

BIOL 1108 Principles of Biology II (4 credits)

Instructor: Dr. Theresa J. Grove

Office: BC 1099

Office hours: Tuesday 9:30-11:00am; Monday 9:00-10:30am. or by appointment

Email: tjgrove@valdosta.edu

Lecture (BC 1024)

Tuesday and Thursday 8:00-9:15 a.m.

Lab (BC 2040)

Section A: W 10:00 a.m. -12:50 p.m.

Section B: W 2:00 - 4:50 p.m.

Prerequisite

BIOL 1107 or permission of the instructor.

Description

An introduction to physiological processes in plants and animals. Structure, nutrition, transport, coordination, reproduction, and development will be addressed

Course goals and objectives

The primary goal of this course is to introduce physiological processes of plants and animals. This is the second introductory course, and it is expected that the student is familiar with topics covered in BIOL1107. By the end of the semester students should have sufficient background to successfully complete higher level courses that will cover specific topics in much greater detail.

The Department of Biology seeks to help develop general skills, such as communication skills and information processing skills. Communication skills will be exercised through library assignments and write-ups of lab activities. Information processing skills will be developed because of the nature of biology. A lot of information will be given to students in a relatively short period of time, and students are expected to retain this information, not only for the final classes, but for future courses.

Learning goals include:

- Understanding physiological of the major systems in both plants and animals that include:
 - Structure/function relationships
 - Nutrition
 - Transport
 - Movement
 - Reproduction
 - Development
 - Sensory systems
- Learning common experimental tools and techniques used in physiology
- Strengthening your ability to think critically and process information and data

These goals support the Department of Biology Education Outcome #2, #3 and #5 and VSU General Education #5.

Textbook

Life: The Science Biology 8th edition. Sadava *et al.* (2008) ISBN 978-0-7167-7671-0

Attendance

Attendance in lecture is expected by all students, and it will be recorded to determine patterns of attendance, which may be considered when determining borderline grades. Attendance in laboratory is mandatory; see lab policy below.

Access to Slides/Information

Lecture handouts will be made available in lecture and will be available on BlazeView when possible. Lecture slides will also be posted on BlazeView; these slides will not have all the information on them. It is the student's responsibility to come to class and take notes. Students are responsible for getting the notes from other students if they miss a lecture.

Lecture Conduct

- Arrive on time.
- Turn off cell phones during class and lab; there is no reason you should be texting or calling anyone.
- Don't talk during lecture; if you don't understand something or didn't hear something ask.
- Unless it's an emergency (and using your cell phone does not constitute an emergency) do not get up in the middle of lecture, leave and come back.
- Do not leave class early unless you have informed me prior to the start of the class or if it's an emergency.
- During exams NOBODY can leave the exam and re-enter the exam room.
- Food and drink are allowed during lecture as long as it's not disruptive to the class.

Lab Conduct

- Arrive on time. Quizzes will be handed out at the beginning of lab, and the class will have ~10 minutes to finish the quiz. Students who arrive late will have a shorter amount of time to take the quiz. Students who completely miss the quiz will receive a zero and will not be able to make it up.
- No eating or drinking during the lab.
- Attendance is mandatory. Excused absences are usually given for medical emergencies and documentation must be provided; the professor determines whether or not an absence is "excused" or not. One unexcused absence is allowed. For each subsequent unexcused absence, 3% points will be deducted from the student's FINAL grade. Except under extenuating circumstances, labs cannot be made up outside of scheduled laboratory sessions. Students are still responsible for all lab content even if they received an excused absence
- Students must take care of lab equipment. Notify the professor if something is not working properly or if something breaks during the course of the lab. Microscopes will be assigned to individual students; failure to properly care for and put away the microscopes will result in 1 point being subtracted from total number of points available during the semester (not final grade percentage).
- Labs are available online on BlazeView. It is your responsibility to print out the labs and bring with you. No copies of the lab will be available in lab.
- Cell phones are not allowed to be used in lab with the exception of using them as timers when necessary.

Withdrawing from the course

The last day to withdraw without penalty is October 8, 2009. If you don't officially withdraw, and instead just stop coming to class, you will receive an F for the course.

Academic conduct

Cheating and plagiarism will not be tolerated and may result in a failing grade for the assignment, exam or the class. The Department of Biology has a plagiarism policy, which can be found on the department's webpage.

Privacy Act (FERPA)

The Family Educational Rights and Privacy Act (FERPA) prohibits the public posting of grades by social security number or in any manner personally identifiable to the individual student. No grades can be given over the telephone, as positive identification can not be made by this manner.

