BIOLOGY 1081
2016 Fall Syllabus

TABLE OF CONTENTS

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Professor of Biology and Chemistry
UC Clermont College
Batavia OH 45103

14 August 2016

https://fankhauserblog.wordpress.com/2016/03/14/biology-1081-lectures/

(NOTE: this page is a restoration of my previous extensive Webpage, no longer supported by the College.)

page: Handout:

1. Table of Contents
2. Biology 1081 Syllabus, Autumn Semester, 2016-2017
3. The Science of Learning
4. How to Take a Fankhauser Biology 1081 Science Major’s course
5. Biology 1081 Wordstems, chronological list, part 1
6. Biology 1081 Wordstems, chronological list, part 2
7. Cumulative List of Wordstems with meanings for Biology 1081, part 1
8. Cumulative List of Wordstems with meanings for Biology 1081, part 2
9. Study Groups: Towards Effective Peer Education
10. Study Group Report Form
11. Newsnote Assignment and Protocol
12. First Genetics Homework
13. Second Genetics Homework
14. Healthful, inexpensive staples
15. Extra-curricular Activity Report Form
16. TGIF Volleyball Flier
### Course Objectives for Biology 1081: What you will learn and be able to apply

This course is designed for students whose program requires majors' level course in biology. This course introduces the fundamental characteristics of life, from the molecular to the cellular level, with an emphasis on structure-function relationships and placed in an evolutionary context. Topics covered include: chemicals of life, cell biology, bioenergetics, cell cycle, genetics, DNA replication, protein synthesis, and gene regulation. We will learn biological terms related to these concepts with their derivation from the Latin and Greek, the ecological ways in which these principles affect our daily lives, and how we may more effectively live in this biological world.

### Required Text

Please bring Campbell's Biology to class every day. (I also post my lecture notes online.)

