Biology 1001A October Term Test Oct 2012

Saturday, October 27
2 – 4 pm

Bring your Student Card, HB pencils and white eraser.
Room Assignments are posted in the Term Test Tab on OWL.

Tom's Office Hours :	Drop in Wed 3:00 to 5:00 pm (Rm 301G NCB);
	Online only, Fri 10 am (link on OWL)
Beth and Denis:	Contact by email or post to OWL forum.
Optional Review Sessions:	Wed. Oct. 24, 5:30 – 7:00 pm, NCB 101

The question "What do we have to know for Biology?" is a common and reasonable one for such a complex course. If the question really is "What do we have to know in order to be successful in future courses?", the answer is "As much as you can." If, however, the question really is "What do we have to know in order to be successful on Bio 1001A tests?", the answer is "As much as you can, given that some material is more likely than some other to appear on tests."

The following list of Outcomes should help to focus your preparation. This list is not necessarily exhaustive but students who command these Outcomes are more likely to be more successful. In particular, watch for Independent Study Outcomes that were not addressed in class.

Form study groups if you haven't already. This course encourages the development of independent thinking and learning skills and it is important for you now to bounce your understanding off of someone else. This provides free feedback and will help you to identify hidden problem areas before they become costly on the test.

Attend workshops offered by the Student Development Center in the UCC. Come to office hours and review sessions. Go to tutorial. Post your questions to the Form. Look over other people's posted questions. Reorganize your notes as shown in Tutorial 2. Make lists. Review the archives. Use the text. Do relevant text questions. Test your friends. Eat well. Sleep enough. Think. Think more.

Your understanding of concepts from the Lecture 2 up to, and including, Lecture 11 and 2 Labs will be tested by about up to 40 questions in multiple choice format. You can expect 3 – 5 questions to be derived from each lecture, 2 – 3 questions from each lab. Some of the grade will be earned for what you study in advance; this is the knowing part. However, some of the grade will be earned in the room by working with what you know; this is the thinking part.

Although there are no "tricks" on the Test, there is ample opportunity for you to make careless oversights. Read the "stem" of each question carefully - then read the question carefully again. *Without looking at the list of distractors,* answer the question in your own mind. Then pick the closest answer from the list of options.

Some people are unecessarily worried by the "multiple multiple" questions. These questions are your friend. These questions often provide an opportunity to earn part marks that are not

available in standard questions. Although these questions might look complicated at first glance, just approach them with a strategy. For instance, start at Answer #2, then go to Answer #3. Your thoughts on these two answers will simplify the options dramatically.

The following list of Outcomes indicates, in general, the kinds of performances that you can be expected to do in order to achieve a high grade on the Midterm. Lab Outcomes are listed in the Manual on pg. 1 and 19.

Major Outcomes for Lectures 2 through 11

In multiple choice format questions, identify the:
general mechanisms by which vaccines protect against diseases.
why developing a vaccine against HIV is relatively challenging, compared to other diseases.
why people are encouraged to get a flu vaccine each year (as opposed to one time only).

general global distribution of HIV infections.
general temporal trends in HIV infection rates.
factors that explain why no cure or universal vaccine has been developed for HIV/AIDS.
reasons why viruses are not considered “alive”.
reasons why anti-viral drug therapies often have serious side effects.
major steps in life cycle of HIV.
specific role of integrase and reverse transcriptase in retroviral life cycle.
mechanism of action of AZT.
reasons why effectiveness of AZT decreases over time.
rationale for multi-drug (drug cocktail) approach to treating viral infections.
principles of evolution of HIV: variation, heritability, differential reproduction, change in genotype of population.
role of CCR5-Δ32 mutation in human resistance to HIV infection.
global distribution of CCR5-Δ32 allele.
likely explanations of modern distribution of CCR5-Δ32 allele.
characteristics shared by all life.
way in which properties of life are "emergent".
characteristics of the "habitable zone" of a solar system.
conditions of a primitive Earth.
types of molecules that were, and were not, synthesized by the Millar-Urey experiment.
importance of liposomes in evolution of first cells.
characteristics of mimivirus that suggest it should be considered to be alive.
characteristics of virophage.
age of the Earth.
age of start of life on Earth.
domains of life.
characteristics of LUCA
characteristics shared by all domains of life.
reason why the term “prokaryote” is inappropriate.
reductive evolution explanation for rise of bacteria and archaea.
advantages of evolutionary simplification (streamlining).
relationship between homochirality and life
reasons why we think RNA was the first of the three molecules of the Central Dogma to evolve.
force that drives RNA folding.
characteristics of a ribozyme.
mechanism whereby a ribozyme cleaves RNA.
characteristics of amino transferase activity.
reasons why a ribosome is considered a ribozyme.

