ISCI 3103: Natural History for Middle School Teachers Fall 2014

Department of Biology, College of Arts & Sciences, Valdosta State University

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Office Hours: Tues 2:00-3:00 & Thurs 1:30-2:30 or By Appointment. Please feel free to call the office or email to schedule a convenient time. Anytime I am in my office, you are welcome to stop in to ask questions.

Instructional Design: This will be a "**Hybrid**" course that combines online assignments with a "**Flipped**" face-to-face classroom. Instead of a traditional lecture/lab format, we will use an eBook to introduce you to information before class. Then you will complete online homework that will give you the opportunity to identify any areas that need clarification. This is so that we can use class for elaboration of important concepts, explanation of anything that was unclear, and learning activities that are more effective than sitting and taking notes. Most of the lab periods will be used for field trips, but there will be some other inquiry-oriented sessions.

Required Platforms:

LMS=Blazeview: Learning Management System - Your VSU Account: Be sure to use the combined A&B section of ISCI 3103 not the single section you are registered for. This will be used for all class communication, listing your assignments, and access to various resources. (http://www.valdosta.edu/academics/elearning/blazeview-d2l.php) Free

CMS=Connect: Course Management System - McGraw Hill Connect Plus Version of *Biology: The Essentials* by Marielle Hoefnagels. This is a complete electronic version of the book and a versatile software product that will be the basis for most of your assignments. It is integrated with D2L, so you can access Connect from a direct link in Blazeview. Log into Connect and there will be instructions on how to purchase the product. You will be given a personal code in class that will give you access to the LearnSmart Labs we will use. To save money, you will purchase this directly from the publisher. (http://connect.mheducation.com/class/l-jones-fall-2014) $85.00

SRS=TopHat: Student Response System - We are testing a BYOD Bring Your Own Devise (SmartPhone, LapTop, I/Android Pad, Text Phone) as an alternative to traditional clickers. These will play an important part as the communication tool for class participation grades, and you are responsible for having your device in class for every session after the first week or you will not be able to earn participation points. (You will receive a direct invitation from https://tophat.com/ because we get a discount on the price) $15.00

Pedagogical Philosophy: This class will bridge the gulf between scientific and educational disciplinary training by allowing future teachers to learn new scientific information through a variety of instructional strategies. The course has been designed to model methods that enact the rhetoric of the science education reform movement. This nontraditional approach to college science is structured to help prospective middle school teachers make connections between methods of teaching and the process of learning science.

Course Content: The scientific subject matter aligns with the *New Generation Science Standards* which are the national framework for K-12 Science Education. The Georgia Performance Standards will be discussed and there will be deliberate coaching as preparation for the GACE Science Exams. Reflections on Teaching & Learning will be a regular feature.

Learning Objectives: In the ***Nature of Science*** module at the start of the course, *Integrated Science 3103* addresses the VSU General Education Outcome that specifies "students will demonstrate knowledge of scientific and mathematical principles and proficiency in laboratory practices." In the ***Ecology*** & ***Evolution*** modules, emphasis is on the Biology Departmental outcomes that call for the ability to "interpret ecological data pertaining to the behavior of the individual organism in its natural environment; to the structure and function of populations, communities, and ecosystems" and to "describe the evolutionary processes responsible for biological diversity."

Academic Honesty: Members of the class are expected to maintain high standards of integrity. This course will use the VSU Handbook Code of Ethics as a basic standard of behavior, and everyone in the class is required to read the Biology Department Plagiarism Policy sign a statement verifying that these guidelines are understood. Evidence of dishonest conduct or cheating will result in no credit for the assignment and depending on the case, a grade of "F" for the course.

Never copy text from a book or website and always cite sources unless it is very general or commonly known scientific information. Do not share your work with other students because both people will be held responsible. When students work together on projects or assignments, each person is responsible for submitting completely individual, distinctly different products. Do not expect lenience for claims that on the grounds of not knowing better. You will be reported to the Dean of Students and employers such as school systems do call that office at VSU to check on whether you have a record of infractions.