Reece et al., Campbell's Biology, 12th Edition, Benjamin Cummings

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<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
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<tbody>
<tr>
<td>22-Aug</td>
<td>Introduction to Sci. Major's Course (Word stems, Newsnotes, Study Groups)</td>
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<tr>
<td>24-Aug</td>
<td>How do you know it is alive? Early History of Biology</td>
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<td>26-Aug</td>
<td>Theory: Matter is made of atoms Structure and Function of atoms</td>
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<td>29-Aug</td>
<td>Water, the medium of life: that surprising and wonderful solvent</td>
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<tr>
<td>SGR</td>
<td>FIRST TEST</td>
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<tr>
<td>44-55</td>
<td>Water ionizes: Acids, Bases, &amp; pH 56-64</td>
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<tr>
<td>5-Sep</td>
<td>LABOR DAY!</td>
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<td>7-Sep</td>
<td>Tests returned and discussed Intro to Sugars? 66-69</td>
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<tr>
<td>9-Sep</td>
<td>Macromolecules I: Carbohydrates What they are &amp; how they behave 69-72</td>
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<td>12-Sep</td>
<td>Macromolecules II: Lipids Organic hydrocarbons 72-75</td>
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<td>14-Sep</td>
<td>Phosphodiglycerides, Membranes, Emulsions, Cholesterol and Soap 74-75</td>
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<td>16-Sep</td>
<td>Macromolecules III: Proteins: polymers of amino acids 75-78</td>
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<td>19-Sep</td>
<td>Protein 2: Protein structure and function</td>
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<td>21-Sep</td>
<td>Why do you need dietary protein? Protein Complementation Lappe Chapter 4: 172-182</td>
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<td>SGR</td>
<td>SECOND TEST</td>
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<td>23-Sep</td>
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<td>26-Sep</td>
<td>Tests returned and discussed 10/6 Cell Theory: &quot;the cell is unit of life&quot; The Origins of Life 92-102</td>
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<td>28-Sep</td>
<td>30-Sep Organelles: Structure and function of cell subunits 102-123</td>
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<td>Membranes: Structure, Function &amp; Osmosis 124-139</td>
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<td>5-Oct</td>
<td>Energy in Cells: Metabolism Adenosine Triphosphate 141-161</td>
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<td>7-Oct</td>
<td>Harvesting Energy I: Glycolysis &amp; Fermentation 162-179</td>
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<td>10-Oct</td>
<td>Harvesting Energy II: Respiration &amp; the Krebs Cycle 169-183</td>
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<td>12-Oct</td>
<td>Plants: Why do they need light? What IS light, wavelength, fluorecence 185-199</td>
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<td>14-Oct</td>
<td>READING DAY...</td>
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<td>17-Oct</td>
<td>THIRD TEST 19-Oct Tests returned and discussed</td>
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<td>21-Oct</td>
<td>Photosynthesis II: Dark reactions (Intro: mitosis?) 199-208</td>
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<td>SGR</td>
<td>NEWSNOTE DUE</td>
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<td>24-Oct</td>
<td>The Cell Cycle</td>
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<td>232-249</td>
<td>Alternation of Generations</td>
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<td>252-266</td>
<td>Mitosis: exact duplicate cells</td>
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<td>26-Oct</td>
<td>Meiosis: Four unique haploid cells 252-265</td>
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<td>28-Oct</td>
<td>Introduction to Genetics: Mendel studies Peas: his two laws! 267-274</td>
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<td>31-Oct</td>
<td>Punnett Squares</td>
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<td>2-Nov</td>
<td>Inheritance of Traits and the two Laws of Probability</td>
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<td>2-Nov</td>
<td>Independent Assortment 279-291</td>
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<td>4-Nov Sex Linkage: color blindness, calico cats</td>
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<td>Linked genes are on same chromosome. 292-304</td>
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<td>275-280</td>
<td>Homework, Set 1 due</td>
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<td>7-Nov</td>
<td>NEWSNOTES DISCUSSED</td>
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<td>FOURTH TEST</td>
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<td>11-Nov</td>
<td>ARMISTICE DAY</td>
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<td>14-Nov Tests returned and discussed</td>
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<td>16-Nov</td>
<td>Human genetics: traits you may carry blood type, color blindness, etc</td>
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<td>18-Nov</td>
<td>DNA is genetic material 312-318</td>
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<td>21-Nov</td>
<td>DNA: structure &amp; function</td>
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<tr>
<td>85-89</td>
<td>Translation 23-Nov</td>
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<td>318-330</td>
<td>Replication and transcription 333-354</td>
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<td>Mutations, mutagenesis 354-373</td>
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<td>Homework, Set 2 due 333-365</td>
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<td>NEWSNOTES DISCUSSED</td>
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<td>FIFTH TEST</td>
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<td>2-Dec</td>
<td>Tests returned and discussed</td>
</tr>
<tr>
<td>9-Dec</td>
<td>FINAL EXAM, 1:30 to 3:30... Arrive prior to 1:30 to be ready for Point and Name!</td>
</tr>
</tbody>
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15-Aug-16
THE SCIENCE OF LEARNING: TRICKS OF THE TRADE OF AN EFFECTIVE STUDENT

David B. Fankhauser
14 March 2015*, revised 14 August 2016

LONG TERM MEMORY is enhanced by 1) engaged, emotional impact (think hippocampus), 2) rehearsal

1) **ENJOY AND BE ENGAGED IN THE SUBJECT.** Make an effort to be engaged, enjoy and be excited by the material and the process. If you love the subject, learning is joyful and effective. Without the love, learning can be drudgery. If you do not enjoy the material you are studying, why are you there?

2) **PHYSICAL ENGAGEMENT IN YOUR EDUCATION:**
   a. **Writing:** Take physical notes in your own handwriting, outlining major points of the lecture. The physical activity of handwriting impacts the brain's learning centers more powerfully than mere typing on a computer or audio/visual-recording/listening does.
   b. **Illustrating:** Use illustrations as often as possible. They show relationships far better than words alone. The relationships are important, your artistic ability, less so. (Remember: a picture is worth how many words?)
   c. **Classroom Behavior: BE A PARTICIPANT**
      i. **Answer questions posed.** The best class is one in which students are active participants in a dialog with the teacher. Socrates taught by using student answers to his questions.
      ii. **Engage in the process.** Ask your own questions in class whether to clarify or expand into an area of interest to you. Tie your life experiences into the material being presented. These connections will help you remember the material.
      iii. **Turn off your phone before class, DO NOT TOUCH IT DURING CLASS.**

