



UNIV 110

The Science Semester for Elementary Teacher Education

Spring 2006

Welcome to the Science Semester! Being an effective elementary science teacher requires knowing about science, as well as knowing how to help children learn science. The goal of the Science Semester is to help you examine, and enrich your knowledge, skills, and attitudes as a science learner, future teacher, and citizen. In the Science Semester, learning science and learning how to teach science go hand-in-hand. The Science Semester consists of specially designed versions of four courses: BISC 104 Principles of Biology; EDUC 341 Elementary Curriculum: Science; GEOL 113 Earth Science; and SCEN 102 Physical Science. These courses are integrated to emphasize their rich connections, and to reveal different disciplinary perspectives on the natural world, science education, and current social issues. The courses are connected to one another through investigations of current issues in science and elementary science education. By participating in these investigations, you will improve your inquiry skills, learn science content, and experience and reflect on teaching and learning strategies that you can use in your future elementary classroom.

Instructor Information		
Instructors	Office	E-mail & phone
BISC 104 Richard Donham, Mathematics & Science Education Resource Center	Room 108 200 Academy Street	donham@udel.edu 831-2617
EDUC 341 Danielle Ford, School of Education Zoubeida Dagher, School of Education	132F Willard Hall 103C Willard Hall	djford@udel.edu 831-6254 zoubeida@udel.edu 831-1667
GEOL 113 John Madsen, Department of Geology	101c Penny Hall	jmadsen@udel.edu 831-1608
SCEN 102 Harry Shipman, Department of Physics & Astronomy	124 Sharp Laboratory	harrys@udel.edu 831-2986

Goals of the Science Semester: The Science Semester is designed to help future elementary teachers develop integrated understandings, skills, and attitudes in science and science education. Student learning goals in the Science Semester address five interconnected categories: These instructional approaches are directed towards student learning goals in five interconnected categories:

Content Knowledge -- Improve understandings of major concepts, issues and methods in science and elementary science education

Inquiry -- Develop inquiry skills and reflect upon their inquiry experiences as future teachers.

Unifying Themes -- Explore unifying themes and distinguishing characteristics among the biological, earth and physical sciences.

Science/Technology/Society -- Examine science, technology, and science education in relation to personal, professional, and broader social issues.

Pedagogical Knowledge -- Experience and critically examine a variety of science teaching and learning strategies and their theoretical foundations.

Major Course Topics and Unifying Themes: As shown here, each course in the Science Semester addresses a number of major topics.

Biological science	Structure & function in living systems Life cycles of organisms Diversity and adaptations Organisms, ecosystems & energy
Earth science	Earth materials Earth systems Earth cycles Earth history & geologic time
Physical science	Energy Force and motion Properties of matter Earth in space Evolution of the universe
Elementary science curriculum	The nature & practice of science in scientific & everyday communities Diversity, equity, and science education Theories of childrens' science learning & assessment of their thinking Selecting & designing science curricula and resources Planning, enacting, assessing, & reflecting on inquiry science instruction

Course Requirements: These are the products and activities that you will complete in the Science Semester.

The scores you earn on these items will determine your final grade in each course. A general requirement for all assignments that ask for citations of resources used to complete the assignment is the use of a standard citation format. This required format is American Psychological Association (APA) style, which is typically used in education. The APA style format is described at: <http://www2.lib.udel.edu/ref/citationstyles/apa.pdf>.

Exams on Investigations. An examination will follow each of Investigations 1, 2, and 4. You will complete these exams as individuals, not in your groups. Each exam will cover the science topics related to the Investigation. Each question on the exams will be designated to apply to the grade in one of the science courses. Each exam will contain questions from all the science courses, but the total points on an exam will be weighted toward the course that is the primary focus of each Investigation (Investigation 1 - SCEN 102; Investigation 2 - BISC 104; Investigation 4 - GEOL 113). The format of the exams will be discussed in more detail in class. In general, the exams will contain mostly short answer and essay questions with a few multiple choice questions. The exams will require that you be able to describe, apply, explain, analyze, and justify issues, topics, concepts, research strategies, points of view, and decisions related to the Investigations. Investigation 3 (EDUC 341) will have a final project.