Special Services: Students requiring classroom accommodations or modifications because of a documented disability should discuss this need with me at the beginning of the semester. Register with the Access Office, Farber Hall, 245-2498.

Family Educational Rights & Privacy Act: Grades cannot and will not be posted by Name, Social Security Number, or other Personal Identifiers. Grades and student work will not be given over the telephone, by email or to another student.

SCI 3103 – Course Design: Guidelines for Content & Evaluation

Enduring Understanding:

The natural world includes the totality of the physical and biological factors that have and continue to influence the evolution of living organisms, and science is the specific collection of processes employed by humans to understand natural phenomena.

Essential Questions:

What characterizes the systematic aspects of human investigations of the natural world?
How have significant features of physiogeography of Georgia influenced the vast biodiversity of the state?
How does the Theory of Evolution explain the history of life?
How does Inquiry-Oriented, Activity-Based pedagogy influence the teaching and learning of Life Science?

Basic Knowledge & Skills Students Will Acquire:

The Nature of Science as both a Body of Knowledge and Set of Processes
Principles of Ecology
Evolutionary History and Biological Diversity of Living Organisms
Strategies for Teaching 7th Grade Life Science Based on the New Generation Science Standards

Students in ISCI 3103 will be expected to:

I. Characterize the ***Nature of Science*** as both a ***Body of Knowledge*** and a ***Set of Processes***.
II. Compare and contrast how abiotic factors influence the biotic features of major ***Ecosystems in Georgia***.
III. Describe the ***Evolutionary*** processes responsible for ***Biodiversity*** and explain the characteristics of major Taxa.

Proof of mastery for each will be demonstrated by the knowledge & skill shown in:

I. Online Assignments – Completion of a variety of reading, interactive adaptive programs, virtual labs, & writing.
II. Participation - Attendence, Deportment, Class Discussions, Field Trips, Lab Activities, TopHat Questions in Class etc.
III. Midterm & Final Exams - Based on Online SmartBook, Labs, Discussions, Field Trips, & Videos

The following facets of understanding will be built into the course assessments:

Explanation – Description of subject matter and pedagogical practices
Interpretation – Demonstration of astute reasoning and ability to make meaningful connections between concepts
Application – Explanation of the links between subject matter and science instruction
Perspective – Identification of the nature of science in our formulation of an understanding of the natural world
Empathy – Indication of the recognition of the value and need to provide quality education in Middle Grades Science
Self-Knowledge – Illustration of personal reflection on the process of learning and teaching science

Course Assessment: Course grades will be based on a variety of assessment techniques that are designed to produces evidence of achievement of the specified learning outcomes. Personal reflection and class discussions about teaching methods will facilitate the development of Pedagogical Content Knowledge. The course will provide students with an opportunity to move beyond the mere assembly of subject matter knowledge and develop sound pedagogical philosophies for teaching science to middle school students.

Online Assignments - Connect Plus SmartBook Chapters, Writing Assignments , LearnSmart Labs, Quizzes & Pretests	50%
Class Participation TopHat SRS Scores, Attendance, Deportment, & Other Participation Points	25%
Examinations 3 Midterm Exams (5% Each) Comprehensive Final Exam (10%)	25%

Dates for Modules, Exams, Trips, & Other Events (Subject to Change with Notice)

NATURE OF SCIENCE MODULE - Weeks 1-5, August 19th - Sept 18th

Saturday, Sept 6 - Project WET @ Grand Bay
Friday - Sunday, Sept 12-14 Sapelo Island Trip
Thursday, Sept 18 - NoS Exam

ECOLOGY MODULE - Weeks 6-10, Sept. 23rd - Oct 16th

Lake Louise Study - Sept 23 & 25
Saturday, Sept 27 - Project WILD @ Grand Bay
Thursday, Oct 16 - Ecology Exam

