

BIOLOGY 2022: Animal Biology (Spring 2009)

Course Overview

Animal Biology is an integrative course that addresses the evolution, anatomy, physiology, and ecology of animals. This course is intended for students majoring in life sciences. Students must enroll in both a lecture and laboratory section. The prerequisite for Biology 2022 is a passing grade in Biology 1010 (General Biology I). If you have not taken Biology 1010, then you must see the General Biology Director, Dr. Mark Lyford, during the first week of class, or sooner.

This course will continue to build upon the four central themes of Biology 1010—Cell and Molecular Biology, Genetics, Evolution, and Ecology of animals. By the end of the course you should be able to understand and describe in broad terms:

1. The evolution, phylogeny and diversity of animals, including
 - The evolutionary history of animals—when and how did the major animal groups evolve?
 - The relationships among animals, and how we classify them using molecular and morphological data.
 - The diversity of animals, including an appreciation and value of their diversity.
2. The ecology of animals. Note: although ecology is not included in the Lecture topics that are listed on pp. 4-5, principles of population, community, and ecosystem ecology will be integrated into the topics that are listed. For example, ecological principles will be introduced to enrich the understanding of content addressing topics 1 and 3.
 - The ecology and some behavioral biology of animals
 - The roles of animals as components of communities and ecosystems
3. The morphology and physiology of animals, including
 - The body plan of a variety of animal taxa both vertebrate and invertebrate
 - The homeostatic regulation of animal function
 - The transport and exchange of materials within an animal body
 - The genetic basis for animal reproduction and development
 - The neural and locomotor function in animals

Meeting times and locations

Section 01: TR 09:35-10:50, Classroom Building 302

Section 02: TR 11:00-12:15, Classroom Building 302

<u>Instructors</u>	<u>Instruction period</u>	<u>Office/Phone</u>	<u>Email @uwyo.edu</u>	<u>Office hours</u>	<u>Weekly study session</u>
Dr. Amy Krist	January 13– March 5	BS 411 (6-5487)	krist	Tues. 1:30 – 3:00	TBA (everyone will be polled to choose a time)
Dr. Carlos Martinez del Rio	March 10- April 30	BS 423 (6-2623)	cmdelrio	Tues. 1:30-3:00	TBA (everyone will be polled to choose a time)

Course Materials

Required materials for Biology 2022 includes

- *Biology*. Custom Edition for the University of Wyoming, by Campbell and Reece (7th edition of Biology is also acceptable)
- Clicker (CPS RF) – for sale at the Bookstore. **Instructions for registering on p. 5**
- *A Dissection Guide and Atlas to the Fetal Pig*, 2003 (Second Edition) by Smith and Schenk.
- Lab Manual for Animal Biology, 2006, by E.R. Hotchkiss.
- Dissection kit

Grading Policy

Each of the 4 lecture exams is worth 100 points. The cumulative final exam is also worth 100 points. The fourth lecture exam will be combined with the cumulative final exam. Laboratory is worth 200 points. Hence, there are 700 total points possible to be earned in lecture and lab for the course. Final course grades are based on the total points possible according to the following scale: A (90-100%), B (80-89%), C (70-79%), D (60-69%), and F (59% and below).

Laboratory

Biology 2022 is a laboratory course. Enrollment and active participation in laboratory is required. You are responsible for ensuring that you are signed up for one of the laboratory sections.

In order to pass Biology 2022, you must receive at least 60% of the points possible in lab. If you do not receive at least 60% of lab points, you will fail the course, regardless of your lecture grade.

You will not have laboratory meetings during the first two weeks of the semester. Laboratory sessions will begin the week of January 26th. You will receive a laboratory syllabus during your first laboratory meeting that will outline details concerning the lab that are not present in this document.

