Biology 11-Human Biology

Fall 2005
Instructor: Krista M. Granieri
Office: SM22B
VoiceMail: (408) 741-2045 x-3358
Email: krista_granieri@westvalley.edu
Website: http://instruct.westvalley.edu/granieri/

Lecture: Tuesday and Thursday 9:20-10:55, room SM34
Lab: Tuesday or Thursday 11:05-2:15pm, room SM24

Today’s Agenda

1. Course Information
2. Introduction to Life

Required Text

HUMAN BIOLOGY: Concepts and Current Issues 2nd Ed.

Required Lab Manual:
## Grading Protocol

<table>
<thead>
<tr>
<th></th>
<th>Points</th>
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<tbody>
<tr>
<td>Lecture:</td>
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<tr>
<td>Lecture Exams (3 @ 250pts)</td>
<td>750</td>
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<tr>
<td>Final Exam</td>
<td>350</td>
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<tr>
<td>Various Lecture Assignments</td>
<td>100</td>
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<tr>
<td>Lecture Total</td>
<td>1200</td>
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<tr>
<td>Lab:</td>
<td></td>
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<tr>
<td>Lab Assignments</td>
<td>150</td>
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<tr>
<td>Lab Participation</td>
<td>25</td>
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<tr>
<td>Lab Quizzes</td>
<td>225</td>
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<tr>
<td>Lab Total</td>
<td>400</td>
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A = 90-100%
B = 80-89%
C = 65-79%
D = 55-64%
F < 54%

You must pass the lab and the final to pass the course.

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## Final Exam

**Thursday, December 15th**

9:40am-11:40am

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## Extra Credit

Perfect lab attendance -20pts

Study Guides - up to 10pts each (40pts)

Jeopardy - up to 5pts each (20pts)
CLASS RULES

1. **READ THE SYLLABUS.** You are responsible for the information presented there.
2. **ATTENDANCE.** Come to class. I will do what I can to encourage regular attendance.
3. **NO CELL PHONES.** Turn ‘em off.
4. **PARTICIPATE.** Ask questions in class. Get a study partner or group and study together.
5. **NO “MAKE-UP” WORK.**

*KRISTA M. GRANIERI*
Instructor, Department of Biology
Phone: 408.741.2045 x-3358
Office: Science & Math Building, Room 238
Email: krista_granieri@westvalley.edu

The Website
http://instruct.westvalley.edu/granieri

BIOLOGY FORUMS
FALL 2005 SCHEDULE
SEXUALLY TRANSMITTED DISEASE INFO
PARASITOLOGY ATLAS
JOHN KYRK BIOLOGY ART
Human biology is an introductory biology course designed for non-science majors. Students will learn the basic concepts of biology using human beings as the model organism. The course will begin with a brief introduction to scientific inquiry and the field of biology. We will spend the first part of the course studying the concepts that are key to understanding biology, including the fundamental nature of life and how the genetic material that directs our conception and development has provided the continuity of species since life began on Earth. In the second part of the course, we will study the structure and function of the human body focusing on those systems that model broader biological concepts.

Biology: Study of Life

- Characteristics
- Hierarchies
- Interactions/Ecology
- Classification

Characteristics of Life

Organization/Hierarchy
Homeostasis
Growth/development
Interactions
Metabolism
Adaptation
Reproduction
Response to stimuli
Hierarchy

Food Webs

- Producers (autotrophs)
- Primary Consumers (herbivores)
- Secondary Consumers (carnivores)
- Decomposers (bacteria, fungi)
Classification of Life

Two Kingdoms

Five Kingdoms

Six Kingdoms

DOMAINS?