EVOLUTION MODULE - Weeks 10-14, Oct 21st - Nov 20th

Thursday 6- Class is Cancelled
(Sapelo Island Make-Up Trip - Nov 14-16)
Thursday, Nov 20 - Evolution Exam

Week of 25 & 28 No Class - Thanksgiving Break

Summary Activities

2 - Human Impact Presentations
4 - Human Impact Presentations
Final Exam – Friday, Dec 12th 10:15am-12:15pm

Work Ethic: This course has an accurate reputation for being "a lot of work." Effort will be rewarded by gains in understanding of scientific information and good grades. Success depends on consistent attention to the assignments and hard work. Grades are based on the quality of the product produced, not the time spent on assignments. Depending on your background and affinity for this material, you may take more or less time than other students. You will need to gauge your own progress and spend the time you need to master the material. The only students who ever fail this course are those who do not do the work and/or have a bad attitude!

Short Assignments: It is too easy to attend class on a regular basis, but put little thought into the course material until there is pressure to study for an exam. Regular short assignments will give you an idea of the course expectations and mandate regular attention to the material that is being covered. These assignments will be described in class, assigned on Blazeview, and submitted via Connect. These will usually be graded on a 10 point scale as follows: (10=Excellent, 8=Good, 6=Adequate/Minimal). Deadlines are firm there will be no late submission in most cases because there are 50 students in the class.

Topic Selection: There will be several assignments that require each student to select a separate topic from a list that will be posted on Blazeview. There will be a discussion thread posted for that assignment and choices will be given on a first come-first served basis by posting to this discussion thread. It is your responsibility to ensure that your selection does not duplicate something that is already taken, and your post clearly indicates your selection. In these cases, just post your name and the topic you claim in the title of your post - no message is necessary. Some of these will be short reports that will serve as the basis of our class discussion. They may require submission of a single PowerPoint slide which must be submitted to me by Blazeview email before the deadline.

Attendance: Since most of this course involves active experiences in the field and in the laboratory, it is not possible to "make-up" missed material. Three late arrivals to class will be counted as an unexcused absence. With a good reason and the approval of the instructor, class absences may be made up by writing a paper on the class topic that uses no less than 2 outside published sources (i.e. not your text) and is 1 full single-spaced page (10-12 point type, 1" margins) and at least 500 words in length. Failure to submit these make-up papers by Blazeview as an email attachment within 1 week of the absence, will impact the grade for the course. Anyone who misses more than 20% of the class sessions can receive a failing grade for the course.

	50%	75%	100%	125%
Attendance	2 Unexcused	3 xTardy/ 1 Unexcused	All Made-Up	No Tardies or Absences
Deportment	Rude/Impolite Disrupts Class	Passive in Class Off-Task	Volunteers Answers Involved in Labs	Very Active Participant Enhances Class Sessions

Expectations on ISCI 3103 Writing Assignments

Objective
Written assignments will reinforce class lessons and will help you to learn, outside the classroom, through your own thinking. Papers are an opportunity to display your knowledge through more than just exams or what you might or might not say in class. These assignments also allow you to show your own style of expression and personal interests, so you should take pride them.

Focus
Well-crafted writing always has a specific purpose. Every paragraph or paper should have a distinct thesis or central idea. Your thesis should directly address the nature of the writing assignment. Decide on the topic and a specific case you want to make before you start writing. Write the thesis or topic sentence down and check back throughout the writing process to be certain that the work supports it. Concentrate on demonstrating your understanding of the scientific information.

Paper Organization
Before you begin to write, think through how you plan to develop your thesis and use an outline to structure the paper. An Introduction and Conclusion will be the first and last paragraphs of your paper. Start paper with something catchy to interest the reader. Make it perfectly clear, in this introductory section, what your point or central idea will be. Support that concept throughout the body of your paper. Paragraphs in the middle will be the Body of your text. Subheadings should be used for clarity. Your assignments in this class should usually be in first person. Avoid using statements such as "In this paper I will discuss…" since it is much more sophisticated to avoid this type of "crutch statement."