Lecture Exams

The first three lecture exams will be given at the dates and times listed in the detailed syllabus. The fourth exam will be combined with the final exam and will be given on May 8 from 1:15-3:15 pm. The 2 sections of the exam will be clearly marked. The final exam is **cumulative**. If your final exam score is **better** than any **one** of your lecture exam scores, we will **replace your lowest score with your final exam score** and your final exam will count twice. If your final exam score is **NOT** better than any of your lecture exam scores, it will count only once (as the final exam). Hence, the final exam is an excellent opportunity for redemption, should you perform poorly on one of the exams. **NOTE: you are REQUIRED to take the final exam; it is not optional.**

You are required to bring the following items to each exam: 1) student Campus Express ID Card, 2) an NCS Trans-Optic F4521 answer sheet (8.5 x 11 inch blue form available in the bookstore), and 3) a #2 pencil. Be sure you enter the correct P-code for your exam (this can be found at the top of your exam and will be shown on an overhead during the exam). Do not fold, crumple, or tear your answer key!

Make-up Exams

If you are unable to attend the regularly scheduled exams (Exams 1-4) for a valid reason, you may take an all-essay make-up exam **with the approval of your instructor**. Make-up exams for exams 1-3 will be given on Friday April 24th at 7:00 AM in BS 142. Please bring your student Campus Express ID Card with you to the exam.

Obtaining Your Exam

Following the exam, your answer sheet will be given to your laboratory Teaching Assistant. Exams can be obtained from your Teaching Assistant no sooner than the Thursday following the exam. You may get your exam back from your laboratory Teaching Assistant during their office hours or during the laboratory session the following week. Answer keys to the exams and a tentative grade scale will be posted in the glass displays in the hallway near BS 144. Exam grades will not be posted. If you question the validity of a test question or the accuracy of the exam key, you must bring these concerns to the attention of your lecture instructor **within 7 days of posting the exam key**. If an instructor chooses to accept alternative answers, we can re-grade each student's exam from a file that notes each student's responses.

Study Guides

We will provide study guides for each topic (see lecture topics). Study guides are a list of questions addressing the content that we expect you to know from every topic. If you have learned **detailed** answers to all of the questions on the study guides and you **understand** all of the concepts, you will be very well prepared for the exams. The only remaining hurdle to successfully completing the exams is the skill and strategy required to answer multiple choice and short answer questions. We will provide advice and strategy about answering multiple-choice questions when we answer these types of questions in class using your clickers.

For Dr. Krist's half of the course, all study guides and powerpoint slides will be posted after class at <http://www.uwyo.edu/krist/biol2022/> Dr. Martinez del Rio will also be posting the study guides at his web site (<http://uwyo.edu/cmdelrio/Site/Teaching.html>)

Email Policy

If the instructor needs to contact the class, an email will be sent to the students' UW accounts. Students should check their UW email accounts every day. We will use WyoWeb to both send personal and mass email messages. If your email address is not registered in WyoWeb, please register it as soon as possible. Email should only be used by students to set up an appointment with the instructor, or to contact the instructor in the event of an emergency. Emails will be answered within 24 hours, if at all possible. Response time may be longer over weekends or breaks. Because there are so many students in Biol 2022, if you have quick questions, please ask us before or after class. If you have questions that require a lengthy answer, or complaints and/or concerns about the course/exams, etc, please come to Office Hours. Questions pertaining to course content should be addressed to the instructor who teaches the relevant material. Please note that emails should be written in a polite manner, including a salutation (e.g. Hello Dr. Krist, Dear Dr. Martinez del Rio) and formal English.

Academic Dishonesty

Representing the work of others as your own constitutes academic dishonesty and is strictly forbidden in this course. The official University definition of academic dishonesty is: *An act is academically dishonest when it is an act attempted or performed which misrepresents one's involvement in an academic task in any way, or permits another student to misrepresent the latter's involvement in an academic task by assisting in the misrepresentation.* Further information and some specific examples of academic dishonesty can be found at: <http://uwadmweb.uwyo.edu/legal/Uniregs/ur802.htm>. All sources (whether printed or verbal) used in assignments and projects, including those located on the WEB, need to be correctly cited. If you use 5 or more words from a source just as they are used in the source, you need to put those words in quotation marks and cite the source. It is better to avoid using quotes and instead paraphrase and cite the source from which you derived the idea. If necessary, we will use electronic means to detect plagiarism. Students involved in any form of academic dishonesty can as a minimum, receive an automatic "F" in this course.