advantage that protein has over RNA as a catalyst.
advantage that DNA has over RNA as a repository for genetic information.
chemical basis for the advantage that DNA has over RNA as a repository for genetic information.
approximate times by which the first cells, and the first eukaryotic cells, had appeared.
two-kingdom, five-kingdom and three-kingdom (three domain) systems for classifying living things.
main characteristics distinguishing members of the Eubacteria, Archaea, Eukaryota domains of life.
meaning of horizontal gene transfer and why this makes it challenging to recreate the universal tree of life.
monophyletic vs. polyphyletic groupings of organisms.
most recent common ancestor (MRCA) for a given group(s), given a phylogenetic tree.
why the idea that “humans are descended from chimps” is inaccurate.
order of main branching events in tree of life (dates not testable).
cause of global catastrophe associated with mass extinction 65 mya.
relative proportion of protostome vs. deuterostome species.
information provided by genetic relatedness vs. traditional groupings of organisms (“reptiles”, “fish”)
distribution of multi-cellularity in tree of life.
why estimating numbers of species is uncertain.
role of similarities due to common descent (DNA genome) vs. convergence (eyes) in constructing a phylogenetic tree.
meaning of "C-value".
"paradox" or "enigma" associated with C values
meaning of haploid (n) and diploid (2n) relationship between C and n as measures of genome size.
proportion of the human genome that codes for protein.
non-nuclear genomes in typical plant and animal cells.
trend in C value from prokaryotic vs. eukaryotic cells.
relationship between C value and organismal complexity
relationship between C value and ploidy
distribution of linear vs. circular chromosomes in the various domains of life.
role of nucleosomes in DNA packaging in chromosomes
general trends in costs of DNA sequencing
relative distribution of various component of genome sequence ("junk" vs. essential DNA)
purine and pyrimidine base-pairing in DNA/RNA
outcome of the classic Meselson and Stahl experiment
direction of movement of DNA polymerase on the template strand
meaning of semi-conservative, semi-discontinuous, leading and lagging strand
general action of proteins in Fig. 12.15.
basic structure of double-stranded DNA
components necessary for DNA synthesis
direction of elongation of a given DNA strand
structure of a replication bubble
relationship between replicated DNA and metaphase chromosomes
reason why chromosomes shorten at each replication
mechanism by which telomerase adds telomeres to chromosomes
stages and main characteristics of the stages of mitosis.
stage of cell division, given a micrograph of a dividing cell.
role and mechanism of the mitotic spindle.
role of cell cycle check points.
changes in amount of DNA throughout the cell cycle
mechanisms that ensure "inheritance of sameness"
location of actively cycling cells in multicellular animals/plants
function of rapid cycling cells at various stages of the life cycle
examples of situations in which cells would be programmed to die by apoptosis
main features of each stage of mitosis with respect to cytoskeleton and chromatin
main features of chromosome anatomy
composition of microtubules, intermediate filaments and microfilaments
interaction between spindle fibers and kinetochores
role of motor proteins in chromosome segregation