3) **AFTER CLASS, REVIEW AND EMPLOY MULTIPLE STUDY TECHNIQUES:**
   a. **Review your notes** soon after class and fill in areas needing clarification. If you are unclear about a point, ask for clarification at the next class.
   b. **Meet with your fellow students** outside of class to discuss the material. “If you really want to learn a subject, teach it.” Explain the material to each other, repeating the major points which were made. Quiz each other. The foundation of long-term memory involves the activity of your muscles involved in speaking and writing the words and concepts, termed “engrams”
   c. **Use the “trickle-in” theory of learning.** **Discipline** yourself so that you allot about 20 minutes each night just before you go to bed: go over your notes, redraw illustrations, and learn word stems. Hours and hours of studying are not nearly as effective as frequent reviewing sessions. Studying just prior to bedtime favors consolidation of knowledge overnight.

4) **DO NOT STAY UP ALL NIGHT BEFORE A TEST TO STUDY!** Long term memory is consolidated during sleep. The most effective time to study for long term retention is just before you go to sleep. Adequate sleep is critical to learning and effective recall. “I don’t know why I did so poorly on this quiz! I studied for four hours last night until 1:00 AM!” What is wrong with this picture?

*Abstracted from a lecture delivered to the Medical Faculty at the University of Romania, Arad: Universitatea De Vest “Vasile Goldis” din Arad, Facultatea de Medicina, 14 March 2015.
HOW TO TAKE A FANKHAUSER SCIENCE MAJORS’ BIOLOGY 1081 COURSE

David B. Fankhauser, Ph.D., Professor of Biology and Chemistry
U.C. Clermont College, Batavia OH 45103
revised 10 August 2016

PREREQUISITES: You must have passed High School Biology and Chemistry with C or above within 5 years.

ELECTRONIC GADGETS: TURN OFF YOUR PHONES, PLEASE. THIS MEANS NO TEXTING IN CLASS!

COMPLETE THE READING ASSIGNMENTS PRIOR TO CLASS: In order to benefit maximally from this college course, you must possess the requisite study habits. Of value is the disciplined completion of the reading before each lecture. It will improve your comprehension, allow us more freedom for class discussions and increase our joy in teaching and learning. To slack off until test time will turn interesting assignments into drudgery.

ATTENDANCE is important and records will be kept. Missing even one class will put you out of synchrony with the class, short-change your education and doubtless cost you points on the next test.

CLASS NOTES: Do not attempt to record lecture material verbatim. Instead, concentrate on these elements:

- **TITLE:** IN CAPITALS at the left-most margin to organize each day’s notes (or new major topic section).
- **Words:** Copy all written on the board, correctly spelled. Leave space in your notes for explanations.
- **Definitions:** All key words should be defined in detail when you rework your notes.
- **Drawings:** These should be carefully copied, labeling all mentioned structures and processes or effects.
- **Textbook:** Bring it to each class. We use its illustrations and tables. Carefully note them in the text.
- **Wordstems:** List them on the last page of your notebook with their meanings. Memorize the new ones prior to each test. Note that these will comprise around 25% of each test. (See attached cumulative list.)

PARTICIPATE IN CLASS: Participation in class is critical to the proper functioning of the class. Do not hesitate to speak up. Offer answers to questions posed, ask your own questions. Challenge my statements.

REWORK YOUR NOTES AFTER EACH CLASS: Spend 15 minutes soon after class to rework the day’s draft lecture notes. Compare with your text. "Flesh out" skimpy material with detail while it is still fresh in your mind. Bring any unresolved question to the next class, because I call for such questions at the beginning of each class.

STUDY GROUPS are extremely helpful in the learning process. See separate handout, and earn points!

HOMEWORK: Homework in genetics is valuable practice at problem solving. Follow directions for full credit!