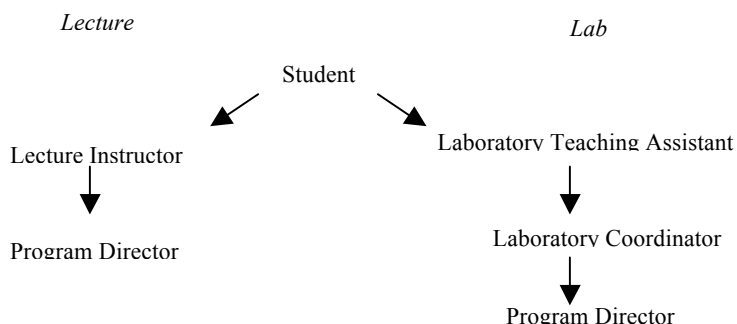
Non- Discrimination Statement

A campus environment characterized by diversity, free inquiry, and free expression has always been a top priority of the University of Wyoming. Civil discourse is an essential aspect of the search for and transmission of knowledge. Words and actions that promote and encourage self-worth, respect and dignity are consistent with the university's mission. Conversely, words or actions that reflect prejudice, stereotypes and discrimination are antithetical to the mission of the university and cannot be countenanced. Specifically, racist and other discriminatory or harassing conduct based on gender, color, disability, sexual orientation, religious preference, national origin, ancestry or age impair and disrupt legitimate university functions. Every effort, within the context and protection of the First Amendment rights, will be expended to eliminate such conduct from the campus community. Teaching students to live productively in a multicultural/multiethnic society is a process that must take place within a constructive and harmonious environment. It is the obligation of the faculty, staff, students and the administration of the University of Wyoming to provide this environment.

It is the policy of the University to accommodate students with disabilities, pursuant to federal and state law. Any student who needs accommodation because of a disability should inform the instructors at the beginning of the course. Students with disabilities who seek accommodations must contact Student Educational Opportunity Services, Knight Hall room 330, at 766-6189.

Course Questions and Concerns

Should you have questions or concerns about the course or laboratory, you should first speak with your lecture or laboratory instructor. If you feel your questions or concerns are not adequately addressed, you can meet with the next individual as portrayed below.



Lecturer on evolutionary history, diversity, and ecology of animals

Dr. Amy Krist

Department of Zoology and Physiology

BioSciences Building Room 411

766-5487

krist@uwyo.edu

Office hours: Tues. 1:30 -3:00, or by appointment, weekly study sessions, TBA

<http://www.uwyo.edu/krist/biol2022/>

Lecturer on how animals work

Dr. Carlos Martinez del Rio

Department of Zoology and Physiology

BioSciences Building Room 423

766-2623

cmderio@uwyo.edu

Office hours: Tues. 1:30 -3:00, or by appointment, weekly study sessions, TBA

<http://uwyo.edu/cmderio/Site/Teaching.html>

Director, General Biology Program:

Dr. Mark E. Lyford

Department of Botany

Aven Nelson 138C

766-2818

mahler@uwyo.edu

Laboratory Coordinator:

Beth Rintz

Department of Zoology and Physiology

Biosciences Building Room 302

766-3553 (lab) and 766-4837 (office)

brintz@uwyo.edu

Lecture Schedule:

Each line represents one topic, which is typically more than one lecture period.

Lecture Topic

Text pages

Evolutionary history, diversity, and ecology of animals (Dr. Krist: approximately 15 lectures)

The history of the earth

Taxonomy, phylogeny, major lineages of life, and the origins of eukaryotes

Not animals nor plants: the “protists”

Introduction to animals

pp. 516-531, 538-544

pp. 495-504, 523-525, 549-551

pp. 549-553, 555-558, 563-566
1159-1165

pp. 626-636

Sponges , corals and flatworms

pp. 638-648, 1166-1167

EXAM 1 on Tuesday February 10 (5-7 pm, CR rooms to be announced)

Earthworms and snails

pp. 650-655

Roundworms and bugs

pp. 655-665, 1114-1118

Sea stars and chordates: introduction and fishes

pp. 665-667,671-684,1168-1169

Chordates: amphibians and reptiles

pp. 684-691

Chordates: birds and mammals

pp. 691-702, 1106-1107

EXAM 2 on Tuesday March 10 (5-7 pm, CR rooms TBA)

How animals work (Dr. Martinez del Rio: approximately 15 lectures)

