BIOLOGY 321   GENETICS   Fall 2002

Dr. Carol Trent    trent@biol.wwu.edu
Office Hours: BI 408   Mon,Wed, Fri  10:30 - 11:30 am

If you need to see me outside of office hours, please contact me via email to set up a specific appointment time.

MTWRF 9 am in BI212

• This class meets five days a week.
• One day a week, typically Monday, will be set aside for an informal discussion of the lecture material and problem sets.
• No new material will be introduced in these discussion sessions.
• But don’t skip them!
• They provide an additional opportunity for you to talk to me, along with your classmates, about genetics.
**REQUIRED TEXT:** The 2\textsuperscript{th} edition of *Modern Genetic Analysis (Integrating Genes and Genomes)* by Anthony Griffiths et al.

**COURSE WEB SITE**  
http://fire.biol.wwu.edu/trent/trent/Biol321index.html

Lecture Notes are available on the 321 web site but they are not a substitute for coming to class.

See cautionary comments on web page

**READING ASSIGNMENTS AND PROBLEM SETS:**
- Each week you will receive a reading and problem set assignment.
- After reading through the assigned chapter, work through the assigned problems at the end of the chapter and the additional problem set handed out in class.
- The answers to the problems will be available online at the Biology 321 web site.
- Try writing out the answers yourself before checking my answers. Make sure that you understand the genetic principles underlying the answers.
- We will review some of the assigned problems in the weekly discussion session, but that should not be a substitute for you working through the problems yourself.
POINT ALLOCATIONS FOR QUIZZES AND EXAMS:
In class-quizzes:  4 @ 15 pts each................................. 60
Exams:  4 @ 40 pts. each ........................................... 160
Final Exam:  1 @ 60 pts. each ........................................ 60
Total Points: 280

No points are allocated specifically for class participation.

BUT:  if you have a borderline grade at the end of the quarter and were an active class participant, I will “bump” you up to the higher grade.
Goal of this course
to teach you as many facts as possible

Okay, so here are the real
Goals of this course

(i) To develop your analytical skills via problem solving and data analysis

(ii) To introduce you to the science underlying modern genetics (you will learn some facts…)

(ii) To help you become sophisticated and critical consumers of scientific information in general and genetic information in specific.
Goal One
To develop your analytical skills via problem solving and data analysis

- over the course of the quarter you will receive 7-8 reading and problem assignments
- the problem assignments will be a combination fo textbook problems and problems from old quizzes and exams
- we will work through some problems during lecture and the discussion sessions
- the discussion sessions will be most useful if come prepared to tell me what you are having problems with
- so, ideally, before you come to Monday’s discussion, you have will have reviewed the lecture material and worked (or at least tried to work) most of the assigned problems -- so you know where the trouble spots are.
- take time to review lecture notes and figure out which material has geled and makes sense and which material is not falling into place
Goal Two
To introduce you to the science underlying modern genetics (you will learn some facts...)

Themes:
- transmission genetics
- molecular genetics
- genomics
- population genetics
- special topics

Transmission Genetics: the transfer of genetic information from generation to generation of a cell or individual

Includes:
- Mendel genetics (simple and complex traits)
- Chromosome mechanics including mitosis, meiosis, linkage and crossing-over
- Complex relationship between genotype and phenotype: to what extent do your genes determine your outward appearance, your susceptibility to cancer, your behavior, success in life, etc. .....?
Questions in transmission genetics

Tomato on left is from a *wild* tomato species
The tomato on the right is a cultivar called Giant Red which was bred to produce extremely large tomatoes?

What sorts of questions might a geneticist pose about these two strains of tomato or the different strains of bell pepper?

- *What is the genetic difference between these two strains of tomato?*
- *Is this a single gene trait or a complex trait controlled by multiple genes and the environment?*

Molecular genetics
- molecular definition of the gene
- the molecular basis of information storage and expression of genetic information
- the molecular basis of mutation

Biologist live in privileged times: *in the next several years, the complete genome sequences of representatives from all the major groups of organisms on earth will be determined.*
Genomics

- a *genome* is the entire complement of genetic information in a set of chromosomes
- *genomics* is the molecular characterization of entire genomes including the complete sequence of DNA of each chromosome and all of the encoded proteins

The evolutionary relationships among organisms whose genomes have been sequenced (or sequencing is in progress)
How does the “genomics” approach to understanding inheritance differ from other, more traditional approaches?

What sorts of surprises have been revealed by the completion of the human and other genome projects?

Just how long will it take to sort through all of the data?

Population Genetics:
• we will consider the genetic composition of groups of individuals or entire populations
• for a given population, we will consider the forces that interact to determine the genetic composition of that population

Goal three
To help you become sophisticated and critical consumers of scientific information in general and genetic information in specific.

The relentless stream of Genetics in the Popular Press
A DNA fingerprinting test showed that Thomas Webb had been wrongly convicted of rape

What is so compelling about the science underlying DNA fingerprinting that it can be used to overturn a conviction of an individual?

To address this question, we need to examine the *structure of our genome*, the nature of *PCR* (a molecular methodology used in fingerprinting) and basic issues in *population genetics*
Is it genetic?

- The complex relationship between genotype and phenotype
- To what extent are variations in behavior within a group of individuals due to variations in genotype?
- In other words to what extent is our behavior “determined” by our genes?
- Do we have any clues to the answer to this question?
Genetically Modified Foods
The debate over genetically modified foods has exploded over the last couple of years, becoming a world-wide public relations disaster for the biotech industry and casting science in the role of villain.
Before tomorrow’s lecture:
Browse through Chapter 1: *Genetics and the Organism*
Start reading Chapter 5: *Inheritance of Single-Gene Differences*

**Test yourself on these terms:**

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<th>Some genetical jargon</th>
<th>Definition ?</th>
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