**BIO 344 – 01 – Genetics**

Tentative Syllabus – Spring 2023

Instructor: Dr. William J Mackay

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Office Hrs: MWF 8-9; M 12-2; T Th 8-930

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TEXT Pierce, B. 2021. Genetics Essentials: Concepts and Connections 5th ed. MacMillan. New York. ISBN: 978-1-319-24492-7

COURSE DESCRIPTION

An introductory study of the patterns of inheritance with an emphasis on the structure and function of the hereditary material. Prerequisite: BIO 200, BIO 201, BIO 202, CHE 111, CHE 112.

COURSE OBJECTIVES

1. To gain factual knowledge of genetic principles and develop an understanding of mechanisms of inheritance.

1. To integrate the basic chemical and biological concepts, principles, generalizations, and theories needed to understand genetics.
2. To demonstrate the importance and significance of genetics in both health and disease and to relate inheritance to real life situations.
3. To learn how professional geneticists conduct investigations to gain new knowledge.
4. To acquire basic laboratory skills necessary to perform genetic investigations.

ATTENDANCE POLICY

 Class attendance is **expected**. See the *Student Handbook* for a complete description of the attendance policy.

 Lab attendance is **mandatory**. Lab material will be available for study **only** during the designated lab period.

**DR. MACKAY’S WEB PAGE:** [**www.wjmmackay.com**](http://www.wjmmackay.com)

The provisions of this syllabus may be added to, deleted from, or modified at the discretion of the instructor. Advanced notice will be given in the case of such an event.

ACADEMIC DISHONESTY

1. Cheating. Cheating includes buying, stealing, or otherwise fraudulently obtaining copies of examinations or scantrons for the purpose of improving one’s grade or academic performance. During examinations or in-class work, it includes receiving oral information from others and referring to unauthorized notes or other written information. In addition, copying from others, either during an examination or in the preparation of homework assignments, is a form of cheating.
2. Responsibility. Anyone who knowingly assists in any form of academic dishonesty shall be considered equally guilty as the student who accepts such assistance. Students should not allow their work to be copied or otherwise used by fellow students, nor should they sell or give unauthorized copies of examinations or scantrons to other students.

DISABILITIES STATEMENT: Campbellsville University is committed to reasonable accommodations for students who have documented physical and learning disabilities, as well as medical and emotional conditions. If you have a documented disability or condition of this nature, you may be eligible for disability services. Documentation must be from a licensed professional and current in terms of assessment. Please contact the Coordinator of Disability Services at 270-789-5192 to inquire about services.

EMERGENCY CONTACT INFORMATION

In the event of an emergency, please contact campus security @ (270)403-3611.

HARASSMENT REPORTING STATEMENT (Title IX)

Campbellsville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires all responsible employees, which includes faculty members, to report incidents of sexual misconduct shared by students to the University's Title IX Deputy Coordinator: Rusty Watkins at 1 University Drive, UPO Box 944, rdwatkins@campbellsville.edu or 270-789-5047. Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence may be found at [www.campbellsville.edu/titlelX](http://www.campbellsville.edu/titlelX).

EVALUATION

**1. Determination of grade:**

Quizzes\* (see below) 15

 Exam 1 25

 Exam 2 25

 Final Exam 25

 Lab Reports\*\* (see below) 10

 TOTAL 100

A: 90 – 100

B: 80 – 89

C: 70 – 79

D: 60 – 70

F: < 60

EXAMINATIONS: There will be **3 examinations** over lecture material given during the semester. Examinations 1, 2, and the Final Exam **WILL** be given on the dates specified. Any question format may be expected on the exams. Examinations will be primarily based on information presented in the lecture/lab sessions. Each exam, however, will also contain information that will be drawn from textbook readings and handouts that may not have been directly covered in lecture or lab. Thus, it is to your benefit to read the assigned chapters in your textbook.

 **\*Lecture quizzes:** There will be periodic ten-minute quizzes that will cover lecture material since the previous quiz. Quizzes will count **15%** toward your final course grade. **No make-up quizzes will be given (for any reason)**.

**\*\*Lab reports:** Eight (8) lab assignments will be administered during the semester. In addition, there are three (3) bonus lab assignments. Lab report average will be determined as follows: each assignment will receive one of the following grades.

 Grade assigned: Requires:

 100% No errors. Every answer must be complete and, where possible, must use experimental data to correctly illustrate the answers.

 95% No errors. No more than 1-2 incomplete answers and/or failures

 to illustrate answers using experimental data

 90% No more than one error. No more than 1-2 incomplete answers

 and/or failures to illustrate answers using experimental data

 87% No more than two errors.

 84% No more than three errors.

 80% No more than four errors.

 70% No more than five errors.

 60% No more than six errors.

 50% No more than seven errors.

 40% No more than eight errors.

**Sample question & suggested answer:** An experiment was conducted using Edinboronites to determine if, like humans, the sex ratio among offspring is 50:50 female to male. 300 Edinboronite couples were mated. Each couple produced one offspring which was sexed. 152 of the offspring were male and 148 were female. What is your conclusion?

**Suggested answer:** "It would appear that the ratio is very close to a 1:1 (50:50) ratio. If it had been perfect, there should have been 150 males and 150 females but instead we obtained 152:148. Just like tossing a coin 300 times, we do not expect to get exactly 150 heads and 150 tails every time because each occurrence is randomly determined. Therefore, occasionally we will get more heads than tails or vice versa and sometimes we will get an equal number. However, it is possible, that we have not tested enough specimens to be sure. Perhaps this ratio does indicate a bias towards males (we know this occurs in humans)."