Students with disabilities

Students requiring special accommodations because of disability must discuss their needs with me as soon as possible. Those needing accommodations who are not registered with the Special Services Program must contact the Access Office for Students with Disabilities located in room 1115 Nevins Hall. The phone numbers are 245-2498 (voice) and 219-1348 (tty).

Grades

Grades will be based on:

Exams (4 at 100 pts each)	400 points
Final	200 points
Lab Assignments and Quizzes	125 points
Total Points	725 points

Grade Scale

For Biology majors, a grade of C or higher is required for this course.

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	< 60

Exams

All exams will be multiple choice exams. Review sheets with topics on which the students will be tested will be handed out prior to the exam. The dates for the exams are included in the Tentative Class Schedule. Note, that these are TENTATIVE, therefore the professor reserves the right to adjust the dates of the exams. Make-up exams are available for students with approved reasons, but these exams will be more challenging than the original exam, and the format may also be different. Students must contact me via email on the day of the exam for approval (NO PHONE CALLS) and are required to make-up the exam within 2 days of the missed exam. I reserve the right to not approve a missed exam as well as to require documentation of the reason why the exam is missed. Only students with a University related excuse may take an exam early.

Final

The final will be cumulative and will have a format similar to the other exams. The date of the final is Wednesday, December 9 (10:15 a.m. -12:15 p.m.). **NO EARLY EXAMS WILL BE GIVEN!**

Lab assignments and Quizzes

Throughout the semester lab quizzes and assignments will be given. Quizzes will be announced and will consist of questions from the previous lab. Usage of microscopes or specimens that were examined in the previous lab are fair game. Information on lab assignments will be handed out in lab and will involve analysis of laboratory exercises. Due dates for each of the assignments will be announced.

TENTATIVE LECTURE SCHEDULE

August	
18	Intro and Chapter 28: Seedless Plants
20	Seedless Plants (cont'd) and Chapter 29: Evolution of Seed Plants
25	Evolution of Seed Plants (cont'd) and Chapter 34: The Plant Body
27	The Plant Body (cont'd)
September	
1	Chapter 35: Transport in Plants
3	Transport in Plants (cont'd) and Chapter 36: Plant Nutrition
8	EXAM 1
10	Plant Nutrition (cont'd) and Chapter 37: Regulation of Plant Growth
15	Regulation of Plant Growth (cont'd)
17	Chapter 38: Reproduction in Flowering Plants
22	Reproduction in Flowering Plants (cont'd)
24	Chapter 39: Plant Responses to Environmental Challenges
29	EXAM 2
October	
1	Chapters 31-33: Animal Diversity
6	Animal Diversity (cont'd)
8	Chapter 40: Homeostasis in Animals
13	Homeostasis (cont'd) and Chapter 41: Animal Hormones
15	Animal Hormones (cont'd) and Chapter 42: Animal Reproduction
20	No Class
22	Animal Reproduction (cont'd)
27	Chapters 44 and 46: Nervous Systems
29	Nervous Systems (cont'd) and Chapter 45: Sensory Systems
November	
3	Sensory Systems (cont'd) and Chapter 47: Muscles
5	Muscles (cont'd) and Chapter 48: Gas Exchange
10	EXAM 3
12	Gas Exchange (cont'd) and Chapter 49: Circulatory System
17	Circulatory System (cont'd) and Chapter 50: Nutrition and Digestion
19	Nutrition and Digestion (cont'd) and Chapter 51: Salt and Water Balance
24	Salt and Water Balance (cont'd)
26	No Class
December	
1	Catch up and Review
3	EXAM 4

TENTATIVE LAB SCHEDULE Note: Many of the labs involving plants will be conducted over multiple weeks.

August 19	Introduction
August 26	Diversity of Non-Tracheophytes (Seedless Plants)
September 2	Diversity of Tracheophytes (Vascular Land Plants)
September 9	Plant Anatomy-Roots, Stems and Leaves
September 16	Angiosperm Development
September 23	Angiosperm Development (cont'd)
September 30	Angiosperm Development (cont'd)
	Water Movement and Mineral Nutrition in Plants
October 7	Water Movement and Mineral Nutrition in Plants (cont'd)
	Plant Responses to Stimuli
October 14	Water Movement and Mineral Nutrition in Plants (cont'd)
	Plant Responses to Stimuli (cont'd)
	Diversity of Porifera, Cnidaria and "Worms"
October 21	Plant Hormones (cont'd)
	Molluscs, Arthropods, Echinoderms and Chordates
October 28	Animal Tissues
	The Basics of Animal Form: Skin, Bones, and Muscles
November 4	Circulatory System
November 11	Gas Exchange and Respiratory Systems
November 18	Digestive, Excretory and Reproductive Systems
November 25	No Lab
December 2	Nervous and Sensory Systems

Topics Covered on GRE Biology Subject Test

The approximate distribution of questions by content category is shown below.