Biology 1001A October Term Test Oct 2012

role of cell cycle checkpoints
implications for cell division if various components malfunction (ie. what if drugs prevent microtubule polymerization?)
mechanism of proofreading and likely result of proofreading defects
mechanism of mismatch repair
differences among insertion sequences, transposons and retrotransposons
implications of insertion of mobile elements into DNA
reasons why transposons are not actually "jumping" genes
basic structure of retrovirus genome
different types of genomic variation among humans
structure of IS elements, transposons, retrotransposons and retroviruses
types of evidence that might be useful in determining how long the human genome has been infected by a given mobile element.
mechanism by which tautomeric shifts in DNA bases leads to alternative base pairing
mechanism by which alternative base pairing gives rise to mutation during replication
characteristics of STR loci that make them useful for forensic DNA analysis (DNA fingerprinting).
mechanism of DNA recombination
stage of meiosis when recombination occurs
reason why incorrect tautomers of bases are not recognized as mismatches and removed by excision repair
mutagenic mechanism of action of base analogues such as 5 Bromouracil
mutagenic mechanism of action of UV radiation
mechanisms of repair of UV photodamage
mutagenic mechanism of in/del damage during replication
mutagenic mechanism of ionizing radiation
various types of chromosomal rearrangement resulting from attempts to repair double strand breaks
possible consequences of relocation of DNA sequences within or between chromosomes
possible advantages of gene duplication
general use of gene families to create phylogenetic trees
products of meiosis in animals vs. plants, fungi and algae
timing of meiosis in vertebrate life cycles
main differences between meiosis and mitosis
characteristics of homologous chromosomes
reason why meiosis I is "reductional" and meiosis II is "equational"
changes in C and n during meiosis
mechanism of recombination during prophase
role of cohesin and synaptonemal complex
how homolgues pair in order for all non-sister chromatids to participate in recombination
mechanism by which recombination creates new combinations of alleles
mechanism by which recombination creates copy number variation (CNV)
randomness of alignment of homologous pairs at metaphase I
relationship between distance separating genes and the likelihood of recombination between them
way in which meiosis can be thought of as a kind of DNA "repair". That is, how can you inherit mutations on both homologues of chromosome 6 but give a chromosome 6 with no mutations to your offspring?
mechanism by which errors in MI or MII give rise to aneuploid products of meiosis
arrangement of genes and alleles on homologous chromosomes in a dihybrid organism
how independent assortment creates 4 different products of meiosis from a dihybrid parent
application of the sum and product rule of probability
way in which inheritance of polygenic traits show that inheritance is not "blended"
characterisitics of Mendel's work that set him apart as a genetic researcher
components of Mendel's explanatory model
distribution of progeny, given parental genotypes in monohybrid, dihybrid and sex-linked crosses
parental genotypes, given distribution of progeny in monohybrid, dihybrid and sex-linked crosses
genetics of human ABO blood groups
location of various alleles on homologues
segregation of various alleles during meiosis
number of different gametes produced, given parental genotype

Biology 1001A October Term Test Oct 2012

What if you have a known conflict with the Term Test?

There is a Make-Up Term Test on Thursday, Nov. 1 from 6:00 to 8:00 pm in Rm 301 NCB. However, in order to qualify to write this alternative Test, you must have permission of an academic counselor associated with the Office of the Dean of your Faculty. (In Science, this Office is in Rm 191 Western Sciences Building.) You must provide the counselor with adequate documentation of your health, religious, varsity sport or compassionate conflict well in advance. Only students who have the advance permission of an academic counselor will be allowed to write the Make-Up Test.

What if you are sick at the time of the midterm?

It is best not to try to write the Term Test if you are not well enough to function properly. If you try, but then fail to finish or fail to obtain an appropriate grade, there is little that can be done to accommodate your illness. It is better to get documentation of your condition in support of a request to write a Make-up Test.

You must follow the University policy on medical accommodations. You will need to:

1. Email Ms. Jacqui Griffin (fybioadmin@uwo.ca) to inform us that you have missed the midterm because you were ill, and to indicate that you are following the instructions to request Accommodation for Medical Illness.
2. Visit a doctor immediately and acquire documentation of your illness (see the Accommodation for Medical Illness to understand what kind of documentation is acceptable).
3. Take your documentation to an Academic Counsellor in your Dean's Office.

Only students with approval from an Academic Counsellor will be permitted to write a Make-up Term Test.