First day business for BIOL 1407—check items as you complete them—tear off and return this page to instructor at end of first day class

Name:

_____Verify your enrollment—sign in (on roll sheet)

_____Note that extensive use of blackboard is REQUIRED for this course
_____I have used blackboard before
_____I have not used blackboard before

_____Understand pre-requisites' importance; students must have recent grasp of all these subjects and must write ONE SENTENCE demonstrating some knowledge of each:

mitosis

meiosis

respiration

photosynthesis

cellular organelles

protein synthesis

_____Meet potential lab partners. All laboratory work for this course requires teamwork and your lab partners are extremely important to your success—see next sheet

_____Describe how pre-requisites have been met. When and where did you take Biol 1406? What was your final course grade?

_____Note that safety training is required for participation in course

_____Note that safety procedures and lab notebook are required at all class meetings

_____Note overview of syllabus and schedule

_____Fill out back of this page to communicate your plans as a scientist (or not)

Name

Please tell me something about your career plans (unless you consider them private). Knowing something about your plans can help me tailor the course to your needs.

Please tell me something about your history in dealing with living things; Have you raised pets? Kept a vegetable garden? Maintained an aquarium? Dealt with serious disease? Observed ecological beauty? Observed ecological catastrophe? Hunted or fished or backpacked in wilderness?

Do you have any particular expectations or hopes for this course?

C ircle all applicable statements and display this like a billboard sign while mingling and trying to put together a team.

I can make EXCEL spreadsheets—simple ones at least.

I am familiar with simple digital cameras in addition to cell phone cameras.

I am familiar with more than one Web browser. NAME THEM:

I am fluent in an additional language to English. Which?

I took Biol 1406 (bio 1) at ACC. Which campus? When?

I have used a student grade spectrophotometer (Spec 20).

I am comfortable using a standard microscope.

I like to keep my work area neat and well organized.

I have lots of experience with email, including use of attachments.

I can bring a digital camera (in addition to cell phone) to class.

I can bring a laptop computer to class.

I have used the ACC library for more than one project.

I have personal experience in:

- Aquarium set-up and maintenance
- Home vegetable gardening
- Kennel or herd or zoo maintenance
- Agricultural or horticultural work
- Health care professions--including pharmacy
- Wildlife biology/Nature parks/ hunting/fishing

I have used ACC's "Blackboard" system

Lab teams will differ in divisions of labor and responsibilities, but here is a suggestion for an initial division of responsibilities among four people. This is NOT a required organization, just a default template intended to aid in establishing a quick start on our labs.

Quantitative data functions—needs spreadsheet and numerical confidence; plans, generates, records and maintains numerical data
Who in your group can do this?

Qualitative data functions—takes primary responsibility for non-numerical data like photos, descriptions, vouchers (specimen records)
Who in your group can do this?

Manipulator of materials and equipment—sufficiently dexterous to lead in assembly of materials, preparation of solutions, operation of equipment
Who in your group can do this?

Planning and strategic resource management—predicts actions and resources needed; arranges for work to progress smoothly; general design of final report of work
Who in your group can do this?

All students are expected to acquire all these skills; not only do scientists generally need them, but students frequently drop out or fail to perform and teammates are forced to cover for an absent member.

Syllabus (subject to correction and updating)

Structure and Function of Organisms Biol 1407

This syllabus is for the following section(s):

28541 Lec 001 RVS RVSA 2242 T 2:50pm- 5:30pm
Lab RVS RVSA 2242 Th 2:50pm- 5:30pm

Safety procedures, laboratory notebooks and portable "stick memory" are required at all meeting times of this course—both lecture and laboratory meetings. Attendance at all class meetings is mandatory. There are no excused absences.

Instructor: Steve Bostic
Office hours: M, T, W, Th 1:15pm—2:50pm
By appointment on Fridays 9am—4pm

Conferences are arranged by phone contact, email, or simply drop-in
My office is RVS 2244 (If I'm not in office please check classrooms 2242 and 2219—often I am in them after or before class.)

Office telephone is 512-223-6685

Email is bostic@austincc.edu (I generally check email during office hours only. Use it for short communications only, please.)

Course description: From ACC's catalog:

"**BIOL 1407 STRUCTURE AND FUNCTION OF ORGANISMS (4-3-3).** General biology course designed for science majors and students with a strong science background who desire an in-depth approach to biological topics. An introduction to the diversity, anatomy, physiology, reproduction, development, behavior, and evolution of living organisms. Includes prokaryotes, protists, fungi, plants, and animals. BIOL 1407 and 1409 may not both be counted toward graduation. Fee: $24 Insurance: $3.50Skills: G Prerequisites: BIOL 1406 with a minimum grade of C. ( ) Course Type: T"

Additional description from your instructor:

This class is for students majoring in some area of science. You must have background in cellular biology, chemistry and math before taking this course. ACC has another organismal biology course for non-science majors that is more appropriate for students with a weak chemistry or math background. The pre-requisite of BIOL 1406 is strictly enforced.

Also, this class is very time consuming. **You must attend every class meeting.** In addition, you will need to devote a great deal of time outside class to study and laboratory work. Many people have extensive family and work commitments and simply do not have time available to succeed in a course this demanding. If you cannot devote a lot of time, do not take this course.

Prerequisites: BIOL 1406 with minimum grade of C—STRICTLY ENFORCED
Required text/supplies:

(1) Biology by Campbell and Reece is the required text. You will be expected to read the required chapters in this text. It is generally available at the ACC bookstore. (2) You also will need a laboratory notebook **of a certain style**. This will be further described in class and in this syllabus. (3) Each student should have a small set of inexpensive colored pencils to facilitate certain projects and presentations. (4) Each student is required to have a computer "memory stick" (recommend 2 gigabyte) that must be brought to every class meeting. (5) All students will be required to utilize computers during this course; several will be available in the classroom, but students are encouraged to bring their own if that is possible. (6) All students will be required to utilize digital photography during this course (cell phone camera is adequate); several cameras will be available in the classroom, but students are encouraged to bring their own if that is possible.

Much information will be presented in lecture or assigned from the world wide web that is not in textbook readings. You are entirely responsible for this material and it will be represented extensively on exams.

Instructional methodology:

This course will blend traditional informal lecture and laboratory work with computer-based classroom management and instruction. Do not think that simply reading the textbook will "cover" material for exams. All students are absolutely required to participate fully in computer-based work, group work, and laboratory work in addition to traditional lecture-like presentations.