TESTS are as comprehensive as possible, worth ~110 points each (finals ~180). Use pen on all materials turned in:

- 3 or 4 essays, definitions or illustrations of key concepts or processes 5 points each
- 29 wordstems (translate the wordstem into English) .............. 1 point each
- 20 or so fill-in-the-blanks (short answer questions) .............. 2 or occasionally 3 points each
- 2 to 4 problems or illustrations on certain tests .............. 2 or 3 points each

Total: .................................................. ~110 points

**Student Number:** To ease my task of collating and entering grades, you will be assigned a number according to your place in the alphabetized class list. All class materials should carry your name and your number, (thanks).

**Grade slips** are distributed after each test showing your progress in the course. Tape them in a safe place.

HONOR CODE: I assume that students will support the honor code during testing (thank you). The class shares the responsibility of protecting the integrity of the curve. Please tell me if the honor system is being abused. (Names of offenders need not be given.) Make-up tests are given only in the event of a valid excuse, and should be rescheduled and taken before tests are returned. The penalty for taking an unexcused late test may be a deduction of 5% for that test.

**YOUR GRADE** is based upon your position on a histogram of student cumulative points, approximated by scores on:

- tests: 50%, final exam: 35%, study groups: 7%, [newnotes: 3%], homework: 5%. The class median curves to ~80%. Grades are assigned on the decimal system: 90-100% = A, 80-89 = B, 70-79 = C, 60-69 = D, <60 = failing. Within in a given grade range, the lower 1/3 = “-”, upper third = “+.” I.e., 80 to 83.3 = B-, 83.4 to 86.66 = B, 86.7 to 89.9 = B+.

Unsatisfactory test scores? See me about your study habits (listed above). You should also seek help from the Learning Lab: take your tests, notes, and books. They will help you, and may provide appropriate tutoring.

For failing students (below 60%), I will sign drop slips with a WP (without prejudice) prior to the third test. Failing students who drop after the third test will receive a WF (withdrawal failing). If you cannot complete the quarter, you must officially drop the course. In that case, pay attention to the last day to drop a course.

Your Grade for the course will be available through the registrar. Please do not telephone me about your grade.

DO A JOB OF WHICH YOU ARE PROUD.
I GUARANTEE THAT WE WILL ALL HAVE A GOOD TIME IN THE PROCESS.
The meaning of words may, at the very least, be approximated if you know their etymological origins. This is especially true for scientific terms. This principle will be emphasized during this course, and selected wordstems will appear on every test. The value of knowing wordstems is not limited to science, but is applicable to every aspect of language, and we are confident that your knowledge of them will be a valuable tool for you in understanding language for the rest of your life.

The following wordstems have been presented in the past in Bio 1081. The listing per test is _APPROXIMATE_, based on previous semester's material prior to the indicated test. Be careful to add any new wordstems given in class but not be on the list. Once presented in class, they are eligible for use on any subsequent tests. Wordstems are cumulative for the semester.

<table>
<thead>
<tr>
<th>For first test:</th>
<th>For second test:</th>
<th>For ~ third test:</th>
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<tbody>
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<td>astroph-</td>
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FOURTH TEST:

acro-

aero-
anima
cancer
carcin-
cell
chondri-
chromo-
cilium
de-
elle
-erg
eu-
flag-
kin-
hyper-
matrix
mito-
nucl-
oma
osmo-
per-
phago-
photo-
-port
pyr-
reticulo-
some
spir-
-tonic
tox-
tropy
vesicle
vita

FIFTH TEST (if there is one):

acet-
ana-
apse
aster
auto-
centesis
chela
chi-
chloro-
chrom-
chym-
-ele
cyto-
dermis
-ella
epi-
gam-
-gen
gest-
ha-
hem-
infra-
i
inter-
k-i
lambda
mater
meio-
-melan-
meta-
micro-
nito-
on
oxy-
-phloem
-photo-

FINAL EXAM:

adeno-
all-
dero-
agglut-
anemia
-blast
chiasma
cis-
d-
dis-
drome
-droso-
-emia
erythro-
filial
-gam-
gaster
-gen-
guan-
hemi-
hemo-
-hetero-
-homo-
-homunculus
-in
-ine
-iris
-juga-
karyo-
-leuko-
-lig-
-locus
-mer
-milli-
morph-
-muta-
-oma
-oo-
-pheno-
-pleio-
-Rh
-scope
-script
-semi-
sperm
-
-stasis
-terato-
thym-
-tion
-trans-
yoga
-zoan

