

**Grande Prairie Regional College
Department of Science**

Course Outline: BI 2070 Molecular Genetics and Heredity Fall 2009

BI 2070 Molecular Genetics and Heredity 3(3-0-3)

Biology 2070 is a course dealing with both classical and molecular genetics. The chromosomal and molecular basis for the transmission and function of genes will be covered as well as the construction of genetic and physical maps of genes and genomes. Molecular biology strategies for isolation of specific genes and examples of regulatory mechanisms for the expression of the genetic material in both prokaryotes and eukaryotes will also be discussed.

Instructor: Dr. Sean Irwin
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Prerequisite: BI 1070

Transfer: University of Alberta BI 207

Required Text : Griffith, A.J. et al., Introduction to Genetic Analysis (9thed.),
W.H. Freeman and Company, New York, 2008.

Lab Manual: U. of A. 2009-2010 BI 2070 Lab Manual

Lectures: Tues./Thurs. 10:00- 11:20, Room H211

Labs: Fri. 14:30- 17:20, Room J 130

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|---------------------|-----------------|-------|
| Evaluation : | Lab Assignments | - 25% |
| | Midterm Exam | - 25% |
| | Final Lab Exam | - 10% |
| | Final Exam | - 40% |

Office Hours : Monday / Wednesday - 10:00 - 11:20 am
Friday -1:00 – 2:20 pm
Also by appointment

| <u>Alpha Grade</u> | <u>Approximate Percentage</u> |
|--------------------|-------------------------------|
| A+ | 90 – 100 |
| A | 85 – 89 |
| A- | 80 – 84 |
| B+ | 76 – 79 |
| B | 73 – 75 |
| B- | 70 –72 |
| C+ | 67 – 69 |
| C | 64 – 66 |
| C- | 60 – 63 |
| D+ | 55 – 59 |
| D | 50 – 54 |
| F | 0 – 49 |

| Lect. | Date | Topic | Reading |
|--------------|-------------|--|----------------------|
| 1 | Sept 3 | Introduction | |
| 2 | Sept 8 | Important Experiments | 7.1 - 7.3 |
| 3 | Sept 10 | DNA / Chromosome Replication | 7.4 - 7.7 |
| 4 | Sept 15 | Genes and Proteins | 6.2, 9.1 |
| 5 | Sept. 17 | Mutation | 15.1 – 15.3. |
| 6 | Sept. 22 | Genome Organization and Life Cycles | 2.1, 2.2 |
| 7 | Sept. 25 | Chromosome Behaviour in Meiosis | 2.3 |
| 8 | Sept. 29 | Segregation and Independent Assortment | 3.1, 3.2, 3.4 |
| 9 | Oct. 1 | Sex Chromosomes and Sex-linkage | 2.5 |
| 10 | Oct. 6 | Pedigree Analysis | 2.6 |
| 11 | Oct. 8 | Gene Interactions I | 6.1 |
| 12 | Oct. 13 | Gene Interactions II | 6.3, 6.4 |
| 13 | Oct. 15 | Linkage | 4.1 |
| 14 | Oct. 20 | Midterm I | |
| 15 | Oct. 23 | Mapping Genes on Chromosomes | 4.2, 4.5 |
| 16 | Oct. 27 | Physical Mapping | 13.2 |
| 17 | Oct. 29 | Changes in Chromosome Number | 16.1 |
| 18 | Nov. 3 | Changes in Chromosome Structure | 16.2, 16.3 |
| 19 | Nov. 5 | Prokaryotic Genes and Operons | 10.1-10.3 |
| 20 | Nov. 10 | Eukaryote Genes and Globin Genes | 8.3, 11.1, pg. 701 |
| 21 | Nov. 12 | Clones and Libraries | 20.1 |
| 22 | Nov. 17 | Identifying Genes | 20.1 |
| 23 | Nov. 19 | PCR and DNA Sequencing | 20.2, 20.3 |
| 24 | Nov. 24 | RFLP I | Ch.2: pg. 51-53, 4.3 |
| 25 | Nov. 26 | RFLP II | |
| 26 | Dec. 1 | The Human Genome | 13.4 |
| 27 | Dec. 3 | Review | |

Biol207 – List of Problems from the textbook.

Dr. Locke Sept. - Dec. '09

Lecture 1 - 7:1,2,11,16,17, 24.

Lecture 2 - 7: 3-7, 15, 20

Genes and Proteins 6:4; 9:11

Complementation 6:1-7, 25, 28, 50

Prokaryote genes & Lac operon 10: 1-5, 7, 9-12

Eukaryote genes & Beta-globin 8: 2, 3, 6, 8, 12-14, 18

Mutations originate in damage to DNA

Alleles, Dominance, and Morphs 15: 1-2, 8-9, 12, 16, 19, 26

Chromosome organization and life cycles 6:1-7, 10, 12-13, 16, 18, 21-22, 25, 28

Chromosome behavior in meiosis 3: 1-22 (not 18)

The Genetic Implications of Meiosis 3: 1-22 (not 18)

Independent Assortment 3: 1-22

Linkage 4: 1-9, 17, 22

Mapping 3 genes loci by recombination 4: 10-16, 32-37, 42 (not 11b, 12c, 33c)

Sex chromosomes and sex linkage 2: 46-49,52-53, 62-65

Pedigree Analysis 2: 29, 37-45, 50-51, 54, 59-61, 64-66

Changes in Chromosome rearrangements 16:22-28

Changes in chromosome number 16: 32-33, 35-37, 50, 52

Gene Interactions and Epistasis 6: 26-48, 54-66

Review midterm exam

Physical mapping 20: 3, 4, 7, 10

Clone libraries

Identify Genes by complementation 20: 16

DNA probes 20: 17

Transposon tagging 20: 3, 8

PCR

RFLP1, RFLP2 20: 19, 21

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| D | 50 – 54 |
| F | 0 – 49 |