EDUC 341 Exams. Two exams will require you to explain, interpret, analyze, and apply the major course concepts from reading assignments, class discussion, class activities and assignments, the field experiences, and the weekly reflective writings. Format for the midterm will be a mix of short answer and short essay questions. The final exam will consist of longer, reflective essays.

Investigation Final Projects. These assignments will be the products of group work on the Investigations. The nature of these assignments will be described early in each Investigation, and subsequent work will build toward the final project. Each final project will be produced collaboratively by your home group. The base grade for the project will be the same for all group members. In some cases – we anticipate these will be very few --it may be adjusted to reflect the extent to which individual group members participated in the project. The grade for each final project will be applied to the course that is the primary focus of that Investigation (Investigation 1 - SCEN 102; Investigation 2 - BISC 104; Investigation 3 - EDUC 341; Investigation 4 - GEOL 113). No late assignments will be accepted. As part of completion of the final project, you will need to fill in a form that indicates the extent of each group member's participation in the project. This evaluation will be used in determining each group member's grade for the project. For example, if a group member receives an average percent participation score of only 50%, then s/he will receive a 50% reduction in the score awarded to the group's project.

EDUC 341 Individual Projects. You will complete two individual projects for EDUC 341 during the semester. They will focus on researching science questions that interest you, interviewing peers about science topics and analyzing your findings, and finding resources to support teaching these topics.

Field Experiences. The field experiences will introduce you to out-of-school science contexts: for example, science fairs (New Castle County Science Expo) and science field trips (Ashland Nature Center). Some of these field experiences will take place in shifts. More details about on-site assignments related to these experiences will be discussed later in the semester. Attendance at these field experiences, like all field experiences in the ETE program, is mandatory for all students. Attendance will be taken. Failure to attend any event for the entire scheduled time will result in serious consequences, as per School of Education policy.

Laboratory. Assignments related to the laboratories may include pre-lab writing assignments, lab reports, daily in-lab assignments, and quizzes. These will be described in more detail by the course instructors.

Group Participation. A peer group evaluation process will be used to assess group participation. Individual performance in the home groups will be assessed by each group member twice during the semester. You will also be asked to formally reflect on your own performance as part of this process. Evaluation forms will be filled out as a "take-home" assignment, then handed in by the due dates given in the schedule below. Individuals will receive the completed peer evaluations, with the name of the evaluator removed, after they have been reviewed by the course instructors. Evaluation forms will not be accepted after the due date, and the individual who fails to submit the forms on time will receive a "0" for that round of peer evaluation. In EDUC 341, attendance, preparedness for class, contribution to class discussion and reflective writing assignments will also be factored into a participation grade.

Daily assignments. These consist of individual and group assignments that are generally done as part of ongoing work on an investigation. Your signature on a completed assignment associated with each activity will be used to verify participation in the case of group assignments. There will be no opportunities to make up missed daily assignments.

Topics of the Investigations: Each investigation will focus on a few major issues and concepts. All the investigations are multidisciplinary, but each investigation will emphasize perspectives from one of the four courses in the Science Semester.

Investigation	Topics	Dates
Investigation 1. Physical science: "What is energy?"	Sources of energy; electricity; environmental Consequences of energy use; energy in chemical reactions; energy transformations	February 7 - 28
Investigation 2. Biology: "Kids, chemicals, and cancer"	Environmental health; cells & DNA; causes, effects & treatment of cancer; cancer clusters; public understanding of cancer	March 1 - 24
Special topics	Weather and Earth in Space	April 3 - 7
Investigation 3. Elementary science education: "Did my students learn what they're supposed to?"	Goals for science teaching; assessment at national, state, & classroom levels; selecting & customizing science curricula; aligning curriculum, instruction, assessment, & standards	April 10-April 27
Investigation 4. Earth science: " <i>Limulus polyphemus</i> ! Science semester investigates Delaware's state marine animal"	Horseshoe crab lifecycle & habitat; seasons; tides; coastal geology; water chemistry; technology and science	April 28-May 17

Laboratories: Laboratories are associated with each of the science courses in the Science Semester. The laboratories support and extend your investigations by giving you opportunities to clarify your conceptual understandings and to develop inquiry skills through hands-on activities. You will print handouts for the labs from WebCT, or in some cases hard copies will be provided to you. See the full syllabus and the Calendar on WebCT for the schedule of lab topics.