NOTE: These lists are approximations. My intent is to test you on stems given in lecture. Refer to those given in lecture to be certain.
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<th>101-</th>
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<td>form- ant</td>
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<td>Gaia earth goddess</td>
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<td>clium</td>
<td>Galapagos giant tortoise</td>
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<td>cl-</td>
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<td>gastro- stomach</td>
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<td>-cle</td>
<td>gen- give rise to</td>
</tr>
<tr>
<td>amy-</td>
<td>co-</td>
<td>geo- earth</td>
</tr>
<tr>
<td>ana-</td>
<td>coccus</td>
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An old adage goes "If you want to really learn a subject, teach it to someone." One of the most effective means of learning a subject is to explain the material to others and to explore its significance with them. I have contrived "study groups" to encourage you to engage in this activity. It will reward you in two ways. First, you will more effectively (and enjoyably?) learn the material. Second, you will be awarded points for this activity which will be added to your cumulative points and raise your score in the course.

To form your study group, arrange with at least three and up to five persons to meet once a week to review and explore material presented in class and/or which was covered in the assigned readings. Together, "instruct your peers, and be instructed by them." As you go over your class notes, pay attention to:

1) **PRINCIPLES AND PROCESSES:** Describe and explain to each other the principles and processes related to the assigned topics.

2) **ILLUSTRATIONS:** Redraw, label and explore the significance of illustrations presented in class.

3) **TERMS:** List and redefine all terms presented in class.

4) **POSIT QUESTIONS:** Ask each other practice questions which you believe are central to the issue.

5) **WORDSTEMS:** Compare wordstem lists and drill each other on their meanings.

I am so convinced of the importance of these study group sessions that I will give students who meet these criteria 10 points per report period. This corresponds to approximately 6% of your grade for the quarter. (NOTE: if you choose not to participate in a study group, you will effectively lower your cumulative grade by 6%...)

*Please rigorously observe the honor code in your reporting.*

**Ground Rules:**

1. The study group must be composed of at least 3 and no more than 5 people who set a mutually acceptable hour to meet on a weekly basis. (Groups outside this range do not get full credit.)

2. Meet for at least one full hour in the given week.

3. Select a chairperson who will be responsible for preparing and submitting the report. At the conclusion of each session, the Chair fills in the date and hours of the study session and spells out several questions which arose during the session. The duties of the chair are listed on the report form. If the report is correctly filled in and filed, the Chair will receive one additional point per report submitted. The duties of the chair may be rotated within the group.

4. At the end of each session, each student who participated for the entire hour signs the form, testifying to the truthfulness of the report. Lastly, the Chair signs, affirming that all submitted information is correct and truthful. Strict adherence to the honor code is what makes this system work.

5. Students will receive 3 points per each full session attended, and a bonus point if all three sessions in a given report period were attended. The Chair will also receive the Chair's bonus point for timely submission of the correctly compiled report. (Up to 11 points per report for the Chair.)

6. The report must be submitted in class on the dates are listed at the top of the report form (usually prior to the administration of a test or quiz). If the Chair is not able to turn in the report on the due date, someone else should be assigned that duty. Late reports do not earn the bonus point for the Chair.
In order to earn the CHAIRPERSON’s extra point, **these responsibilities must be accomplished:**

a) **List the group members in alphabetical order** (same as numerical order of student number).
b) **Record the date, start time, and conclusion time** for each study period the group meets:
c) **At the end of each study session,** gather signatures of those students who have been present for the entire session. Indicate a student’s partial attendance or absence with a zero in the block (“0”).
d) **Tally the points:** add together 3 points/session add 1 point if they attended all three sessions during the report period. Enter the total points earned in right hand column. Add one point to your (the chairperson’s) tally. Note that this bonus point is only conferred if the report is fully and correctly filled out and submitted on time.
e) **The chairperson circles his/her name,** indicating that this is an honest record of all attendance and times.
f) **Circle the date** on which the report is due. **Hand in** just before the test is administered.