I. Cellular and Molecular Biology (33-34%): Introduced in BIOL 1107

Fundamentals of cellular biology, genetics, and molecular biology are addressed. Major topics in cellular structure and function include metabolic pathways and their regulation, membrane dynamics and cell surfaces, organelles, cytoskeleton, and cell cycle. Major areas in genetics and molecular biology include chromatin and chromosomal structure, genomic organization and maintenance, and the regulation of gene expression. The cellular basis of immunity and the mechanisms of antigen-antibody interactions are included. Distinctions between prokaryotic and eukaryotic cells are considered where appropriate. Attention is also given to experimental methodology.

II. Organismal Biology (33-34%): Introduced in BIOL1108

The structure, physiology, behavior, and development of plants and animals are addressed. Topics covered include nutrient procurement and processing, gas exchange, internal transport, regulation of fluids, control mechanisms and effectors, and reproduction in autotrophic and heterotrophic organisms. Examples of developmental phenomena range from fertilization through differentiation and morphogenesis. Perceptions and responses to environmental stimuli are examined as they pertain to both plants and animals. Major distinguishing characteristics and phylogenetic relationships of selected groups from the various kingdoms are also covered.

A. Animal Structure, Function, and Organization (10%)

1. Exchange with environment
 - Nutrient, salt, and water exchange
 - Gas exchange
 - Energy
2. Internal transport and exchange
 - (circulatory, gastrovascular, and digestive systems)
3. Support and movement
 - Support systems (external, internal, and hydrostatic)
 - Movement systems (flagellar, ciliary, and muscular)
4. Integration and control mechanisms
 - Nervous and endocrine systems
5. Behavior (communication, orientation, learning, and instinct)
6. Metabolic rates (temperature, body size, and activity)

B. Animal Reproduction and Development (6%)

1. Reproductive structures
2. Meiosis, gametogenesis, and fertilization
3. Early development (e.g., polarity, cleavage, and gastrulation)
4. Developmental processes (e.g., induction, determination, differentiation, morphogenesis, and metamorphosis)
5. External control mechanisms (e.g., photoperiod)

C. Plant Structure, Function, and Organization, with Emphasis on Flowering Plants (7%)

1. Organs, tissue systems, and tissues
2. Water transport, including absorption and transpiration
3. Phloem transport and storage
4. Mineral nutrition
5. Plant energetics (e.g., respiration and photosynthesis)

D. Plant Reproduction, Growth, and Development, with Emphasis on Flowering Plants (5%)

1. Reproductive structures
2. Meiosis and sporogenesis
3. Gametogenesis and fertilization
4. Embryogeny and seed development
5. Meristems, growth, morphogenesis, and differentiation
6. Control mechanisms (e.g., hormones, photoperiod, and tropisms)

E. Diversity of Life (6%)

1. Archaea
2. Bacteria (including cyanobacteria)
3. Protista
4. Fungi
5. Animalia with emphasis on major phyla
 - Major distinguishing characteristics
 - Phylogenetic relationships
6. Plantae with emphasis on major phyla
 - Alternation of generations
 - Major distinguishing characteristics
 - Phylogenetic relationships

III. Ecology and Evolution (33-34%)

This section deals with the interactions of organisms and their environment, emphasizing biological principles at levels above the individual. Ecological and evolutionary topics are given equal weight. Ecological questions range from physiological adaptations to the functioning of ecosystems. Although principles are emphasized, some questions may consider applications to current environmental problems. Questions in evolution range from its genetic foundations through evolutionary processes to their consequences. Evolution is considered at the molecular, individual, population, and higher levels. Principles of ecology, genetics, and evolution are interrelated in many questions. Some questions may require quantitative skills, including the interpretation of simple mathematical models.