Paragraphs
Divide the paper by major themes and make each of these a distinct paragraph. You should have at least 3 paragraphs on a 1-page paper. The first sentence of each paragraph is a topic sentence that shows what the paragraph cover. ONE SENTENCE IS NEVER AN ENTIRE PARAGRAPH because there should be at least 3 sentences elaborating any significant idea.

Format
A header on the upper right should include the student's name and the date of submission. Each paper should have a creative title identifying the approach to the assignment. Since the course will be paperless, coversheets are not necessary. Your papers are to be typed using something comparable to 10-12 point Times New Roman type, single-spacing, and reasonable (0.5 to 1 inch) margins. Other professors often expect double-spacing, **I require single-spacing**. The lengths of these papers are stated in the assignments. After your draft you ideas, if the paper is too long, go back through and shorten it up by taking out the less important aspects. If it is too short, go back and incorporate more support or add more detail to what you are saying. When I say 1 page that means one sheet of paper that is full of text. Put your references and heading on that sheet. Use the word counting function on your word processor to be sure your text is 600-800 words per assigned page when single-spaced.

References
Any very general scientific information does not need to be cited. We consider this common knowledge because the place you found it is not the original source of the information. How would you know? The answer is if you can find the same information in 2 or 3 books, it does not require a citation in the text or a reference at the end of the paper. However, you must be very careful about giving appropriate credit to the sources of any original outside information that you use. If you use original information, it should be cited in the text of the paper. You also should have properly formatted references at the end of the paper that include: Author (Last name, Initials), Year (In parentheses), Title, Place & Name of Publisher, Pages. Use the APA or American Psychological Association style and check the web if you want an example of this. Even WWWeb sources must be cited properly. Be sure to reword or paraphrase text from any of your sources to avoid plagiarism. Paraphrasing means changing more than 1 word in a sentence. Think about what something says and completely restate it in your own words. No direct quotes are allowed in papers for this course to prevent you from making your paper look like a mosaic of other people's ideas. The point of writing is to demonstrate your thinking, so first person is usually fine.

Grading
Your assignments will be described in detail in lecture, so listen carefully and be sure that you know what is expected or ask about anything that is unclear. Grades will be docked for any failure to follow directions precisely. If you need more clarification than is given in the Blazeview description, contact your classmates by email, phone, or posting a question on the Blazeview discussion board. Focus on the objective of the assignment and address it clearly in thesis of your paper. You can dramatically improve your work if you critique your own rough draft and revise it at least once. Outside feedback can also make a difference. Proofread to avoid careless errors. Spelling, Punctuation, and Grammar do effect our impression of the quality of your presentation. These papers will be graded on Effort, Quality, Organization, Content, Proper citations and whether or not you followed these directions. I will look specifically at extent of your coverage of the topic and the clarity in your presentation of the material. If you need assistance with your writing, please see me for help and/or contact the Student Success Center.

When assignments are submitted, part of your grade will be based on following directions, so if you do not understand, post a question to the discussion list to get clarification. Obviously, if you wait until the last minute, neither your classmates or I will have time to respond and you may miss the deadline. In many cases, this means you will get no credit at all. In any other case, late work will be graded down 10% per day.

Class Participation Grade

This dimension of the course purposely gives you flexibility and choice about what you do for part of your grade. Each of these and other approved activities will count for a certain number of points. At the end of the semester, the points accumulated by all of the students will be averaged. The class average will be 100%. Anyone who earns more than the class average will accrue extra credit. Anything below the class average will be calculated as a percentage of that. You should plan ahead and do as much as possible early in the semester. Everything you do for participation should be documented in a Reflection Book that also includes your lab write-ups.

