**Ch10**
Mar-17	**Fri**			
Mar-27	**Mon**	**No Class; Prince Kuhio day**		
Mar-29	**Wed**		**Genetic Engineering**	**Ch11**
Mar-31	**Fri**		**Genetic Engineering**	**Ch11**
Apr-3	**Mon**	**Quiz06**	**Genomics**	**Ch12**
Apr-5	**Wed**		**Genomics**	**Ch12**
Apr-7	**Fri**		**Genomics**	**Ch12**
Apr-10	**Mon**		**Transposable Elements**	**Ch13**
Apr-12	**Wed**	**Quiz07**	**Mutation, Repair, recombination**	**Ch14**
Apr-14	**Fri**	**No Class; Good Friday**		
Apr-17	**Mon**		**Large-Scale Chromosomal Changes**	**Ch15**
Apr-19	**Wed**		**Review**	
Apr-21	**Fri**	**Exam02**	**In Class, 50 minutes**	
Apr-24	**Mon**		**Evolutionary Genetics**	**Ch21**
Apr-26	**Wed**		**Evolutionary Genetics**	**Ch21**
Apr-28	**Fri**	**Last Day of Instruction**	**Evolutionary Genetics**	**Ch21**
May-1	**Mon**			
May-3	**Wed**	**Final Exam**	**In Class, two hours**	

* Specific pages within each chapter will be suggested by the instructor at each lecture.