Physiology Related Topics Covered on MCAT

<p>SPECIALIZED EUKARYOTIC CELLS AND TISSUES</p> <p>A. Nerve Cell/Neural</p> <ol style="list-style-type: none"> Cell body (site of nucleus and organelles) Axon (structure, function) Dendrites (structure, function) Myelin sheath, Schwann cells, oligodendrocytes, insulation of axon Nodes of Ranvier (role in propagation of nerve impulse along axon) Synapse (site of impulse propagation between cells) Synaptic activity <ol style="list-style-type: none"> transmitter molecules synaptic knobs fatigue propagation between cells without resistance loss Resting potential (electrochemical gradient) Action potential <ol style="list-style-type: none"> threshold, all-or-none sodium–potassium pump Excitatory and inhibitory nerve fibers (summation, frequency of firing) <p>B. Muscle Cell/Contractile</p> <ol style="list-style-type: none"> Abundant mitochondria in red muscle cells (ATP source) Organization of contractile elements (actin and myosin filaments, cross bridges, sliding filament model) Calcium regulation of contraction, sarcoplasmic reticulum Sarcomeres (—I and —A] bands, —M] and —Z] lines, —H] zone—general structure only) Presence of troponin and tropomyosin <p>C. Other Specialized Cell Types</p> <ol style="list-style-type: none"> Epithelial cells (cell types, simple epithelium, stratified epithelium) Endothelial cells Connective tissue cells (major tissues and cell types, fiber types, loose versus dense, extracellular matrix) <p>NERVOUS AND ENDOCRINE SYSTEMS</p> <p>A. Endocrine System: Hormones</p> <ol style="list-style-type: none"> Function of endocrine system (specific chemical control at cell, tissue, and organ levels) Definitions of endocrine gland, hormone Major endocrine glands (names, locations, products) Major types of hormones <p>B. Endocrine System: Mechanisms of Hormone Action</p> <ol style="list-style-type: none"> Cellular mechanisms of hormone action Transport of hormones (bloodstream) Specificity of hormones (target tissue) Integration with nervous system (feedback control) <p>C. Nervous System: Structure and Function</p> <ol style="list-style-type: none"> Major functions <ol style="list-style-type: none"> high-level control and integration of body systems response to external influences sensory input integrative and cognitive abilities Organization of vertebrate nervous system Sensor and effector neurons Sympathetic and parasympathetic nervous systems (functions, antagonistic control) Reflexes <ol style="list-style-type: none"> feedback loop, reflex arc, effects on flexor and extensor muscles roles of spinal cord, brain efferent control <p>D. Nervous System: Sensory Reception and Processing</p> <ol style="list-style-type: none"> Skin, proprioceptive and somatic sensors Olfaction, taste Hearing <ol style="list-style-type: none"> ear structure mechanism of hearing Vision <ol style="list-style-type: none"> light receptors eye structure visual image processing <p>CIRCULATORY, LYMPHATIC, IMMUNE SYSTEMS</p> <p>A. Circulatory System</p> <ol style="list-style-type: none"> Functions (circulation of oxygen, nutrients, hormones, ions, and fluids; removal of metabolic waste) Role in thermoregulation Four-chambered heart (structure, function) Systolic and diastolic pressure Pulmonary and systemic circulation Arterial and venous systems (arteries, arterioles, venules, veins) <ol style="list-style-type: none"> structural and functional differences pressure and flow characteristics Capillary beds <ol style="list-style-type: none"> mechanisms of gas and solute exchange mechanism of heat exchange Composition of blood <ol style="list-style-type: none"> plasma, chemicals, blood cells erythrocyte production and destruction (spleen, bone marrow) 	<ol style="list-style-type: none"> regulation of plasma volume coagulation, clotting mechanisms, role of liver in production of clotting factors Oxygen and carbon dioxide transport by blood <ol style="list-style-type: none"> hemoglobin, hematocrit oxygen content oxygen affinity Details of oxygen transport: biochemical characteristics of hemoglobin <ol style="list-style-type: none"> modification of oxygen affinity <p>B. Lymphatic System</p> <ol style="list-style-type: none"> Major functions <ol style="list-style-type: none"> equalization of fluid distribution transport of proteins and large glycerides return of materials to the blood Composition of lymph (similarity to blood plasma; substances transported) Source of lymph (diffusion from capillaries by differential pressure) Lymph nodes (activation of lymphocytes) <p>C. Immune System: Innate and Adaptive Systems</p> <ol style="list-style-type: none"> Cells and their basic functions <ol style="list-style-type: none"> macrophages, neutrophils, mast cells, natural killer cells, dendritic cells T lymphocytes B lymphocytes, plasma cells Tissues <ol style="list-style-type: none"> bone marrow spleen thymus lymph nodes Basic aspects of innate immunity and inflammatory response Concepts of antigen and antibody Structure of antibody molecule Mechanism of stimulation by antigen; antigen presentation <p>DIGESTIVE AND EXCRETORY