There are two weeks that we will have one extended field trip and lecture will be combined with the lab so that we can get away from the university from 10:00-3:15. Each of these will be worth multiple participation points. The first is a teaching experience that takes place right after Fall Break on Thursday, Oct. 18th at Pine Grove Outdoor School. The entire 3rd grade class is meeting us for hike. In pairs that I designate, two of you will take 6-8 of them on a tour of habitats. You can prepare by studying up on: Cypress Ponds, Freshwater Lakes, Blackwater Rivers (the Withlacoochee), Swamps, Floodplains, Upland Forests, & Pine Plantations. The second opportunity is on Tuesday, November 20th when we will go out to VSU's Lake Louise Field Station and do an extensive study of the community that is exposed of several ecosystems including: a lake, a swamp, and several types of forests. You are going to be responsible for knowing the ecology of these 2 places whether or not you go, but you can get the information from the students who do attend.

Attending Projects WET, WILD, and Learning Tree (TBA) will each count for 5 participation points. You must register ahead for each one. The books cost $15-20, but you do not have to purchase them to earn the points. You can add 1-2 points to each workshop by researching the subject matter and the history and combining this with an analysis of how the curriculum supports the 7th grade standards in any subject area.

Our class probably will be taking a trip to Sapelo Island. This trip will be worth 25 participation points as long as you are positive and contribute to the experience. Anyone who acts wrong and tries to spoil the trip for others will get no points. If you can't attend the Sapelo Trip, you can do a research paper that will make up the same participation points if it is well enough done. This would be no less than 3 pages of text and a photoessay from the web.

The College of Arts & Sciences Seminars will count for 1 or 2 points. One point for attending as long as you fill out the evaluation sheet and leave it with the Biology professor in charge. They will place your evaluations in my mailbox. You can earn a second point by writing up a 300 word synopsis that includes information from 2 Web sources and relates to the scientific content of the presentation. The seminar schedule can be found at: http://www.valdosta.edu/cas/scisem/Fall2012.shtml

Trips to other natural sites, parks, aquaria, or natural history museums in Georgia or North Florida will also count as participation experiences. You must arrange credit in advance by writing up what you plan to do and how you will document with photography and writing what you learn on your visit.

Destinations: Okefenokee Swamp, Any Barrier Island

University Exhibits: UGA, UF, FSU Museums

Coastal Areas: UGA Marine Education Center (Savannah), Any Estuary Area

Natural History Museums: Fernbank in Atlanta, GA Natural History at UGA, Natural History at Georgia College in Milledgeville

Aquaria: Atlanta, Flint River (Albany)

Parks: Amicolola Falls, Stone Mountain, Unicoi, Providence Canyon, Cloudland Canyon, Tallulah Gorge, etc

Springs: Indian, Magnolia, Warm, Sandy, Radium

Geological Sites

Class Field Trips

For some of the laboratory sessions, the class will visit a local site for an informal field science experience. You will be told in advance whether to meet at the site or travel with the class in a convoy. When a van is available, the van will leave promptly around 9:45 from the north door of the BSC. Meet outside of my office.

Local Sites

VSU Bike Trail

Meet in the Northwest corner of the parking lot behind the Student Recreation Center by the north side of the parking garage.

Grand Bay Wildlife Management Area

Take Bemiss Rd. north past Inner Perimeter to Knights Academy Rd., turn right at sign for Grand Bay, go East for 4.7 miles and the big brown sign indicates the entrance on the left.

Dr. Bechler's House

Go North from Campus on Oak Street, Turn left on Eager at Northside. Turn Left on Bud Mckey and go left on the circle. His house is #2841

Lake Louise Field Station

Drive south on Rte. 31 just past the Airport, go left on Loch Laurel Rd for 2.7 miles, turn right on Touchton Rd, the entrance is 0.2 miles on the left and posted with a very rusty old VSU Foundation sign

Pine Grove Elementary & Middle School

Take Bemiss Rd. north past Inner Perimeter to Skipper Bridge Rd. Turn left just after McDonalds and travel northwest to River Rd. which is just before the bridge over the river. Turn right and then left into the campus. Park in front of the elementary school and we will meet near the front door of the school.

Oris Blackburn Park

Follow Rte. 31 south out of town past the airport and past the Paper Mill. The park entrance is on the right just past the town of Clyattville. The distance is 11.4 miles from the place where Rte. 31 turns off of Rte. 41.

