Grande Prairie Regional College
Department of Science

Foundations of Molecular Genetics, Genetics 2700 (3* 3-1s-0)
Winter 2009 Course Outline

Instructor: David Dansereau, PhD
Email: *ddansereau@gprc.ab.ca*
Office: J221
Phone: 780-539-2986

COURSE DESCRIPTION: Basic concepts on the organization of genetic material and its expression will be developed from experiments on bacteria and viruses.

COURSE OBJECTIVE: An introduction to bacterial molecular genetics, from a historical to contemporary perspective. Simple organisms can serve as models for cellular functions in complex organisms (and Bacteria are interesting in their own right).

Prerequisite: **Biology 2070**
You are responsible for ensuring that you have the prerequisite and that you are properly registered for this class.

Course Transferability: This course transfers to Athabasca as BIOL 3xx (3), Concordia as BIO 2xx (3), U of C as UC Sr. BIOL (3), U of A as GENET 270 (3) OR AUBIO 2xx (3), or U of L as BIOL 2xxx (3). *see http://www.acat.gov.ab.ca/ for details.*

Schedule:

Lectures	Monday	13:00 – 14:20	E305
	Friday	11:30 – 12:50	E305
Seminar	Tuesday	10:00 – 10:50	J204

Office Hours: You are welcome to drop in to my office (J 221) at any time. Times that I will be out of the office for a lecture or lab will be posted on my office door. If you prefer to have an appointment, please email and we can choose a time that is convenient to both of us.

Textbook: "Molecular Genetics of Bacteria", (3rd Edition) by Snyder and Champness. This textbook is available at the bookstore.

Readings from the textbook will be assigned throughout the term. Readings will assist in your understanding of the lecture material and papers. The textbook is meant to supplement your lecture notes, not replace them.

Papers: You will be reading a set of historical journal articles that have been selected for Genetics 2700. These papers will be available on reserve in the College library. These papers will be covered in seminar sessions and you will be tested on their content.

Course Assessment: Midterm 35%
Final exam 45% cumulative with emphasis on 2nd half material
Quizzes 20%

The final exam **will be cumulative** with emphasis on the 2nd half of the material. Exams will contain mainly paragraph-length written answer questions. Exams will cover material from assigned readings, seminars, and lectures.

Quizzes will be given during the seminar period and will be based on the seminar readings. **Quizzes and the mid-term exam will not be rescheduled**; if you miss a quiz or the mid-term exam, *with proper documentation*, its weight will be transferred to the final exam.

Final Grade: At the end of this course you will be assigned a letter grade that the Registrar's office will convert to four-point equivalence as follows:

Grade	4-point Equivalence	Descriptor
A+	4.0	Excellent
A		
A-	3.7	First class standing
B+	3.3	
B	3.0	Good
B-	2.7	
C+	2.3	Satisfactory
C	2.0	
C-	1.7	
D+	1.3	Minimal Pass
D	1.0	
F	0.0	Fail

TOPIC OUTLINE

	TOPIC	READINGS *
1	Bacteria & Phage	Introduction (pp. 1-9)
2	Genetic Concepts	Chapter 2
3	Complementation & Recombination	Chapter 2
4	Genetic Concepts	Chapter 3
5	Lytic Phage Genetic Analysis	Chapter 7
6	Lytic Phage Genetic Analysis	Chapter 7
7	Transduction	Chapter 7
8	Transformation	Chapter 6
9	Plasmids & Conjugation	Chapter 4; Chapter 5
10	Transposition	Chapter 9
11	DNA structure; DNA replication	Chapter 1
12	DNA replication	Chapter 1
13	Mutation	Chapter 3
MIDTERM		
14	Mutation	Chapter 3
15	DNA repair	Chapter 11
16	DNA repair	Chapter 11
17	Recombination	Chapter 10
18	Recombination	Chapter 10
19	Gene Expression; negative control/lac	Chapter 12
20	Gene expression; positive control/lac;	Chapter 12, also pp. 482-484
21	Lambda	Chapter 8
22	Lambda	Chapter 9
23	Modern Genetic Analysis	Chapter 14

SEMINAR READINGS

1 Edgar and Epstein. 1965. The Genetics of a Bacterial Virus. Scientific American (February) pp. 70-78.

2 Zinder, N.D. 1958. "Transduction" in Bacteria. Sci. American (November) pp 38-4

3 **Quiz 1** (covers Seminars 1 & 2)

4 Cohen et al. 1972. Nonchromosomal Antibiotic Resistance in Bacteria: Genetic Transformation of *Escherichia coli* by R-Factor DNA. PNAS 69:2110-2114. Lederberg and Tatum.1946. Gene Recombination in Escherichia coli. Nature 158:558

5 Watson and Crick. 1953. Genetical Implications of the Structure of Deoxyribonucleic Acid. Nature 171: 946-969.

Richardson. 1983. Bacteriophage T7: Minimal Requirements for the Replication of a Duplex DNA Molecule. Cell 33:315-317.

Quiz 2 (covers Seminars 4 & 5)

7 Crick, Barnett, Brenner, and Watts-Tobin. 1961. General Nature of the Genetic Code for Proteins. Nature 192(4809):1227-1232.

8 Weigle. 1953. Induction of Mutations in a Bacterial Virus. PNAS 39:628-636.

Quiz 3 (covers Seminars 7 & 8)

10 Clark and Margulies. 1964. Isolation and characterization of Recombination-deficient mutants of *E. coli* K12. PNAS 53:451-9.

11 Jacob and Monod. 1961. On the Regulation of Gene Activity. Cold Spring Harbor Symposium of Quantitative Biology. 26: 193-205.

Quiz 4 (covers Seminars 10 & 11)

13 Mullis. 1990. The Unusual Origin of the Polymerase Chain Reaction. Scientific American (April) 56-65.