Laboratory work comprises a considerable portion of this class. You will be expected to develop certain laboratory skills and you may be tested on them. Laboratory - related exams will be included with unit exams and laboratory content is incorporated with lecture content during exams. Also, you will be required to maintain a laboratory notebook, which will comprise a portion of your final course grade. Some laboratory exercises involve dissections—likely organisms to be dissected include: moss, fern, lycopod, flowering plant, earthworm, lobster, rat, mushroom.

Course rationale:

This course intends to provide a substantial introduction to modern organism level biology with considerable chemical, mathematical, and laboratory components. Most students not majoring in scientific disciplines will find this course too rigorous for their needs. (They probably should consider enrolling in BIOL1409 instead of this.) All students taking this course will be assumed to be preparing for professional careers in science, engineering or health care; acquisition of good laboratory practice--not simply knowledge--is required.

Common course objectives information: See attached information.

Course evaluation/grading scheme:

Four exams will be given: three unit exams and one, required, comprehensive final exam; Your final course grade will be calculated by taking these four numbers and averaging them: the two highest unit exam scores (your lowest unit exam score is dropped), the final exam score, the laboratory notebook score. **Note that lab notebook and final exam are not drop-able.** Your course grade will be assigned according to the following schedule:

average	grade
90 - 99	A
80 - 89	B
70 - 79	C
60 - 69	D
0 - 59	F

Exam format:

As a general rule, unit exams and the comprehensive final exam will be given during class time and generally will be of the multiple-choice, machine graded type. Students are required to bring a number 2 pencil to all exams. Material covered during laboratory periods will be included with lecture material on unit exams. Exams will have strict time limits. Students starting exams late loose time for themselves.

Missed exams cannot be "made up" regardless of the cause for the miss. If you miss an exam, you receive a grade of 0 for that exam.

Exam dates:

Dates and chapter assignments are subject to change when unforeseen circumstances occur; as exam dates draw near, consult with instructor about exam content. Estimated times this semester follow.

Reading assignments from textbook
And exam dates (subject to change)

Dates and chapter assignments are subject to change. When exam dates draw near, consult with instructor about exam content and exact dates of exams. Dates below are estimates; Note that textbook chapter numbers do not coincide with course unit numbers and neither corresponds with lecture outline numbers.

Unit 1
Campbell **(7th)** Chapters 22, 23, 24, 25, 26, 29, 30, 35, 36, 37, 38, 39 handouts, power-points, etc
Campbell **(8th)** Chapters

Time: Unit 1 requires about 6 weeks in a 16-week session.
Estimated exam date for this semester: Feb 26—March 4, 2009

Unit 2
Campbell **(7th)** Ch. 32, 33, 34, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49 handouts, power-points, etc
Campbell **(8th)**

Time: Unit 2 requires about 6 weeks in a 16-week session.
Estimated exam date for this semester: Apr 14—21, 2009

Unit 3
Campbell **(7th)** Chapters 26, 27, 28, 31, handouts, power-points, etc
Campbell **(8th)**

Time: Unit 3 requires about 4 weeks in a 16-week session.
Estimated exam date for this semester: May 11—14, 2009
Estimated final exam date for this semester: May 11—14, 2009

Note that your last week of the semester probably will be particularly stressful. Our last scheduled class meeting will be the cumulative, not-drop-able, final exam. Very near this time will be your third unit exam. Thus, in this course alone, you probably will have two major exams in a single week. During this week, instructor's office hours may be REDUCED, particularly when final exams have started.

Missed exam policy:

Missed exams cannot be "made up" regardless of the cause for the miss. If you miss an exam, you receive a grade of 0 for that exam. Please do not ask to take an exam at any time other than with the class for which you are registered. This is not allowed. You are absolutely required to start each exam “on time”.

Late work policy:

Missed exams and labs cannot be "made up" regardless of the cause for the miss. If you miss an exam or lab, you receive a grade of 0 for that item. Students normally will not be allowed to start class activities more than10 minutes after assigned time.

Attendance policy:

By far the most important factor affecting grades is attendance. If you miss class, your final course grade probably will be affected adversely. It does not really matter whether the reason for missing is a good one or a bad one. Material will be covered in class that is not in the textbook and this material will be on the exam. If you miss as many as two classes, you should drop this course. Do not miss class.

Please do not worry about offering explanations to your instructor if you miss class. Your instructor does not distinguish between “good” and “bad” reasons for missing class. (I do not know how to make such a distinction.)

Statement on organisms from biology department policy:

Most ACC biology classes, particularly those with laboratory components, use actual organisms during instruction in addition to images and models. ACC students generally are preparing for real-world careers requiring workers with hands-on experience. These careers include health care, veterinary work, horticultural and agricultural work. Other students plan to transfer to four-year colleges and will be participating in biological research where hands-on experience is equally important.

Organisms used at ACC are fundamental in biology instruction and they are utilized to teach specific skills and knowledge. Their condition and usage varies from course to course. Students will be expected to actively participate in these activities. Students with particular concerns in this matter should consult with their instructor and/or departmental officials before enrolling in a laboratory course so that they can know what will be required of them.

Some organisms are observed alive while others are dead and preserved in various ways. Student manipulation of organisms ranges from culturing living organisms to dissecting preserved ones. Some examples include, but are not limited to: bacterial culturing for microbiology courses; cat, pig or rat dissection for anatomy courses; skeleton and pelt examination for field biology; and use of frogs in physiology experiments.

Class participation expectations:

All students are expected to participate fully and ON TIME in all parts of this course. There are no “make-ups” for laboratory exercises or exams. If you miss class, you miss material. Note, however that your lowest grade on a unit exam is automatically dropped. This is your “safety net” and it is a generous one and it is accorded to all students equally.

During class, questions and discussion pertinent to the subject of the class are encouraged and expected, but private, personal chats during class are not allowed. Students who persist in private conversations not pertinent to the class may be asked to leave the room. Students should refer to their student handbook for a fuller discussion of disciplinary procedures regarding disruption of classes.

Students are allowed (encouraged, in fact) to tape-record lectures, but recorders must be handled quietly and unobtrusively. Do not wait until lecture has started to check your tape to see if it is full, to unwrap new tapes, to experiment with recording levels, etc. Do not ask your instructor to operate your equipment for you.

Students are expected to utilize ACC's "Blackboard" system during this course. IN addition, students will be expected to utilize ACC's new email service to receive announcements concerning this course. Clearly, computer access and usage is required for this course. Students who do not own a computer can utilize ACC computers in various library and computer centers across the college.