---

We, the undersigned students, by way of adhering to the honor code, do affirm by our signatures that the following is an honest record of persons who participated for the full time in each study session. Signed:

<table>
<thead>
<tr>
<th>Assigned student number in alphabetical order. (One session per week, please.)</th>
<th>Student Name</th>
<th>Signatures (please sign at the <strong>end of each session</strong>)</th>
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<table>
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<tr>
<th>Topics covered</th>
<th>Discuss course reqs</th>
<th>Review levels of organization in organisms, History of Biology.</th>
<th>Describe subatomic components, elements. Drill wordstems</th>
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Additional questions: (Use back if necessary)
Newnotes are student reports on biological “current events.” You should summarize an interesting article with a significant conclusion which you have read in addition to assigned class material. They are due several times each quarter. (See the syllabus for due dates.) Selected Newnotes will be “published,” and students whose cards are published will present them orally in class.

**APPROPRIATE TOPICS** for a newnote may cover a wide range: ecology, energy impact, lifestyle, nutrition, medicine, disease prevention, etc. Try to pick a topic which is likely to affect you and/or your classmates directly.

**SOURCES** could include reputable newspapers, magazines, scientific journals, books, etc. Be sure to accurately spell scientific terms and numerical data. If you use a web source, be certain to include the entire and correct URL. In the event of duplicate topics, preference will be given to newnotes from printed sources.

<table>
<thead>
<tr>
<th>Journal Name</th>
<th>INFORMATIVE</th>
<th>Your Name &amp; No.</th>
<th>Vol (No.): pp.</th>
<th>TITLE</th>
<th>Due Date (on syll)</th>
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<tbody>
<tr>
<td>The text goes here. Give sufficient background to show why the study is important. Describe how it was performed and its results. Give critical numbers and other data. What was the most significant conclusion? Use appropriate abbreviations, but be sure to correctly spell the full names of chemicals, species, processes, etc. Polish your grammar as well.</td>
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**FORMAT FOR NEWSNOTES:** Submit your newnote on a single 3x5 index card (no larger) filled in with the exact header illustrated to the left. It should be typed on one side only. Use at least 10 point font size so that it is easily legible. Type it up on a computer after first setting up the correct margins (2.5 x 4.5”). **Vertical orientation of the card occasionally favors publishing.** Print out the finished text, trim it down and paste it onto a 3x5 card. One point will be deducted for handwritten cards. I will select and reproduce the best Newnotes according to my (subjective) evaluation. The published sheet will be handed out at a subsequent class and students who submitted them will lead discussion on their topics.

**NOTE:** *No late Newnotes will be accepted.* (Sorry). If you know you must miss the due date, give the card to another student to turn in for you on the appointed day.

**POINTS:** At least 5 points are awarded for a typed Newnote relating to biology. Points earned on Newnotes are added to your cumulative score. All Newnotes will be posted on the Biology Bulletin Board outside of the Biology Lecture room. Please do not remove them from the board so that the entire College community may share them.

**BONUS POINTS:** If your card is published, you earn 6 points, and if yours is the lead card, you earn 7 points. To earn these bonus points, you must also be present on Newnote presentation day (see syllabus) and be prepared to make an oral presentation about your topic to the class.

**PREPARE YOUR PRESENTATION:** Research the details of your topic including, but not limited to, background information, prepared tables of data, diagrams to illustrate the topic, meaning and etymology of the words used, and implications which might interest the class. Newnote-related questions may appear on subsequent tests.

*The NEWSNOTE HEADER should include the following (see boxed illustration above):

**TOP LEFT:**
1. Name of the source of your information: newspaper, magazine, journal, book, etc.
2. Give the full reference: Volume # (if appropriate), full date, page, (or full URL).

**TOP RIGHT:**
1. Your name and assigned student number
2. The date that the Newnote is due (as it appears on the syllabus).