Introduction to physiology (homeostasis and negative feedback)

pp. 820-843

Animals and energy

pp. 820-843

The importance of body size

not in book

Review of enzymes and transport across membranes

review from 1010

Nutrition and digestion

pp. 844-865

EXAM 3 on Tuesday April 7 (5-7 pm, rooms TBA)

Circulation

pp. 867-884

Gas exchange

pp. 884-895

Osmoregulation and water balance

pp. 922-940

Hormones

pp. 943-960

Sex and reproduction

pp. 964-984, 1137-1157

Nervous systems

pp. 1011-1041

Skeletons and muscles

pp. 1045-1076

EXAM 4 and CUMULATIVE FINAL EXAM on May 8 from 1:15 to 3:15 pm, CR rooms TBA.

Information on Clickers

You are required to have a clicker for the course. You may use the same clicker you purchased for Biol 1010 last fall. If you do not have a clicker, you must buy one in the bookstore. Once you have your clicker **you must register your clicker before class on January 22** – this is when we will start using them in class. We have typed out the instructions for how to register your clicker and enter class information below. This information is also found on an instruction sheet in the box with your clicker. If you follow those instructions instead, please follow **Enrolling through CPSOnline** (and not Enrolling through WebCT or Blackboard).

To register your clicker, follow these directions:

- go to the website, www.einstruction.com.
- Click on the **Students** button at the top left of the window.
- Select University of Wyoming from the drop-down menu.
- Click **Choose Course**.
- Enter the Class Key **H46354I912** for section 01 (TR, 9:35-10:50) and **H46355F928** for section 02 (TR, 11:00-12:15) into the **Class Key** box.
- Enter the response pad's **serial number** in the Serial Number Box. You can find your serial number on your LCD screen when you turn on your pad; if your pad does not have an LCD screen, your serial number is either on a sticker on the back of your clicker or written just below the batteries (you will need to remove the battery cover to read this). The serial number starts with an "r".
- You do not have an enrollment/coupon code, so you will need to choose **'I do not have a code'** then continue through the registration process. You will be able to **purchase access using a credit card or personal check**. Do not type a username and password yet.
- Click **Join the Class**.

- After clicking **Join the Class**, you will need to enter a **username, password, first name, and last name**. Choose a username and password that you can easily remember and that other people are not likely to guess. **You must enter your first and last name; this is NOT OPTIONAL**. Otherwise, we only have your number and we do not know who you are.
- Click **Finish**.
- To join an additional CPSOnline class, click the **Enroll in a class** button from the main menu.
- Please make a note of the response pad number assigned to you at the end of the enrollment process for each class.
- Once you have finished enrolling in all of your classes, click **Log Out**. If you just close the window, CPS will not be able to properly record your information.

Please read “Using CPS in your class” that is written on your paper instructions that came in the box with your clicker. This will tell you about how to turn on your clicker, join the class, give your answers, etc. For any other questions you may have, call Technical support (888) 333-7532 or go to www.einstruction.com and use the **Customer Support** menu option.

A brief statement of expectations

What we expect from students:

- You will treat everyone in the class, including the professor, with the respect due to all human beings.
- You will attend every class, give your full attention to the material, and conduct yourself in an appropriate manner. For example, you will not talk, read the newspaper, or otherwise disrupt the class.
- You will turn off the ringer on your cell phone and not answer your phone during class.
- You will not leave or prepare to leave class until the class is dismissed.
- You will read the syllabus carefully, familiarize yourself with the procedures of the course, and agree to do the work outlined in the syllabus on time.
- You will only use email in a polite and appropriate way. To learn the appropriate use of email for this course, you will read the Email Policy (page 3) carefully and comply to it.
- You will acknowledge that previous academic preparation (e.g., math prerequisites, and BIO 1010) will affect your performance in this course.
- You will acknowledge that your perception of effort, by itself, is not enough to justify a distinguished grade.
- You will not plagiarize or otherwise steal the work of others.
- You will not make excuses for your failure to do what you ought.
- You will accept the consequences -- good and bad -- of your actions.

What you can expect from Dr. Krist and Dr. Martinez del Rio:

- We will treat you with the respect due to all human beings.
- We will not discriminate against you on the basis of your identity or your well-informed viewpoints.
- We will manage the class in a professional manner. That may include educating you in appropriate behavior.