Withdrawal policy:

Your instructor is not responsible for withdrawing you from this course if you fail to attend class meetings or in any other way fail to progress in this course, but he retains the right to do so. Your instructor specifically informs you of the possibility of withdrawing you for any of the following reasons: frequent non-attendance; disruption of class activities; failure to meet course pre-requisites; general inability or unwillingness to participate in class.

If you want to withdraw, go to admissions and records office and withdraw formally. No grades of "I" (incomplete) will be given. Students should check college calendar for last day to withdraw--instructor's deadline is same as college's deadline.

Reinstatement policy: Withdrawn students are not reinstated.

Incomplete grade policy: No grades of "I" will be given.

Course specific support services: General tutoring is available in RVSG 9100 (the "learning lab"). A "study lab" is generally available in RVSA 2233. Check with both services for exact hours and services.

Lecture schedule/outline:

An important lecture outline is a separate document. It will be subject to modification through this semester, however.

Lab schedule/outline:

See separate document. Laboratory material is integrated with lecture material. Dates are subject to change when unforeseen circumstances occur.

Statement on scholastic dishonesty:

This course has been structured so that no single exam need "make or break" a student's grade. In the academic world this is unusually generous. Furthermore, students are assumed to be honest and honorable unless demonstrated otherwise. Unfortunately, there have been enough incidents of scholastic dishonesty in classes that it seems important to make some rules of behavior clear at the beginning of the course.

For any student caught in any form of scholastic dishonesty, I shall recommend the maximum penalty allowed by ACC policy. For further information on your rights to appeal and the policies followed by the college, consult your student handbook.

The following information is copied from the biology department master syllabus:

"Acts prohibited by the college for which discipline may be administered include scholastic dishonesty, including but not limited to, cheating on an exam or quiz, plagiarizing, and unauthorized collaboration with another in preparing outside work. Academic work submitted by students shall be the result of their thought, research or self-expression. Academic work is defined as, but not limited to, tests, quizzes, whether taken electronically or on paper; projects, either individual or group; classroom presentations; and homework."

Statement on students with disabilities: (The following information is copied from the biology department master syllabus.)

"Each ACC campus offers support services for students with documented physical or psychological disabilities. Students with disabilities must request reasonable accommodations through the Office of Students with Disabilities on

the campus where they expect to take the majority of their classes. Students are encouraged to do this three weeks before the start of the semester."

"Students who are requesting accommodation must provide the instructor with a letter of accommodation from the Office of Students with Disabilities (OSD) at the beginning of the semester. Accommodations can only be made after the instructor receives the letter of accommodation from OSD."

Statement on academic freedom: (The following information is copied from the biology department master syllabus.)

"Institutions of higher education are conducted for the common good. The common good depends upon a search for truth and upon free expression. In this course the professor and students shall strive to protect free inquiry and the open exchange of facts, ideas, and opinions. Students are free to take exception to views offered in this course and to reserve judgment about debatable issues. Grades will not be affected by personal views. With this freedom comes the responsibility of civility and a respect for a diversity of ideas and opinions. This means that students must take turns speaking, listen to others speak without interruption, and refrain from name-calling or other personal attacks."

Statement on safety policy: (The following information is copied from the biology department master syllabus.)

"Health and safety are paramount values in science classrooms, laboratories and field activities. Students are expected to learn, understand and comply with environmental, health and safety (EHS) procedures and protocols, and must agree to abide by the ACC science safety policy. Students are expected to conduct themselves with appropriate professional behavior and with respect and courtesy to all. Anyone who thoughtlessly or intentionally jeopardizes the health or safety of another individual will be immediately dismissed from the day's activity, may be withdrawn from the class, and/or barred from attending all activities. Specific safety information for each activity will be discussed at the beginning of the activity. For those activities that require specific safety training, a student who is late and misses the safety training will not be able to participate in the activity. The comprehensive science safety policy can be found at: http://www.austincc.edu/sci_safe/.

In addition to the standard information above, your instructor advises you that persons with delicate health conditions should consult their physician before taking this course. The room contains hazardous materials (you receive hazardous materials training) and potential allergens. Persons with sensitive immune systems, environmental chemical sensitivities, or who are pregnant should give extra consideration to the hazardous nature of this lab room.

Testing center policy: The following information is copied from the biology department master syllabus, although this course does not utilize the testing center in its ordinary testing:

ACC Testing Center policies can be found at: http://www2.austincc.edu/testctr/

Student services: (The following information is copied from the biology department master syllabus.)

The web address for student services is: http://www3.austin.cc.tx.us/evpcss/rss/Default.htm.

The ACC student handbook can be found at: http://www3.austincc.edu/evpcss/handbk/toc.htm.

Instructional services: (The following information is copied from the biology department master syllabus.)

The web address is: http://www3.austincc.edu/evpcss/memos/reference.htm, then click on "Campus Based Student Support Overview".

Some additional information and comments from your instructor:

In many ways, learning biology is like learning a foreign language. You will encounter many terms with technical meanings and you will be expected to develop the ability to use and understand them. An excellent way to learn terms is to use them; try to develop a "study group" where you can talk and use terms often.

Be aware that your attitude toward this large amount of difficult material has a major impact on both you and those around you. Students generally have far more power in the classroom than they realize and should use all their social skills to increase the effectiveness of their learning experience. Your likelihood of success in this course greatly increases if you have a “can do” attitude toward the class and if you help others as they struggle with course material.

A “good attitude” is usually very helpful, but it is not the basis for your grade. Your grade is based on your actual performance on exams and in laboratory.

Teaching philosophy of Steve Bostic

Teachers’ most lasting lesson to their students is attitude -- attitude toward people, attitude toward subject, and attitude toward education in general. Concepts, factual information and skills have much shorter residence in students’ brains than attitudes cued from admired teachers.

I strive for students to perceive from me that my attitude toward them is business-like caring and consistent demand for highest quality performance. I want them to become important players in biology, not simply competent workers. I want them to sense that I am observing their performance, thinking about it and pushing it in directions that are appropriate. Perhaps a good analogy would be that I strive to function for an academic like a personal trainer functions for an athlete.

I strive for students to perceive from me that my attitude toward biology is one of passion and critical awareness. I want students to love our subject but not to be slavish followers of it. Biology’s role in human affairs – and increasingly in all Earth’s functions – should be a recurring consideration in all biologists’ minds.

I strive for students to perceive from me that my attitude toward education in general is that more is better and broader, also, is better. Many students arrive in my courses looking for job training (they get some) but I hope they leave my courses wanting to relate all areas of human thought to the scientific study of life.