Bacteria and Archaea are Prokaryotic Domains
Prokaryotic Cells are Small & Simple

- DNA
- Plasmids
- Asexual reproduction
- Cell membrane
- No nucleus
- No organelles
- No compartments
- Small single cells

The Eukaryotic Domain - 4 Kingdoms

- Protista
- Plantae
- Fungi
- Animalia

Eukaryotic Cells are Large & Complex

- DNA
- Large cells
- Cell compartments
- Organelles
- Nucleus
- Ability to specialize
- Can be multicellular
- Sexual or asexual reproduction
Classification Scheme

- Domain
- Kingdom
- Phylum
- Class
- Order
- Family
- Genus
- Species

Genus species
Ex. Homo sapien
Mycobacterium tuberculosis

BIOCHEMISTRY

ATOMS
TYPES OF BONDS
WATER
pH

PERIODIC TABLE OF THE ELEMENTS
Basic Chemistry

Electrons
Protons
Neutrons

N
Atomic Number
Atomic Mass
Ions
ISOTOPES

TYPES OF CHEMICAL BONDS

IONIC- atoms become charged and opposite charges attract

Can be strong or ~Weak, Dissolve in water

COVALENT- atoms share electrons (strongest bonds)

Strong: Do not dissolve in water...in fact, water molecules are held together by this type of bonding...more in a bit...
HYDROGEN BONDS- bonds between a hydrogen atom in one molecule and a negatively charged atom from another molecule.

Water

Water & pH

OH⁻ Hydroxide Ion

H⁺ Hydrogen Ion

a.k.a. Proton
LIPIDS (Fats, Waxes, Oils)

HORMONES

PROTEINS
AMINO ACIDS

Backbone: Leucine (hydrophobic) and Serine (hydrophilic)

Side Groups: 20 possible side groups:
- Hydrophobic
- Hydrophilic
- Positive charge
- Negative charge
- Polar
- Non-polar

PRIMARY STRUCTURE
NUCLEIC ACIDS

(a) Normal red blood cell
Normal hemoglobin

(b) Sickled red blood cell
Sickle-cell hemoglobin
Like proteins, nucleic acids have a backbone and “side groups.”

For nucleic acids, these side groups are called “bases” and there are only 4 of them.

CARBOHYDRATES
THE FASCINATING LIVES OF CELLS

DEAD GUYS, WHOSE NAMES DON’T MATTER:
HOOKE (BUT WHAT THEY DID, DOES MATTER)
LEEUWENHOEK
SCHLEIDEN & SHWANN

CELL THEORY
- all living things are made out of cells
- cells are the smallest units of life
- all cells come from other cells
- all cells are enclosed by a semi-permeable membrane
- all cells (at some point) contain DNA

WHY STUDY CELLS?
MITOCHONDRIA

- Outer membrane
- Inner membrane
- Cristae
- Matrix
- Space between membranes
TISSUES
In-class Assignment:
Due before you leave class today (5pts)

Answer the following questions on a sheet of notebook paper. You may work in groups, but must write answers in your own words.

1. **HOW DO CELLS DIFFER FROM TISSUES?**
2. **WHAT CHARACTERISTICS WOULD YOU EXPECT THE EPITHELIAL LINING OF THE DIGESTIVE TRACT TO POSSESS?**
3. **WHAT MECHANICAL REQUIREMENTS ARE SHARED BY THE TIP OF THE NOSE AND THE PINNAE OF THE EARS? WHAT TISSUE TYPE ALLOWS THESE TO FUNCTION NORMALLY?**

**BIOLOGICAL MEMBRANES**
THREE WAYS FOR “STUFF” TO CROSS A SEMI-PERMEABLE MEMBRANE:

• DIFFUSION/OSMOSIS
• ACTIVE TRANSPORT
• ENDO/EXOCYTOSIS
ENDOCYTOSIS

PHAGOCYTOSIS

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EXOCYTOSIS

HOMEOSTASIS

THREE COMPONENTS:
- SENSOR
- REGULATOR
- EFFECTOR

TWO TYPES OF MECHANISMS:
- NEGATIVE FEEDBACK
- POSITIVE FEEDBACK
Homeostasis & Cellular Respiration
Glycolysis

Glyco=sugar/sweet  lysis=break apart

REVIEW:

1. WHY COULD AN OVERDOSE OF INSULIN CAUSE A COMA?
2. DESCRIBE THE MAIN PLAYERS IN THE REGULATION OF BODY TEMPERATURE.
3. HOW DO YOU THINK LABOR IS INDUCED?