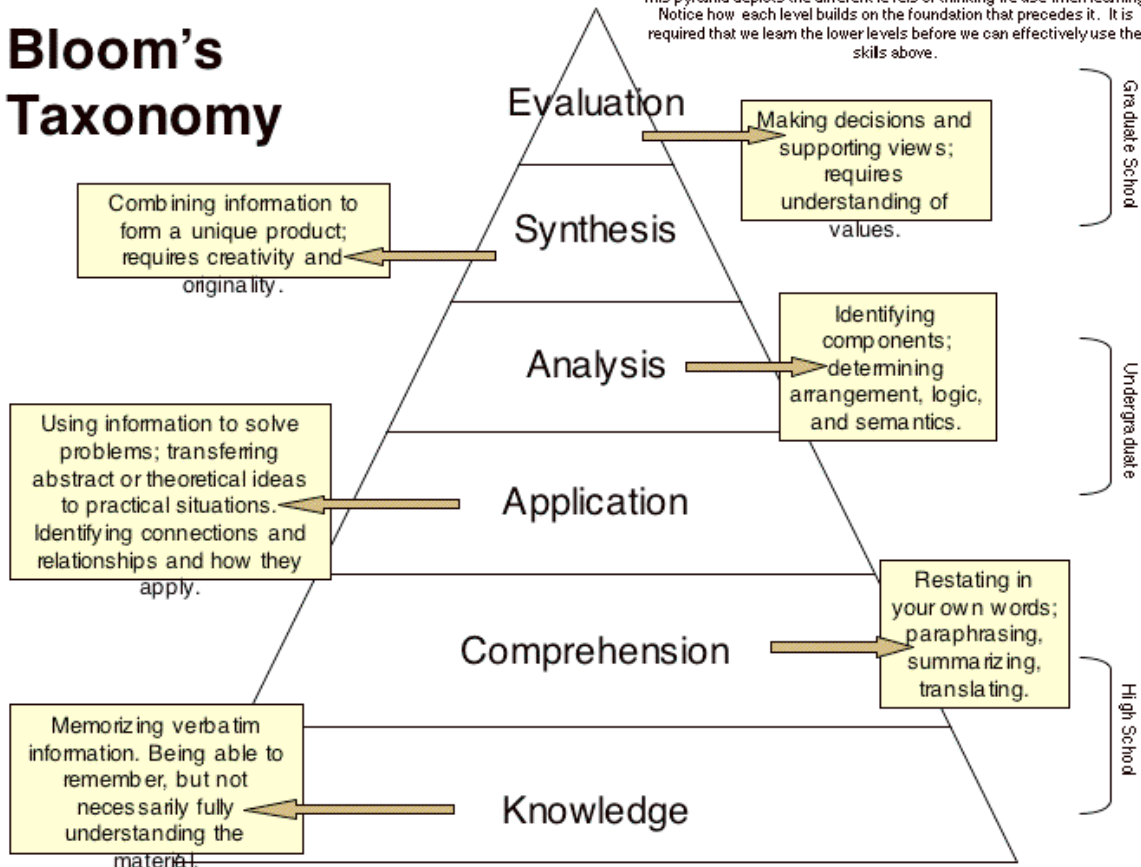
- We will prepare carefully for every class.
- We will begin and end class on time.
- We will respond to emails within 24 hours during the week. Response time may be longer over weekends or breaks.
- We will teach only in areas of our professional expertise. If we do not know something, we will say so.
- We will keep careful records of your performance, and progress.
- We will make ourselves available to you for help or advice in office hours, and if your schedule conflicts with office hours we will meet you by appointment.
- We will be honest with you.
- Your grade will reflect the quality of your work and nothing else.
- We are interested in your feedback about the class, but we are much more interested in what you learned than how you feel.
- We will pursue the maximum punishment for plagiarism, cheating, and other violations of academic integrity.
- We will conduct scholarly research and publication with the aim of making ourselves more informed teachers.

For additional information on how students and instructors should work together, please see

<http://uwadmnweb.uwyo.edu/a&s/Current/Students&TeachersWorking%20Together.doc>

Bloom's Taxonomy

This pyramid depicts the different levels of thinking we use when learning. Notice how each level builds on the foundation that precedes it. It is required that we learn the lower levels before we can effectively use the skills above.