 *Comment: The above answer does not simply answer the question by saying no (or for that matter yes). Whether you answered that it supports a 50:50 or that it does not, you would have a correct answer. However, the added data and explanation is what separates the "A" answer from a non-A answer.*

 **(lab report % X .10 = final lab report points)** (*e*.*g*. 90% X .10 = 9.0 final lab report points)

**Bonus Labs will count up to 1 point (100%) toward your final lab grade!** Thus, you can add up to 3 points (13/10) to your final lab score.

**Written Lab Reports are due on the day in class (unless otherwise specified).**

**There will be NO CREDIT for a late report!**

**Electronic lab reports will not be accepted!**

BIO 344 – Tentative Lecture Schedule 9:00 – 9:50 MWF

Jan 9 Chapter 1 – Introduction to Genetics

Jan 11 Chapter 2 – Cellular Reproduction

Jan 13 Chapter 2 – Cellular Reproduction

Jan 16 Chapter 3 – Basic Principles of Heredity

Jan 18 Chapter 3 – Basic Principles of Heredity

Jan 20 Chapter 4 – Extensions and Modifications of Basic Principles

Jan 23 Chapter 4 – Extensions and Modifications of Basic Principles

Jan 25 Chapter 4 – Extensions and Modifications of Basic Principles

Jan 27 Chapter 5 – Linkage, Recombination and Eukaryotic Gene Mapping

Jan 30 Chapter 5 – Linkage, Recombination and Eukaryotic Gene Mapping

Feb 1 Chapter 5 – Linkage, Recombination and Eukaryotic Gene Mapping

Feb 3 Chapter 6 – Chromosome Variation

Feb 6 Chapter 6 – Chromosome Variation

Feb 8 Chapter 8 – DNA: The Chemical Nature of the Gene

Feb 10 Chapter 8 – DNA: The Chemical Nature of the Gene

Feb 13 Chapter 9 – DNA Replication and Processing

Feb 15 Chapter 9 – DNA Replication and Processing

Feb 17 Chapter 9 – DNA Replication and Processing

Feb 20 Review for Exam 1

Feb 22 Chapter 10 – From DNA to Proteins: Transcription and RNA Processing

Feb 24 Chapter 10 – From DNA to Proteins: Transcription and RNA Processing

Feb 27 Chapter 10 – From DNA to Proteins: Transcription and RNA Processing

Mar 1 Chapter 11 – From DNA to Proteins: Translation

Mar 3 Chapter 11 – From DNA to Proteins: Translation

Mar 13 Chapter 13 – Gene Mutations, Transposable Elements, and DNA Repair

Mar 15 Chapter 13 – Gene Mutations, Transposable Elements, and DNA Repair

Mar 17 Chapter 13 – Gene Mutations, Transposable Elements, and DNA Repair

Mar 20 Chapter 7 – Bacterial and Viral Genetic Systems

Mar 22 Chapter 12 – Control of Gene Expression

Mar 24 Chapter 12 – Control of Gene Expression

Mar 27 Chapter 4 – Complementation

 Chapter 13 – Deletion Mapping

Mar 29 Chapter 13 – Transposable Elements

Mar 31 Chapter 13 – Transposable Elements

 Chapter 7 – CRISPR-Cas Systems

Apr 3 Review for Exam 2

Apr 5 Chapter 14 – Molecular Genetic Analysis and Biotechnology

Apr 7Chapter 14 – Molecular Genetic Analysis and Biotechnology

Apr 10 Chapter 14 – Molecular Genetic Analysis and Biotechnology

Apr 12 Chapter 15 – Genomics and Proteomics

Apr 14 Chapter 2 – Cellular Reproduction

Apr 17 Chapter 16 – Cancer Genetics

Apr 19 Chapter 16 – Cancer Genetics

Apr 21 Chapter 16 – Cancer Genetics

Apr 24 Chapter 17 – Quantitative Genetics

Apr 26 Chapter 18 – Population and Evolutionary Genetics

Apr 28 Chapter 4 – Cytoplasmic Inheritance

BIO 344 – Tentative Lab Schedule – 2:00 – 4:50 T

Jan 10 LAB: **1** Genetic Probability

Jan 17 **Due:** Lab Report 1 (Genetic Probability)

LAB: **2** Exploring Genetics

Jan 24 **Due:** Lab Report 2 (Exploring Genetics)

LAB: **3** The Dihybrid Cross

Jan 31 **Due:** Lab Report 3 (The Dihybrid Cross)

 LAB: **4** Meiosis

Feb 7 **Due:** Lab Report 4 Meiosis
 LAB: **5** Gene Mapping

Feb 14 **Due:** Lab Report 5 (Gene Mapping)

 Lab 6: Sex Linkage

**Feb 21 EXAM 1**

Feb 28 **Due:** Lab Report 6 Sex Linkage

 Lab 7: Other Modes of Inheritance

Mar 14 **Due:** Lab Report 7 Other Modes of Inheritance

 Lab 8: Population Genetics

Mar 28 **Due:** Lab Report 8 Population Genetics

 Bonus Lab 1: Gene Regulation

**Apr 4 Exam 2**

Apr 11 **Due:** Lab Report: Bonus Lab 1: Gene Regulation

 Bonus Lab 2: Cell Cycle

#  Bacterial Gene Engineering CRISPR Lab Week One

Apr 18 **Due:** Lab Report: Bonus Lab 2: Cell Cycle

 Bonus Lab 3: DNA Fingerprinting

Bacterial Gene Engineering CRISPR Lab Week Two

Apr 25 **Due:** Lab Report: Bonus Lab 3: DNA Fingerprinting

MAKE UP EXAM

May 1-5 Final Exam