Biology Lab Safety Rules and Information

Health and safety are paramount values in science classrooms, laboratories and field activities. You are expected to learn, understand and comply with ACC environmental, health and safety procedures and agree to follow the ACC science safety policy. You are expected to conduct yourself professionally with respect and courtesy to all. Anyone who thoughtlessly or intentionally jeopardizes the health or safety of another individual will be immediately dismissed from the day's activity, may be withdrawn from the class, and/or barred from attending future activities. Specific safety training will take place before most activities. If you are late and miss this training, you will not be able to participate in the activity. You can read the complete ACC science safety policy at: *http://www2.austincc.edu/sci_safe/*.

Emergencies

- If there is a fire, major chemical spill or other emergency call the ACC Police Dispatch as soon as possible. Tell the officer your campus and exact location in the building.
  Location of nearest ACC phone: _____
  ACC POLICE DISPATCH: 222 (from an ACC phone)
  223-7999 (from a mobile or other phone)
- If evacuation is necessary, go to the designated rally point away from this building.
  Directions to nearest exit: _____
  Location of rally point:_____

Safety Equipment and Information:

- Information about chemicals used in this laboratory can be found in Material Safety Data Sheets (MSDSs) and in a chemical inventory located _____ _____.
- The emergency gas shut-off for this lab is located: _____. Shut off the gas immediately if gas nozzles or valves are damaged, or if there is a fire.
- Fire extinguishers are located: (1) _____.
  (2) _____.
  To use a fire extinguisher, pull the pin in the handle and squeeze the handle while pointing the nozzle at the base of the flame.
- Fire blankets are located: (1) _____.
  (2) _____.
  If you are on fire, stop, drop and roll. Let someone else to get the fire blanket.
- A safety shower is located _____.
  If you spill a significant quantity of chemical, especially an acid or base on yourself immediately stand under the shower and pull the handle. Disrobe. The instructor will evacuate the room and close the doors for your privacy. Someone of your gender will stay to help you. Stand under the shower for at least 20 minutes. You will be given clothing after the shower.

- An eyewash is located _____.
  If a chemical is splashed or rubbed into your eyes you must use an eyewash for at least 20 minutes with your eyes held open. Someone will help you with this.
- If a person is experiencing electrical shock from touching wires or equipment, use a belt or other non-conducting material to pull them away from the electrical source.
- First aid kits are located: (1) _____.
  (2) _____.
  Only minor cuts and burns will be treated in the lab. Serious injuries must be treated in a medical facility. Emergency Medical Services (EMS) will be called if you are injured and are unable to take yourself to a medical facility.

Dress code and personal protective equipment (PPE)

- While in the lab you must wear closed-toed shoes.
- In lab activities involving chemicals, you must wear long pants or skirts (below the knee) or a lab apron/coat (provided).
- You must wear goggles or safety glasses marked ANSI Z87.1 when directed to do so by the lab instructor or lab safety instructions. You must bring your protective eyewear with you to every lab class. If you forget your eyewear and the lab room does not have a pair to loan to you, you will not be able to participate in the lab and may forfeit your lab grade for that day. ACC cannot guarantee that loaned safety glasses or safety goggles are uncontaminated by microbes or chemicals.
- Wearing contact lenses in the lab is strongly discouraged. Students wearing contact lenses must wear safety goggles instead of safety glasses.
- You must tie back any long hair in labs involving open flames.
- Gloves are provided and can be worn for any lab activity; Your instructor will inform you when gloves are required rather than optional.
- For your safety, we recommend that you:
  - avoid wearing loose clothing, especially long, loose sleeves.
  - wear natural fiber clothing because synthetic material melts onto skin in a fire.
  - remove watches, rings, and bracelets during lab activities involving chemicals.

Waste disposal

- For chemical wastes, there are (i) flammable, (ii) inorganic, and (iii) solid waste containers located _____.
- For other wastes, there are containers for
  - biohazards - located_____
  - glass - located _____
  - other trash - located _____
- You must precisely follow the waste disposal procedures. Never dispose of anything in lab without prior direction from the instructor.

Lab conduct

- DO NOT
  - horse around or perform unauthorized experiments.
  - eat, drink, or chew (tobacco or gum)
  - bring drinks or food (even in closed containers) into the lab.
  - pipet by mouth.
  - taste chemicals, or directly smell chemical fumes.
- You shall follow all procedures in manuals, in handouts, and as given by the instructor.
- You must store backpacks, coats, and other personal items (located _____) . We recommend that you bring as few items to lab as possible.
- Report broken glass and chemical spills to your instructor immediately.

Lab hygiene

- You must clean up your individual work area/equipment and community work areas/equipment (e.g., sinks, balances).
- You must put lids back on bottles and containers immediately after use.
- Do not put excess chemicals back into original containers.
- Only dispose of chemicals and waste as directed by the instructor.
- Wash hands prior to leaving lab.

- Always assume the chemicals used in lab are corrosive or irritating. Any time chemicals come in contact with your skin, wash the affected area immediately.

Labeling

- You must label containers/test tubes if you are using more than one container per lab.
- Inform your instructor immediately if a label is damaged in any way.
- Read all labels and pay special attention to hazard information.

Disease

Blood-borne diseases, such as HIV and hepatitis, can be transmitted from person to person through contact with human blood. Follow the Universal Precautions whenever exposure to human body fluids is possible:

- Consider all body fluids (saliva, blood, urine, feces, vomit) as potentially infected.
- Do not touch or come into contact with anyone else's body fluids.

Academic Resume for Stephen Reid Bostic, Ph.D.

Education: Doctorate in Botany;1981; The University of Texas at Austin
Bachelor of Science, magna cum laude;1975; Birmingham-Southern College, Birmingham, Alabama with two majors--biology and religion

Professional Employment:
Biology Faculty (Professor) at Austin Community College, Austin, Texas, 1979-present
Assistant Dean, Mathematics and Sciences, 1999
Department Chair, Austin Community College, 1997 .
Summer Fellow, Harvard University, Cambridge, Massachusetts, program in history and philosophy of science, sponsored by the National Endowment for the Humanities, 1985.
Department Head, Biology Department, Austin Community College, Austin, Texas, 1984-1986.
Instructor, University of Texas at Austin, Botany Department, 1980.
National Science Foundation Graduate Fellow, The University of Texas at Austin, Botany Department, 1976-1979.
Research Assistant, The University of Texas at Austin, Botany Department, worked with sea-grass and estuary ecosystems, 1979.
Teaching Assistant, The University of Texas at Austin, Botany Department, assisted in two different courses in plant ecology
Undergraduate Researcher, The Savannah River Ecology Laboratory of The Savannah River Plant, Aiken, South Carolina; worked with ecosystems damaged by radiation and high temperatures, 1975.
Technical Assistant for preparation of an environmental impact statement as part of a proposed uranium enrichment facility near Dothan, Alabama, 1974.