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Sample questions labeled by level in Bloom's Taxonomy

Each question is labeled to indicate the level of thinking that it addresses according to Bloom's Taxonomy. Please see page 8 describing Bloom's Taxonomy. In brief, **Level 1** are knowledge questions (memorization questions), **Level 2** are comprehension questions (restate in your own words), **Level 3** are application questions (solve problems, transfer ideas to new situations, identify connections), and **Level 4** are analysis questions (identify components, determine arrangement and logic). Blooms taxonomy also has 2 higher levels of thinking, but we do not ask questions at those levels in this 2000 level course. You can expect that the majority of the questions will be Level 1, followed by Level 2, 3 and 4.

Sample questions from 1st half of the course (Dr. Krist):

Examples of Level 1 questions:

Choose the correct association:

- a. Anthozoa - jellyfish
- b. Trematoda - fluke
- c. Cestoda - sponge
- d. Hydrozoa - coral
- e. Scyphozoa - sea anemone

Schistosomiasis:

- a. leads to extensive scar tissue from trapped parasite eggs.
- b. is contracted by drinking cysts in the water.
- c. is caused by tapeworms living in the digestive tract.
- d. is caused by protists.
- e. changes the behavior of infected hosts.

Which of the following statements is TRUE?

- a. Photosynthesis first evolved around 6.5 billion years ago.
- b. The first multicellular eukaryotes appeared about 1.3 billion years ago.
- c. The earth is about 8.5 billion years old.
- d. The first unicellular eukaryotes appeared about 3.5 billion years ago.

To which group do tapeworms NOT belong?

- a. Animalia
- b. Cestoda
- c. Platyhelminthes
- d. Eukarya
- e. Trematoda

Prokaryotic cells

- a. do not have a well defined nucleus
- b. have chloroplasts
- c. have well defined cytoplasmic organelles
- d. never have tough cell walls

Red tides are caused by a species of

- a. dinoflagellate
- b. apicomplexan
- c. ciliate
- d. Paramecium
- e. Amoebozoa

Examples of Level 2 questions (from Short answer portion of exam):

Explain the **TWO** major differences between a photoheterotroph and a chemoautotroph and give an example of each.

Give **TWO** explanations for why a more accurate name for the “tree of life” is the “sea fan of life”?

Examples of Level 3 questions:

Black oaks *Quercus velutina* and white oaks *Quercus alba* hybridize in nature and produce healthy, fertile offspring. According to the biological species concept are these trees different species?

- a. There is not enough information to answer.
- b. Yes
- c. No
- d. Partially, but not completely different species.

You discover a new species of protist that contains many organelles. Upon closer inspection you observe that the mitochondria and chloroplasts possess two plasma membranes and another organelle (a plastid) contains three plasma membranes. According to this information you conclude:

- a. the protist is a member of the Alveolata.
- b. the mitochondria, chloroplasts, and the other organelle (plastid) originated from primary endosymbiosis.
- c. the mitochondria, chloroplasts, and the other organelle (plastid) originated from secondary endosymbiosis.
- d. the mitochondria and chloroplasts originated from primary endosymbiosis and the other organelle (plastid) originated from secondary endosymbiosis.
- e. the mitochondria and chloroplasts originated from secondary endosymbiosis and the other organelle (plastid) originated from primary endosymbiosis.

A parasitic platyhelminthes, called *Dicrocoelium*, infects both ants and cows. The parasite alters the behavior of the ant causing it to climb to the tops of grass blades right during the time of day when cows are grazing on the grass. What is a possible explanation for this altered behavior of the ant?

- a. The alteration of the ant's behavior is a defense by the ant to increase the likelihood of the ant's survival.
- b. The parasite manipulates the ant's behavior so that the parasite will survive in the ant.
- c. The change in the ant's behavior will increase the chances that the parasite gets to continue living in the ant.
- d. The change in the ant's behavior increases the likelihood that the parasite will infect the next host in its life cycle (a cow).
- e. The change in the ant's behavior is a side-effect of infection by the parasite and has no effect on the parasite's fate.