**CENTER:**
**TITLE IN CAPITAL LETTERS:** Succinctly but meaningfully state the conclusion of your newnote

**OFFSET THE TEXT FROM THE HEADER:**
Insert an extra return before you begin the text. Write the summary in your best, logical English. Include correctly spelled terms, appropriate numbers, precise conclusions.
BIOLOGY 1081, GENETICS HOMEWORK 1
(Revised 9 May 2016)

SHOW YOUR WORK FOR EACH PROBLEM!
You get credit for showing your work, not for just the “correct answer”.

1: Illustrate the following crosses, and give the proportions of progeny for each cross:
   a) Draw a Punnett square: a man with attached earlobes (dd) mates with a woman homozygous for detached earlobes (DD).
   b) Draw a Punnett square: Cross the F1 times the F1 of the above cross, predict the phenotypes of the progeny.

2) Two brown-eyed parents each had a parent with blue eyes. Answer these questions about their progeny:
   a) What is the name for their condition? Draw the Punnett square for their mating. What is the chance of them having a child with the blue eyes?
   b) Calculate the chances that they have two brown-eyed children in a row.
   c) They have a brown-eyed child. What is the chance that she is heterozygous?

3) What is the probability that you get three heads when you flip a penny, a nickel and a dime?

4) There is a 40% chance of snow today and a 50% chance tomorrow.
   a) What is the chance of snow both days?
   b) What is the chance of snow neither day?
(Hint: No snow one day times no snow the second.)
BIOLOGY 102, HOMEWORK 2

SHOW YOUR WORK FOR EACH PROBLEM!

You get credit for showing your work, not for just the "correct answer".

1: List all of the antibodies a person with the given blood type is certain to carry:

2: Under what circumstances do these individuals carry anti-Rh antibodies?

3: Give the phenotype of all members of a family who has a child with erythroblastosis fetalis.

4: One brother is colorblind, and the other is not. Give the phenotype of the parents, if known. From which parent did color blind gene come?

5: A cat has a litter of three kittens: two males, one black and one orange, and a black female. Draw the Punnett square. Can you say anything for sure about the phenotype of the parents?

6) A plant with genotype Aa:Bb:cc:dd:ee self pollinates. How many different gametes can be made, and what is the probability of an individual progeny with phenotype (show your work):
   a) How many different gametes can be made?
   b) probability of gamete abcde
   c) probability of gamete ABcde

7) A given sex linked trait affects 5% of males. Predict the % of females you expect to be affected.

8) A red times a white flower produces a pink flowered plant. Draw a Punnett square for a pink times a pink, and predict the proportions of progeny.
FOR BROWN RICE (etc): Kroger's carries it, but you must be sure of its freshness.

 Susan's Natural World  Saigon Food Market  Clifton Natural Foods  Whole Foods
 474-4990  721-8053  961-6111  (513) 531-8015
 8315 Beechmont Ave  119 W. Elder  169 McMillan  2693 Edmondson Rd
 (South side of Findlay Market)

TO COOK BROWN RICE: In pot with tight fitting lid:

1 cup brown rice
2 cups water
½ (to 1) teaspoon salt (according to taste)

Bring to boil, cover, simmer for 45 minutes, undisturbed.

FOR WHOLE WHEAT FLOUR AND OTHER FLOORS IN BULK:

Nagel's Mill (also called Brighton Mills), 2641 Spring Grove Ave., [They may have stopped carrying it...]
681-3175 (call first to confirm that they are open, and have whole wheat flour in stock).
They are primarily wholesale, but will sell large bags of stone-ground whole wheat flour to retail customers.

FANKHAUSER'S POPCORN SEASONING (Ingredients available at Jungle Jim's):

4 Tbl Brewer's Yeast (also called nutritional yeast)
2 Tbl Powdered Kelp
1 Tbl Salt

Mix thoroughly (If yeast is in flakes, use a blender).
Store in tightly sealed jar.

Pop 1 cup corn to make 1 gallon of popped corn over very hot fire
Coat with 2 Tbl 1:1 butter/oil mix (needed to make the seasoning stick)
Dust with 1 Tbl Seasoning. (The dark speckled ones are the tastiest.)