Scientific publications and papers delivered:
1981, Field and Laboratory Studies of Some Central Texas Hepatics and Phaeoceros, Doctoral Dissertation, The University of Texas at Austin, 278 pp.
1981, "Laboratory induction of sexuality in Asterella tenella," The Bryologist, Spring 1981, pp. 89-92.
1979, "Laboratory induction of sexuality in Asterella tenella," American Bryological and Lichenological Society Abstracts of Contributed Papers, August 1979, p.5. Paper delivered before the society in 1979.
1978, "Media controlled morphogenetic changes and growth rates in Reboulia hemisphaerica and Marchantia domingensis," American Bryological and Lichenological Society Abstracts of Contributed Papers, June 1978, p.2. Paper delivered before the society in 1978.
1976, "Allelochemical Germination Interactions in Typha latifolia and Typha domingensis," in the ASB Bulletin, vol. 23, no. 2, April 1976, p.45. Paper delivered before the Association of Southeastern Biologists in 1976.

Scholarships, Honors, and Fellowship Positions:
1996, NISOD award for teaching excellence, Austin Community College
1985, National Endowment for the Humanities Summer Fellowship at Harvard University
1976-1979, National Science Foundation Graduate Fellowship at The University of Texas
1975, Atomic Energy Commission Undergraduate Research at The Savannah River Plant
1971-1975, Phi Beta Kappa Scholarship at Birmingham-Southern College
1971-1975, National Merit Scholarship at Birmingham-Southern College
1971-1975, Gorgas Science Foundation Scholarship at Birmingham-Southern College

Membership in honorific societies: Phi Beta Kappa (Birmingham-Southern College); Omicron Delta Kappa (Birmingham-Southern College); Phi Eta Sigma (Birmingham-Southern College); Phi Kappa Phi(University of Texas); Fellows of the Graduate School (University of Texas)

Research experience: ecology, morphology and reproductive processes in mosses and liverworts; estuary and sea-grass ecosystems; population regulation mechanisms in ferns; thermal ecology; vegetation analysis; allelopathy

Professional memberships: American Bryological and Lichenological Society; American Institute of Biological Sciences; American Association for the Advancement of Science; American Horticultural Society; Botanical Society of America; Royal Horticultural Society (London); Texas Community College Teachers Association

Protocols for Laboratory Records in this Course

Almost all scientific research today is conducted in laboratory facilities that are shared by many workers. Usually these workers need to communicate efficiently and effectively with each other; they depend on each other's results and preparations for their own results and preparations. For this to be possible, labs generally have rigid procedures for work habits and records. These procedures are called "protocols" and a skill you need to acquire in this course is your ability to conform to a rigid set of laboratory protocols.

General Information about Laboratory Notebooks

In scientific circles, a laboratory notebook is NOT simply a place to jot one's thoughts, items one wants to remember, or feelings about life. A collection of paper like that is called a journal. (Scientists often keep journals, too.) By contrast, a laboratory notebook is a non-spontaneous, permanent document of activities or observations (or plans or results) created at the same time as the activity or observation.

Laboratory notebooks are prepared not only as a record for the worker's future reference, but also to be convincing records when examined under duress. For example, a worker has had an accident or fallen ill; a researcher needs to know the exact date something was observed; a co-worker needs to know exactly what was done yesterday; a court of law demands evidence that something happened a certain way on a certain day.

While neatness is desirable in a laboratory notebook, it is definitely not nearly as important as immediacy. Never take data on a scrap of paper and later transfer the numbers to a notebook; take the data into the notebook and, if necessary, re-copy onto another page in the book.

Never erase, white-out, or completely scratch through anything in a laboratory notebook. Mistakes should be indicated by a single line marked through the error.

Pages should be numbered in a continuous series throughout a laboratory notebook and should be used in sequence. Never remove any pages from such a book. Most laboratory notebooks have sewn-in pages that are pre-numbered so that any removal of pages is obvious.

Materials added into a lab notebook, computer print-outs, for example, must be fastened securely and neatly so that a vigorous shake does not cause them to fall.

Your Laboratory Notebook for this Course

Quadrille ruled--looks like graph paper
Sewn-in pages
At least 100 pages
Slightly stiff covers
Approximately 9 1/2 inches x 71/2 inches
It is not required that pages be pre-numbered, but it is okay if they are (If pages are not pre-numbered you will have to number them yourself--use ink, write in upper right corner, all pages of book must be numbered.)

You must reserve pages 1--5 for a table of contents and for signatures. This is very important and will serve as the basis of your notebook grade. Do not attempt to make this in advance; build it as you go and follow the format given in class. **You must bring your laboratory notebook to every class meeting (including lecture as well as lab meetings).**

You will be making sketches in your notebook. Please observe the following conventions: (1) If you are sketching material without magnification or if you are switching back and forth between no magnification and slight magnification (a hand lens for example), draw a rectangular border around your sketch and indicate the actual size of the structure in the drawing.
(2) If you are sketching material viewed through a microscope, draw a circular border around your sketch, make sure your drawing fills the circle to the same extent the object fills the microscope's field of view, and indicate the magnification being used. (3) Each sketch should carry a label. If the drawing is of biological material, indicate the genus and/or species in the illustration and name(s) of and pertinent structures illustrated. If the drawing is not of a living thing, indicate what it is and indicate its size. Information in labels is often what gives a drawing any sort of lasting value.

As in real-life research, your notebook is the main (possibly only) record of your work in lab. Your instructor will not maintain any other record of your attendance or work in lab. After each lab you should make a photocopy "backup" of your work and keep these backups stored separately from the original. At the end of semester, your notebook score will be based on the number of signatures you have in your table of contents. If you can produce no record of your work, you will receive a grade of zero for your notebook. Make a habit of backing up your records. Do not store backups near the original.

Make backups. Store them separately.

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BIOL 1407 Course Objectives in Approximate Sequence to be Covered (Bostic)

Unit 1—Some General Biological Principles and Overview of Plant Biology

1. Describe evolution by natural selection and other causes.
2. Discuss the nature of "species". Compare differing concepts of species.
3. Describe binomial nomenclature and use scientific names of species correctly.
4. List levels of the Linnaean hierarchical classification system and use it properly.
5. Discuss advantages and disadvantages of the Linnaean system.
6. Correctly interpret phylogenetic trees and explain their construction.