Plowden Field Station

Take Park Ave east out of town past Forest St., just over the railroad tracks, at the Gas Company on the left – turn right on Baymeadow Dr., follow to the end of the houses and pull over to the left and park at the head of the open area that looks like a powerline.

Langdale Park

Take Rte. 41 north where it is Old Valdosta Rd., just past Country Club Rd. the park entrance is on the left, make a U-Turn in median, turn right into the park, follow dirt road in to the end by the boat ramp

Field Trip Gear

(You will not be allowed to participate if you are not appropriately attired)

Required	Other Items
Long Pants unless shorts are specified	Camera
Hiking Boots or Closed Shoes & Socks	Sunglasses
Clipboard, Field Notebook, &Paper & Pencil	Sunscreen & Insect Repellant
Back Pack & Water Bottle	Snacks to Share with Class

Given the chances that these mornings could be very hot, you may want to wear shorts and carry long pants that you can pull on at the field sites. The best idea may be to pack a field bag that has your gear ready every week.

When we are out in the woods, you must be aware that there is a good chance you will come in contact with ecto-parasites such as ticks. We are going to make it a practice to remind each other to tuck our pants into our socks because this is the best way to keep these critters on the outside of your clothing. Think of it as a field biologist's fashion statement. Hats are also a big help for keeping them out of your hair. You should shower and check your body as soon as you can after class. Many of the places we visit could also involve some contact with snakes and other native species. Be sensible about staying on the trail and watching where you step. Your participation grade will be seriously reduced by any uncooperative, inconsiderate, or unsafe behavior on these trips.

7th Grade GPS Life Science Curriculum

Seventh grade students keep records of their observations and use those records to analyze the data they collect. They observe and use observations to explain diversity of living organisms and how the organisms are classified. They use different models to represent systems such as cells, tissues, and organs. They use what they know about ecosystems to explain the cycling of matter and energy. They use the concepts of natural selection and fossil evidence in explanations. Seventh graders write instructions, describe observations, and show information in graphical form. When analyzing the data they collect, seventh graders can recognize relationships in simple charts and graphs and find more than one way to interpret their findings. The students replicate investigations and compare results to find similarities and differences. The middle school life science course is designed to give students the necessary skills for a smooth transition from elementary life science standards to high school biology standards. The purpose is to give all students an overview of common strands in life science including, but not limited to, diversity of living organisms, structure and function of cells, heredity, ecosystems, and biological evolution.

Co-Requisite – Characteristics of Science Habits of Mind

S7CS1. Students will explore of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.

a. Understand the importance of—and keep—honest, clear, and accurate records in science.
b. Understand that hypotheses can be valuable, even if they turn out not to be completely accurate.

Major Concepts/ Skills: Concepts/Skills to Maintain:

Diversity of living organisms, Characteristics of Science, Dichotomous key/classify (6 Kingdoms), Records investigations clearly and accurately, Structure and function of cells, Uses hypotheses, Tissues, organs, and organ systems, Uses technology, Purpose of major human body organ systems, Uses safety techniques, Heredity, genes, and successive generations, Uses scientific tools, Ecosystems, Writes clearly, Cycling of matter and energy, Organizes data into graphs/tables/charts, Biological evolution, Interprets graphs/tables/charts, Natural selection and fossil record, Asks quality questions, Analyzes/organizes scientific data via calculations and inference, Recognizes the importance of explaining data with precision and accuracy,

S7CS2. Students will use standard safety practices for all classroom laboratory and field investigations.

a. Follow correct procedures for use of scientific apparatus.
b. Demonstrate appropriate techniques in all laboratory situations.
c. Follow correct protocol for identifying and reporting safety problems and violations.

S7CS3. Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.

a. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers, fractions, decimals, and percents.
b. Use the mean, median, and mode to analyze a set of scientific data.
c. Apply the metric system to a scientific investigation that includes metric to metric conversion. (i.e. centimeters to meters)
d. Draw conclusions based on analyzed data.
e. Decide what degree of precision is adequate, and round off appropriately.
f. Address the relationship between accuracy and precision and the importance of each.