Sample questions from 2nd half of the course (Dr. Martinez del Rio):

Examples of Level 1 questions:

Fish have _____, and birds have _____

- a) two-chambered hearts, four-chambered hearts
- b) two-chambered hearts, three-chambered hearts
- c) three-chambered hearts, four-chambered hearts
- d) four-chambered hearts, two-chambered hearts
- e) three-chambered hearts, two-chambered hearts

The respiratory system of terrestrial insects depends on _____ and that of aquatic ones on _____

- a) lungs, tracheae
- b) tracheae, lungs
- c) book lungs, gastrovascular system
- d) gills, lungs
- e) tracheae, gills

ADH is secreted by

- a) the posterior pituitary
- b) the pancreas
- c) the corpora cardiaca
- d) the hypothalamus
- e) the kidney

Insulin is secreted by _____, whereas glucagon is secreted by _____.

- a) beta cells of the pancreas, alpha cells of the pancreas
- b) alpha cells of the pancreas, beta cells of the pancreas
- c) pancreatic acini, beta cells
- d) pancreatic ducts, islets of Langerhans
- e) the adrenal gland, the pancreas

Which one of these statements is **FALSE**:

- a) the sympathetic division of the nervous system is part of the somatic nervous system
- b) The parasympathetic generally causes calming/self-maintenance functions
- c) the sympathetic regulates to arousal/energy generation fight or flight situations.
- d) The enteric division innervates the gut, pancreas, and gallbladder.
- e) The autonomic division of the nervous system is part of the PNS

Examples of Level 2 questions:

A patient returning from tropical Africa has the following volumes of blood cells and plasma in a 50 microliter blood sample: Blood cells 25 μ l, plasma 25 μ l. What is her hematocrit?

- a) 25%
- b) 75%
- c) 50%
- d) 35%
- e) 75%

The body fluids of Marine sharks are _____ relative to sea water
Marine bony fish _____ are relative to **fresh water**

- a) hyper-osmotic, hypo-osmotic
- b) hypo-osmotic, hyper-osmotic
- c) hypo-osmotic, hypo-osmotic
- d) hyper-omotic, hyper-osmotic
- e) hyper-osmotic, iso-osmotic

Increased concentration of arginine vasopressin in plasma leads to

- a) diuresis
- b) increased H₂O permeability of the apical membrane of cells in the collecting duct
- c) decreased H₂O permeability of the apical membrane of cells in the collecting duct
- d) production of large volumes of dilute urine
- e) dehydration

Examples of Level 3 questions:

A shrew (*Sorex exactus*, 8.0 g) has a heart rate equal to 1000 beats per min. The cardiac output of this shrew is 10 mL/min. What is this shrews stroke volume?

- a) 0.1 mL/beat
- b) 1 mL/beat
- c) 10 mL/beat
- d) 0.01 mL/beat
- e) 1 μ L/beat

Prolactin is a hormone that mediates parental affiliative behavior. Jacanas are simultaneous polyandrous birds. During incubation you should expect the levels of prolactin to be _____ in males than females.

- a) lower
- b) higher
- c) the same

The plasma osmolality of humans and kangaroo rats is about the same (≈ 300 mOsm/kg of fluid). However, the U/P ratios of these two species differ vastly. In humans maximal U/P ratios are about 5 whereas those of some kangaroo rats can be as high as 16. What is the maximal concentration of urine in humans and kangaroo rats? Show your calculations.

Examples of Level 4 questions:

If humans lose more than 20% of their body fluids by dehydration they die. A 60 kg person in the desert lost 10% of her total body water when she was found. She originally had 24 liters of water in the intracellular space and 12 in the extracellular space. During dehydration, mammals “defend” (i.e. maintain relatively constant) the volume of the intracellular fluid compartment. Estimate the volume of extracellular fluid of this person after dehydration, show all your calculations.

Biol 2022, Animal Biology, SYLLABUS CONTRACT

SPRING 2009

Name (PRINT):

Major:

I, the undersigned, declare that I have received, read and understood the course syllabus. I agree to abide by its terms.

Signature:

Date:

Please hand this in to your lab instructor during your first laboratory meeting.

Thank you,

Dr. Krist

Dr. Martinez del Rio