7. Define “essential nutrient”. Differentiate macronutrient and micronutrient.
8. Compare essential macronutrients in plants and animals.
9. Compare plant (plus other autotrophs) and animal (plus other heterotrophs) acquisition of matter and energy necessary for life.
10. Compare autotrophism and heterotrophism.
11. Compare ingestive and absorptive heterotrophs.
12. Discuss roles of respiration and photosynthesis in organisms from a standpoint of nutrition.
13. Discuss impacts of surface-area-to-volume ratio on nutrition.
14. Discuss roles of respiration and photosynthesis in organisms from a standpoint of gas exchange.
15. Compare gas exchange in plants (plus other autotrophs) and animals (plus other heterotrophs) .
16. Discuss impacts of surface-area-to-volume ratio on gas exchange.
17. Differentiate among transport involving a single cell, between adjacent cells and over long distances.
18. Define homeostasis and its general importance to organisms.
19. Compare negative and positive feedback mechanisms.
20. Compare conforming strategies and regulating strategies.
21. If given information about a new homeostatic mechanism (either with words or a diagram), be able to identify various parts.
22. Describe water balance and its general importance to organisms.
23. Explain organisms’ need to regulate metabolic wastes.
24. Explain organisms’ need to regulate ions.
25. Distinguish between asexual and sexual reproduction.
26. Discuss advantages and disadvantages of asexual and sexual reproduction.
27. Compare three common life cycle patterns found in sexually reproducing eukaryotes.
28. Explain multicellular organisms’ need for transport systems.
29. Compare transport in single-celled organisms and multicellular organisms.
30. Describe characteristics of plants.
31. If given information, be able to identify unknown organisms as plants.
32. Describe the general life cycle seen in plants. Include the difference between homosporous and heterosporus plants.
33. Describe general relationships between plant embryos and gametophytes
34. Discuss dispersal strategies of plants.
35. Describe the following adaptations of plants:
    a. embryophyte condition
    b. gametangia
    c. spores
    d. vascular tissue (xylem, phloem)
    e. cuticle
    f. stomata.
    g. seeds
    h. flowers
36. Compare plant body parts of nonvascular plants and vascular plants.
37. Describe structures and functions of xylem and phloem.
38. Describe primary growth of roots and shoots, including primary meristems and primary tissues.
39. Describe layers and structures found in typical roots of flowering plants.
40. Describe layers and structures found in typical shoots of flowering plants.
41. Describe layers and structures found in typical leaves of flowering plants.
42. Compare primary and secondary growth.
43. Locate plant groups on a phylogenetic tree of living organisms.
44. Identify the probable protistan sister taxon of the plants and describe evidences for this relationship.
45. Describe characteristics of mosses.
46. If given information, be able to identify unknown organisms as mosses.
47. Identify common members of this group.
48. Locate mosses on a phylogenetic tree of living organisms.
49. Describe modes of nutrition found in mosses.

50. Discuss gas exchange in mosses.
51. Describe the life cycle of a typical moss.
52. Compare life cycles of mosses, ferns, conifers and flowering plants.
53. Explain moss transport.
54. Discuss presence or absence of vascular tissue in this group.
55. Discuss presence or absence of roots and rhizoids in this group.
56. After reviewing animals, compare transport systems of plants and animals.
57. Discuss water balance, ion regulation and waste disposal in mosses.
58. Describe characteristics of ferns.
59. Differentiate between homosporous and heterosporous plants.
60. If given information, be able to identify unknown organisms as ferns.
61. Identify common members of this group.
62. Locate ferns on a phylogenetic tree of living organisms.
63. Describe modes of nutrition found in ferns.
64. Discuss gas exchange in ferns.
65. Describe the life cycle of a typical fern.
66. Compare life cycles of mosses, ferns, conifers and flowering plants.
67. Explain fern transport
68. Discuss presence or absence of vascular tissue in this group.
69. Discuss presence or absence of roots and rhizoids in this group.
70. Discuss structure and function of vascular tissue in plants.
71. After reviewing animals, compare transport systems of plants and animals.
72. Discuss water balance, ion regulation and waste disposal in ferns.
73. Describe characteristics of conifers.
74. If given information, be able to identify unknown organisms as conifers.
75. Describe some adaptations of seed plants to life on land.
76. Describe a seed and its development.
77. Describe a pollen grain and its development.
78. Differentiate among pollination, pollen germination, pollen tube growth, and fertilization.
79. Describe development of female gametophytes.
80. Identify common members of this group.
81. Locate conifers on a phylogenetic tree of living organisms.
82. Describe modes of nutrition found in conifers.
83. Discuss gas exchange in conifers.
84. Describe the life cycle of a typical conifer.
85. Describe structures of pollen-producing and seed-producing cones.
86. Compare life cycles of mosses, ferns, conifers and flowering plants.
87. Explain conifer transport.
88. Discuss presence or absence of vascular tissue in this group.
89. Discuss presence or absence of roots and rhizoids in this group.
90. Discuss structure and function of vascular tissue in plants.
91. After reviewing animals, compare transport systems of plants and animals.
92. Discuss water balance, ion regulation and waste disposal in conifers.
93. Describe characteristics of flowering plants.
94. If given information, be able to identify unknown organisms as flowering plants.
95. Describe a seed and its development.
96. Describe a pollen grain and its development.
97. Differentiate among pollination, pollen germination, pollen tube growth, and fertilization.
98. Describe development of female gametophytes.
99. Describe some adaptations of seed plants to life on land.
100. Identify common members of this group.
101. Locate flowering plants on a phylogenetic tree of living organisms.
102. Describe modes of nutrition found in flowering plants.
103. Discuss gas exchange in flowering plants.
104. Describe the life cycle of a typical flowering plant.
105. Describe, in detail, structures of a typical flower and their functions.

106. Describe structures of a typical fruit.
107. Compare life cycles of mosses, ferns, conifers and flowering plants.
108. Explain flowering plant transport.
109. Discuss presence or absence of vascular tissue in this group.
110. Discuss presence or absence of roots and rhizoids in this group.
111. Discuss structure and function of vascular tissue in plants.
112. After reviewing animals, compare transport systems of plants and animals.
113. Discuss water balance, ion regulation and waste disposal in flowering plants.
114. Name several plant hormones and describe their actions.