SYSTEMS</p> <p>A. Digestive System</p> <ol style="list-style-type: none"> Ingestion <ol style="list-style-type: none"> saliva as lubrication and source of enzymes epiglottal action pharynx (function in swallowing) esophagus (transport function) Stomach <ol style="list-style-type: none"> storage and churning of food low pH, gastric juice, protection by mucus against self-destruction production of digestive enzymes, site of digestion structure (gross) Liver <ol style="list-style-type: none"> production of bile roles in nutrient metabolism, vitamin storage roles in blood glucose regulation, detoxification Bile <ol style="list-style-type: none"> storage in gallbladder function Pancreas <ol style="list-style-type: none"> production of enzymes, bicarbonate transport of enzymes to small intestine structure (gross) Small intestine <ol style="list-style-type: none"> absorption of food molecules and water function and structure of villi production of enzymes, site of digestion neutralization of stomach acid structure (anatomic subdivisions) Large intestine <ol style="list-style-type: none"> absorption of water bacterial flora structure (gross) Rectum (storage and elimination of waste, feces) Muscular control <ol style="list-style-type: none"> sphincter muscle peristalsis <p>B. Excretory System</p> <ol style="list-style-type: none"> Roles in homeostasis <ol style="list-style-type: none"> blood pressure osmoregulation acid–base balance removal of soluble nitrogenous waste Kidney structure <ol style="list-style-type: none"> cortex medulla Nephron structure <ol style="list-style-type: none"> glomerulus Bowman’s capsule proximal tubule loop of Henle distal tubule collecting duct 	<ol style="list-style-type: none"> Formation of urine <ol style="list-style-type: none"> glomerular filtration secretion and reabsorption of solutes concentration of urine countercurrent multiplier mechanism (basic function) Storage and elimination (ureter, bladder, urethra) <p>MUSCLE AND SKELETAL SYSTEMS</p> <p>A. Muscle System</p> <ol style="list-style-type: none"> Functions <ol style="list-style-type: none"> support, mobility peripheral circulatory assistance thermoregulation (shivering reflex) Structural characteristics of skeletal, smooth, and cardiac muscle; striated versus nonstriated Nervous control <ol style="list-style-type: none"> motor neurons neuromuscular junctions, motor end plates voluntary and involuntary muscles sympathetic and parasympathetic innervation <p>B. Skeletal System</p> <ol style="list-style-type: none"> Functions <ol style="list-style-type: none"> structural rigidity and support calcium storage physical protection Skeletal structure <ol style="list-style-type: none"> specialization of bone types; structures joint structures endoskeleton versus exoskeleton Cartilage (structure, function) Ligaments, tendons Bone structure <ol style="list-style-type: none"> calcium–protein matrix bone growth (osteoblasts, osteoclasts) <p>RESPIRATORY SYSTEM</p> <p>A. Respiratory System</p> <ol style="list-style-type: none"> General structure and function <ol style="list-style-type: none"> gas exchange, thermoregulation protection against disease, particulate matter Breathing mechanisms <ol style="list-style-type: none"> diaphragm, rib cage, differential pressure resiliency and surface tension effects <p>SKIN SYSTEM</p> <p>A. Skin System</p> <ol style="list-style-type: none"> Functions in homeostasis and osmoregulation Functions in thermoregulation <ol style="list-style-type: none"> hair, erectile musculature fat layer for insulation sweat glands, location in dermis vasoconstriction and vasodilation in surface capillaries Physical protection <ol style="list-style-type: none"> nails, calluses, hair protection against abrasion, disease organisms Structure <ol style="list-style-type: none"> layer differentiation, cell types, tissue types (epithelial, connective) relative impermeability to water <p>REPRODUCTIVE SYSTEM AND DEVELOPMENT</p> <p>A. Reproductive System</p> <ol style="list-style-type: none"> Male and female reproductive structures and their functions <ol style="list-style-type: none"> gonads genitalia differences between male and female structures Gametogenesis by meiosis Ovum and sperm <ol style="list-style-type: none"> differences in formation differences in morphology relative contribution to next generation Reproductive sequence (fertilization, implantation, development, birth) <p>B. Embryogenesis</p> <ol style="list-style-type: none"> Stages of early development (order and general features of each) <ol style="list-style-type: none"> fertilization cleavage blastula formation gastrulation <ol style="list-style-type: none"> first cell movements formation of primary germ layers (endoderm, mesoderm, ectoderm) neurulation Major structures arising out of primary germ layers <p>C. Developmental Mechanisms</p> <ol style="list-style-type: none"> Cell specialization <ol style="list-style-type: none"> determination differentiation tissue types Cell communication in development Gene regulation in development Programmed cell death
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