S7CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities.

a. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.
b. Use appropriate tools for measuring objects and/or substances.
c. Learn and use on a regular basis standard safety practices for scientific investigations.

S7CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.

a. Observe and explain how parts can be related to other parts in a system such as predator/prey relationships in a community/ecosystem.
b. Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.

S7CS6. Students will communicate scientific ideas and activities clearly.

a. Write clear, step-by-step instructions for conducting particular scientific investigations, operating a piece of equipment, or following a procedure.
b. Write for scientific purposes incorporating data from circle, bar and line graphs, two-way data tables, diagrams, and symbols.
c. Organize scientific information using appropriate simple tables, charts, and graphs, and identify relationships they reveal.

S7CS7. Students will question scientific claims and arguments effectively.

a. Question claims based on vague attributions (such as "Leading doctors say…") or on statements made by people outside the area of their particular expertise.
b. Identify the flaws of reasoning that are based on poorly designed research (i.e., facts intermingled with opinion, conclusions based on insufficient evidence).
c. Question the value of arguments based on small samples of data, biased samples, or samples for which there was no control.
d. Recognize that there may be more than one way to interpret a given set of findings.

The Nature of Science

S7CS8. Students will investigate the characteristics of scientific knowledge and how that knowledge is achieved.

Students will apply the following to scientific concepts:
a. When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often requires further study. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as meaningful.
b. When new experimental results are inconsistent with an existing, well-established theory, scientists may pursue further experimentation to determine whether the results are flawed or the theory requires modification.
c. As prevailing theories are challenged by new information, scientific knowledge may change.

S7CS9. Students will investigate the features of the process of scientific inquiry.

Students will apply the following to inquiry learning practices:
a. Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing competing theories.
b. Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.
c. Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.
d. Scientists often collaborate to design research. To prevent this bias, scientists conduct independent studies of the same questions.
e. Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator's credibility with other scientists and society.
f. Scientists use technology and mathematics to enhance the process of scientific inquiry.
g. The ethics of science require that special care must be taken and used for human subjects and animals in scientific research. Scientists must adhere to the appropriate rules and guidelines when conducting research.

Reading Standard Comment
After the elementary years, students are seriously engaged in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal learning. Students encounter a variety of informational as well as fictional texts, and they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas *in context.* Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects. Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

S7CS10. Students will enhance reading in all curriculum areas by:
a. Reading in All Curriculum Areas
- Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas
- Read both informational and fictional texts in a variety of genres and modes of discourse
- Read technical texts related to various subject areas

b. Discussing books
- Discuss messages and themes from books in all subject areas.
- Respond to a variety of texts in multiple modes of discourse.
- Relate messages and themes from one subject area to messages and themes in another area.
- Evaluate the merit of texts in every subject discipline.
- Examine author's purpose in writing.
- Recognize the features of disciplinary texts.

c. Building vocabulary knowledge
- Demonstrate an understanding of contextual vocabulary in various subjects.
- Use content vocabulary in writing and speaking.
- Explore understanding of new words found in subject area texts.

d. Establishing context
- Explore life experiences related to subject area content.
- Discuss in both writing and speaking how certain words are subject area related.
- Determine strategies for finding content and contextual meaning for unknown words.

Co-Requisite – Content
S7L1. Students will investigate the diversity of living organisms and how they can be compared scientifically.
a. Demonstrate the process for the development of a dichotomous key.
b. Classify organisms based on physical Characteristics using a dichotomous key of the six kingdoms (Archaebacteria, Eubacteria, Protists, Fungi, Plants, & Animals).