115. Describe characteristics of animals.
116. If given information, be able to identify unknown organisms as animals.
117. Describe the general life cycle seen in animals.
118. Describe early stages of embryology from zygote formation through germ layer formation.
119. Explain what germ layers are and identify structures formed by ectoderm, mesoderm and endoderm.
120. Differentiate between:
    a. diploblastic and triploblastic
    b. spiral cleavage and radial cleavage
    c. determinate and indeterminate cleavage
    d. schizocoelus and enterocoelous development
121. Differentiate between radial and bilateral symmetry and discuss the relationships between type of symmetry and animal lifestyles.
122. Differentiate among acoelomate, pseudocoelomate and coelomate animals and discuss adaptive significance of body cavities.
123. Locate animal groups on a phylogenetic tree of living organisms.
124. Identify the probable protistan sister taxon of the animals and describe evidences for this relationship.
125. Compare two competing phylogenetic trees for animals.
126. Describe characteristics of cnidarians.
127. Compare polyps and medusae.
128. If given information, be able to identify unknown organisms as cnidarians.
129. Identify common members of this group.
130. Locate cnidarians on a phylogenetic tree of living organisms.
131. Compare intracellular digestion and extracellular digestion.
132. Describe tentacle structure and mechanism of food capture in cnidarians.
133. Describe the gastrovascular cavity of a typical cnidarian.
134. Compare digestive systems of cnidarians, planarians, annelids, arthropods, and vertebrates.
135. Describe gas exchange in a typical cnidarian.
136. Compare gas exchange in cnidarians, planarians, annelids, arthropods and vertebrates.
137. Describe the life cycle of a typical cnidarian with alternation of generations.
138. Compare alternation of generation in cnidarians with alternation of generation in plants.
139. Describe the gastrovascular cavity of a typical cnidarian.
140. Explain gastrovascular cavity function as a simple transport system in cnidarians.
141. Compare transport systems of cnidarians, planarians, annelids, arthropods and vertebrates.
142. Describe regulation of water balance in cnidarians.
143. Describe regulation of metabolic wastes and ions in cnidarians.
144. Compare excretory systems of cnidarians, planarians, earthworms, arthropods and vertebrates.
145. Describe nervous systems of cnidarians.
146. Compare nervous systems of cnidarians, flatworms, annelids, arthropods and vertebrates.
147. Describe characteristics of platyhelminths.
148. If given information, be able to identify unknown organisms as platyhelminths.
149. Identify common members of this group.
150. Locate platyhelminthes on a phylogenetic tree of living organisms.
151. Compare intracellular digestion and extracellular digestion.
152. Describe the gastrovascular cavity of a typical flatworm (planarian).

153. Compare digestive systems of cnidarians, planarians, annelids, arthropods, and vertebrates.
154. Describe gas exchange in a typical planarian.
155. Compare gas exchange in cnidarians, planarians, annelids, arthropods and vertebrates.
156. Describe the life cycle of a planarian (free-living flatworm).
157. Describe the gastrovascular cavity of planarians.
158. Explain gastrovascular cavity function as a simple transport system in flatworms.
159. Compare gastrovascular cavities of cnidarians and planarians.
160. Compare transport systems of cnidarians, planarians, annelids, arthropods and vertebrates.
161. Describe regulation of water balance in planarians.
162. Describe regulation of metabolic wastes and ions in planarians.
163. Describe excretory systems of planarians.
164. Compare excretory systems of cnidarians, planarians, earthworms, arthropods, and vertebrates.
165. Describe nervous systems of planarians.
166. Compare nervous systems of cnidarians, flatworms, annelids, arthropods and vertebrates.
167. Describe characteristics of annelids.
168. If given information, be able to identify unknown organisms as annelids.
169. Identify common members of this group.
170. Locate annelids on a phylogenetic tree of living organisms.
171. Compare intracellular digestion and extracellular digestion.
172. Describe the digestive system of a typical annelid.
173. Describe four stages of food processing in animals with complete digestive systems.
174. Compare digestive systems of cnidarians, planarians, annelids, arthropods, and vertebrates.
175. Describe gas exchange in earthworms.
176. Compare gas exchange in cnidarians, planarians, annelids, arthropods and vertebrates.
177. Describe the life cycle of an earthworm
178. Describe the circulatory system of typical annelids.
179. After reviewing arthropods, compare open and closed circulatory systems.
180. Compare transport systems of cnidarians, planarians, annelids, arthropods and vertebrates.
181. Explain regulation of water balance in earthworms.
182. Describe regulation of wastes and ions in earthworms.
183. Describe the excretory system of earthworms.
184. Compare excretory systems of cnidarians, planarians, earthworms, arthropods, and vertebrates.
185. Describe the nervous system of annelids.
186. Compare nervous systems of cnidarians, flatworms, annelids, arthropods and vertebrates.
187. Describe characteristics of arthropods.
188. If given information, be able to identify unknown organisms as arthropods.
189. Identify common members of this group.
190. Locate arthropods on a phylogenetic tree of living organisms.
191. Compare intracellular digestion and extracellular digestion.
192. Describe the digestive system of a typical arthropod.
193. Describe four stages of food processing in animals with complete digestive systems.
194. Compare digestive systems of cnidarians, planarians, annelids, arthropods, and vertebrates.
195. Describe structure and function of a crustacean’s gills.
196. Describe structure and function of an insect’s tracheal tubes.
197. Compare gas exchange in cnidarians, planarians, annelids, arthropods and vertebrates.
198. Describe the life cycle of a typical arthropod.