FOR NUTRITIONAL (OR BREWER'S) YEAST AND KELP IN BULK (call first to be sure they have them):

 Susan's Natural World  Clifton Natural Foods  Whole Foods
 474-4990  961-6111  (513) 531-8015
 8315 Beechmont Ave  169 W. McMillan  2693 Edmondson Rd

READING ON COMPLIMENTARY PROTEIN:

Please pay special attention to these charts:
173: Defining "limiting Amino Acid", and "Net Protein Utilization"
176: Net Protein Utilization Chart
179: Demonstrating Protein Complementarity
181: Protein complementation Chart

Food analysis of yeast versus several foods: (From USDA Composition of Foods)

<table>
<thead>
<tr>
<th>food</th>
<th>% protein</th>
<th>% fat</th>
<th>% carbo</th>
<th>mg Ca</th>
<th>mg phosphorus</th>
<th>mg potassium</th>
<th>mg thiamine</th>
<th>mg riboflavin</th>
<th>mg niacin</th>
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<tr>
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<td>37.0</td>
<td>1.0</td>
<td>38.4</td>
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<td>1753</td>
<td>1894</td>
<td>15.6</td>
<td>4.28</td>
<td>37.9</td>
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<td>beef, cooked</td>
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<td>0.0</td>
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<tr>
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<td>3.1</td>
<td>58.7</td>
<td>100</td>
<td>302</td>
<td>305</td>
<td>0.29</td>
<td>0.12</td>
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<tr>
<td>red beans cooked</td>
<td>7.8</td>
<td>0.6</td>
<td>21.2</td>
<td>144</td>
<td>148</td>
<td>216</td>
<td>0.34</td>
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<td>0.7</td>
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<tr>
<td>brown rice</td>
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<td>1.9</td>
<td>77.4</td>
<td>32</td>
<td>221</td>
<td>92</td>
<td>0.07</td>
<td>0.03</td>
<td>4.7</td>
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<tr>
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<td>0.4</td>
<td>80.4</td>
<td>24</td>
<td>94</td>
<td>92</td>
<td>0.44</td>
<td>~1.2</td>
<td>~16</td>
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<tr>
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<td>6.7</td>
<td>0.4</td>
<td>80.4</td>
<td>24</td>
<td>94</td>
<td>92</td>
<td>0.44</td>
<td>~1.2</td>
<td>~16</td>
</tr>
</tbody>
</table>
HINTS FOR ORAL PRESENTATIONS
Revised 15 August 2016
David Fankhauser, Prof.

1) PREPARE: Do the research so you are thoroughly familiar with your topic. You should be able to answer simple questions about the core issues. Be prepared for queries about your understanding, opinions and conclusions about the topic.

2) PRESENTATION: Have outline “talking points”, but do not read them. Speak at a full volume to be heard at the back of your audience, but in a conversational mode.

3) PROJECTED IMAGES: Use a small selection of projected images to illustrate your major points. Not too many, or the images become a blur for the audience.

4) USE THE BOARD: Draw diagrams on the board to illustrate the major points. While PowerPoint is entertaining, do not rely on it 100%. This shows that you believe in the importance of the concept.

5) Write key words on the board so they can copy them. Discuss the etymology of these so that the roots of the meaning of the words are clear.

6) CONNECT THE CONCEPTS you are presenting to previous knowledge of the audience.

7) ENGAGE: Be actively engaged in your presentation. Look the audience in the eye. Enthusiasm, personal animation and spontaneity are all tools of engagement.

8) Encourage questions from the audience so that you maintain engagement with them, and are sure that they understand your points.

9) Move around among the audience to promote the sense of engagement.

10) Make eye contact! Looking at people eye-to-eye establishes a communication pathway.

11) HAVE FUN: Relax. Smile. Acknowledge if you make an error. Admit that you do not know the answer to difficult question.

I will accept these reports until the Wednesday before Thanksgiving, but not after that date.

The points earned by extracurricular activity will be added to your score and reflected on the subsequent grade strip report.

This system is based on the honor system, and your signature below signifies that the record you are submitting is true and accurate.

By my signature, I affirm the honesty of this report:

__________________________________  ______________________
Signature                        Date