S7L2. Students will describe the structure and function of cells, tissues, organs, and organ systems.
a. Explain that cells take in nutrients in order to grow and divide and to make needed materials.
b. Relate cell structures (cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria) to basic cell functions.
c. Explain that cells are organized into tissues, tissues into organs, organs into systems, and systems into organisms.
d. Explain that tissues, organs, and organ systems serve the needs cells have for oxygen, food, and waste removal.
e. Explain the purpose of the major organ systems in the human body (ie. Digestion, Respiration, Reproduction, Circulation, Excretion, Movement, Control, Coordination & Protection from disease.

S7L3. Students will recognize how biological traits are passed on to successive generations.
a. Explain the role of genes and chromosomes in the process of inheriting a specific trait.
b. Compare and contrast that organisms reproduce asexually and sexually (bacteria, protists, fungi, plants & animals).
c. Recognize that selective breeding can produce plants or animals with desired traits.

S7L4. Students will examine the dependence of organisms on one another and their environments.
a. Demonstrate in a food web that matter is transferred from one organism to another and can recycle between organisms and their environments.
b. Explain in a food web that sunlight is the source of energy and that this energy moves from organism to organism.
c. Recognize that changes in environmental conditions can affect the survival of both individuals and entire species.
d. Categorize relationships between organisms that are competitive or mutually beneficial.
e. Describe the characteristics of Earth's major terrestrial biomes (i.e. tropical rain forest, savannah, temperate, desert, taiga, tundra, and mountain) and aquatic communities (i.e. freshwater, estuaries, and marine).

S7L5. Students will examine the evolution of living organisms through inherited characteristics that promote survival of organisms and the survival of successive generations of their offspring.
a. Explain that physical characteristics of organisms have changed over successive generations
b. Describe ways in which species on earth have evolved due to natural selection.
c. Trace evidence that the fossil record found in sedimentary rock provides evidence for the long history of changing life forms.

Georgia Ecosystem Project

Terrestrial

1. Blue Ridge Mountains
2. Appalachian Highlands
3. Bluff & Ravine Regions
4. Great Valley Forests
5. Grass/Herb Balds
6. Pine Flatwoods
7. Oak-Hickory Climax Forests
8. Mixed Pine-Hardwoods
9. Piedmont Province
10. Coastal Plains Region
11. Longleaf Pine Savannas

Wetlands

1. Cypress Swamps
2. Bay/Gum Swamps
3. Hammocks
4. Pocosin - Shrub/Forest Bogs
5. Herb Bogs
6. Flood Plains
7. Carolina Bays
8. River Marshes
9. Freshwater Marshes
10. Canebrakes
11. Salt Marshes

Aquatic

1. Mountain Streams
2. Mountain Rivers
3. Alluvial Rivers
4. Blackwater Rivers
5. Mountain & Piedmont Springs
6. Coastal Plains Springs
7. Limesink Depressions
8. Backwater Streams
9. Natural Lakes
10. Cypress Ponds
11. Sag & Gum Ponds

Coastal

1. Estuary/Sound
2. River Delta
3. Barrier Islands
4. Tidal Creeks & Rivers
5. Oyster Reef
6. Maritime Oak Forests
7. Dune Areas
8. Intertidal Beach Zones
9. Sponge & Coral Reefs
10. Ocean Benthos
11. Open Ocean

Abiotic Factors

Location
Physiography
Substrate
Elevation
Climate
Seasonal Variation
Surrounding Ecosystems

Biota

Producers
Consumers
Decomposers
Symbiotic Associations
Endangered Species

Human Impacts

Habitat Destruction
Pollution
Usage

Project Deadlines

8/21/12 - Topic Choice
8/28/12 - Detailed Outline & Map
9/6/12 - Producers, Consumers & Decomposers
9/13/12 - Endangered Species
9/18/12- Font, Header, & Background
9/25/12 - Abiotic Factors
10/2/12 - Human Impact
10/4/12 -Food Web
10/18/12 - Original Photo Essay & Creative Narrative Description
10/23/12 - PowerPoint Draft
11/1/12- Final Electronic Submission
11/20/12 - Printed Poster Due
11/27 & 11/29 - Presentations in Lab & Lecture