199. Discuss the impact of exoskeletons and molting on growth and development of arthropods.
200. Compare incomplete metamorphosis and complete metamorphosis in insects.
201. Describe the circulatory system of typical arthropods.
202. After reviewing annelids or chordates, compare open and closed circulatory systems.
203. Compare transport systems of cnidarians, planarians, annelids, arthropods and vertebrates.
204. Describe regulation of water balance in arthropods.
205. Describe regulation of metabolic wastes and ions in arthropods.
206. Describe the excretory system of arthropods.
207. Compare excretory systems of cnidarians, planarians, earthworms, arthropods, and vertebrates.
208. Name several arthropod hormones and describe their actions.
209. Describe the nervous system of a typical arthropod.
210. Compare nervous systems of cnidarians, flatworms, annelids, arthropods and vertebrates.
211. Describe characteristics of chordates.
212. If given information, be able to identify unknown organisms as chordates.
213. Identify common members of this group.
214. Locate chordates on a phylogenetic tree of living organisms.
215. Compare intracellular digestion and extracellular digestion.
216. Describe the digestive system of a typical vertebrate.
217. Describe four stages of food processing in animals with complete digestive systems.
218. Compare digestive systems of cnidarians, planarians, annelids, arthropods, and vertebrates.
219. Compare gas exchange in cnidarians, planarians, annelids, arthropods and vertebrates.
220. Describe the life cycle of a typical chordate.
221. Compare larval stages in typical chordates and other animals.
222. Compare metamorphosis in typical chordates and other animals.
223. Describe circulatory systems of typical chordates.
224. After reviewing arthropods, compare open and closed circulatory systems.
225. Compare transport systems of cnidarians, planarians, annelids, arthropods and vertebrates.
226. Describe water regulation in vertebrates.
227. Describe regulation of metabolic wastes and ions in vertebrates.
228. Describe excretory systems of typical vertebrates.
229. Compare excretory systems of cnidarians, planarians, earthworms, arthropods, and vertebrates.
230. Name several vertebrate hormones and describe their actions.
231. Describe nervous systems of vertebrates.
232. Compare nervous systems of cnidarians, flatworms, annelids, arthropods and vertebrates.
233. Describe three functions of nervous systems.
234. Describe typical structures of myelinated motor neurons.
235. Diagram and label a myelinated motor neuron.
236. Explain membrane potential.
237. Define resting potential and explain maintenance of ion gradients and voltage differences across the membrane.
238. Differentiate between voltage-gated and chemically-gated ion channels.
239. Differentiate among depolarization, repolarization and hyperpolarization.
240. Differentiate between graded potentials and action potentials, regarding location in a neuron, size, and direction of propagation.
241. Describe events of an action potential. Draw and label a graph of an action potential.
242. Explain propagation of action potentials along axons.
243. Describe structure and function of a chemical synapse.
244. Describe organization of a centralized nervous system.

245. Compare organization of a centralized nervous system with that of a nerve net.
246. Describe types of cell signals found in animals and plants.
247. Compare cell signaling in plants and animals.
248. Compare the mechanisms of cell signaling in water-soluble (amino-acid based) hormones and lipid-soluble (steroid or sterol-based) hormones.
249. Compare hormones and pheromones.
250. After completing this unit, compare hormones used by plants, arthropods and chordates.
251. After completing this unit, compare hormonal control and nervous system control in animals.

Unit 3—Some General Biological Principles and Overview of “Microbes”

252. Describe characteristics of fungi.
253. If given information, be able to identify unknown organisms as fungi.
254. Describe structure and function of a fungal mycelium and discuss its adaptive significance.
255. Describe basic fungal life cycle, labeling main stages and structures and indicating ploidy of each.
256. Differentiate among Zygomycota, Ascomycota, and Basidiomycota in terms of asexual and sexual reproductive structures and differences in their life cycles.
257. Discuss ecological importance of fungi in terms of saprobes, parasites, predators and mutualists.
258. Describe symbiotic relationships of lichens and mycorrhizae and their ecological importance.
259. Describe characteristics of zygomycetes.
260. Identify common members of this group.
261. If given information, be able to identify unknown organisms as zygomycetes.
262. Describe characteristics of ascomycetes.
263. Identify common members of this group.
264. If given information, be able to identify unknown organisms as ascomycetes.
265. Describe characteristics of basidiomycetes.
266. Identify common members of this group.
267. If given information, be able to identify unknown organisms as basidiomycetes.
268. Explain fungal separation of events of fertilization.
269. Name and briefly describe four phyla of Kingdom Fungi: Chytridiomycota, Zygomycota, Ascomycota and Basidiomycota.
270. Explain why chytrids are considered the most ancient lineage of modern Fungi.
271. Identify the probable protistan sister taxon of Fungi and describe evidences for this relationship.
272. Locate fungal groups on a phylogenetic tree of living organisms.
273. Describe modes of nutrition of fungi
274. Discuss gas exchange in fungi.
275. Describe the life cycle of typical zygomycetes.
276. Compare life cycles of zygomycetes, ascomycetes and basidiomycetes.
277. Describe the life cycle of typical ascomycetes.
278. Compare life cycles of zygomycetes, ascomycetes and basidiomycetes.
279. Describe the life cycle of typical basidiomycetes.
280. Compare life cycles of zygomycetes, ascomycetes and basidiomycetes.
281. Explain fungal transport.
282. Discuss water balance, ion regulation and waste disposal in fungi.
283. Describe characteristics of protists.
284. If given information, be able to identify unknown organisms as protists.
285. Describe characteristics of algae (photosynthetic protists).
286. Identify common members of this group.
287. If given information, be able to identify unknown organisms as algae.
288. Describe characteristics of protozoans and fungal-like protists.
289. Identify common members of this group.
290. If given information, be able to identify unknown organisms as protozoans or fungal-like protists.
291. Discuss evolution of eukaryotic cells from prokaryotic cells including formation of organelles with single membranes by infolding and nucleus.
292. Discuss primary endosymbiosis in evolution of mitochondria.
293. Discuss primary and secondary endosymbiosis in evolution of algal and plant plastids.

294. Locate protist groups on a phylogenetic tree of living organisms.
295. Discuss origins of plants, animals, and fungi within a phylogenetic tree of eukaryotic organisms.
296. Compare modes of nutrition of algae, protozoans, and fungal-like protists.
297. Discuss gas exchange in protists.
298. Describe asexual reproduction in unicellular protists.
299. Describe three common life cycle patterns seen in sexually-reproducing protists.
300. Compare prokarotic and eukaryotic reproduction.
301. Explain protist transport.
302. Discuss water balance, ion regulation and waste disposal in protists.
303. Describe characteristics of prokaryotes.
304. If given information, be able to identify unknown organisms as prokaryotes.
305. Describe characteristics of archaeans.
306. Identify common members of this group.
307. If given information, be able to identify an unknown organism as an archaean.
308. Describe characteristics of bacteria.
309. Identify common members of this group, including cyanobacteria.
310. If given information, be able to identify unknown organisms as bacteria.
311. Discuss the evolution of prokaryotic cells from inorganic materials.
312. Discuss the evolution of the three domains from the universal ancestor.
313. Discuss probable roles of lateral gene transfer in prokaryotic evolution.
314. Locate prokaryotic groups on a phylogenetic tree of living organisms.
315. Discuss modes of nutrition found in prokaryotes.
316. Discuss gas exchange in prokaryotes.
317. Describe reproduction in prokaryotes.
318. Compare prokaryotic and eukaryotic reproduction.
319. Explain prokaryote transport.
320. Discuss water balance, ion regulation and waste disposal in prokaryotes.
321. After reviewing various taxa, compare transport systems used by multicellular protists, plants, fungi and animals.
322. After completing this unit, compare mechanisms of water balance used by prokaryotes, protists, fungi, plants, and animals.