WebCT & E-mail: The UNIV 110 WebCT course homepage will be an indispensable resource for you this semester. You must have selected a UD Unix username in order to access WebCT. Go to Welcome to WebCT and click "For Students" for more information. The full syllabus, class calendar, materials and resources for the investigations, laboratory handouts, and other materials will be available on WebCT. WebCT will often be your only source for required course materials. You will also use WebCT to submit certain writing assignments and to complete some course projects. The Calendar on WebCT will provide the most up-to-date information concerning class activities, assignments, due dates, etc. You are responsible for the information on WebCT and you should visit it on a regular (daily) basis. We will also regularly use University of Delaware e-mail accounts to communicate with individuals and the whole class. Check your UD e-mail account daily. The course instructors will use only your UD e-mail address, so be certain that receive messages sent to your UD address. In these times of rampant Spam, you cannot assume that your UD e-mail will be forwarded reliably to another ISP account.

Academic Policies: The academic policies for the Science Semester (attendance, academic honesty, etc.) are the same as those stated in the University of Delaware's Official Student Handbook.

Groups: Ground Rules & Conflict Resolution. In the first week of class and again in the middle of the semester, you will be assigned to a group of students that will work together. Shortly after your groups are formed, at the start and middle of the semester, groups will be asked to draft a set of policies, or ground rules. Group ground rules are a set of principles, expectations, and consequences that will guide the conduct of group members. The ground rules reflect your group's vision of how group members should relate to one another. One purpose of group ground rules is to provide a basis for resolution of conflicts among group members that may arise during the semester. Two ground rules that are non-negotiable for all groups concern attendance and preparedness. Since absent and unprepared group members delay group progress on investigations, attendance and preparedness are mandatory.

Periodic peer evaluations will be used to monitor the function of the groups. These peer evaluations are intended to encourage open communication and a proactive approach to fostering productive relationships within home groups. Giving and receiving peer feedback is one way to determine whether all group members are conducting themselves in equitable and appropriate ways. The formal, written group evaluations will be conducted twice during the semester - once for each of the two different groups with which you will work.

If a conflict should arise in your group (including conflicts over uneven participation), the first step in resolving the conflict will be to discuss the issue with your group members, using your group's ground rules as a guide. If the conflict cannot be resolved by the group, one or more course instructors will, by request, serve as mediators. The Science Semester instructors reserve the right to take appropriate action to resolve disputes. Instructors may at their discretion assess grade penalties and/or take other actions as needed to address situations when individuals who do not fulfill their responsibilities as group members.

Class Attendance. Attendance at all class sessions is mandatory. If you have an excused absence (e.g., serious illness, emergency, death in the family, military duty, and official University activities), notify an instructor and your home group members in advance, or as soon as possible following the absence. Provide your group, as soon as possible, with any group work that was assigned to you prior to the absence. There will be no opportunities to make up daily assignments or other course requirements due to unexcused absences. If you have no written verification of an excused absence, you'll receive a score of "0" for missed assignments. See the Official Student Handbook for more information on excused, unexcused absences and class attendance.

Academic Honesty. During the investigations this semester, you are encouraged to consult a wide variety of sources, including other students, faculty members, and other experts inside and outside the University. However, when you use words and ideas that are not your own, you must acknowledge and fully cite your sources.

Some assignments this semester will be group products. For group assignments, all individuals who equitably contribute to the product will receive the same score. In the case of group products, the same expectations for academic honesty that apply to individuals apply to your group. That is, your group must produce a product that is unlike that of any other group, and which represents the sum total of the original, creative efforts of the group members. If you are in doubt concerning the application of these policies to a particular assignment, ask a course instructor.

Other assignments this semester will be traditional individual products. While you can discuss general ideas about individual assignments with other students, what you produce must be your own work. The product must represent your own creative efforts and be in your own words. Completed assignments must not be shown to other students in the class before they are handed in for grading. See the Official Student Handbook on Academic Honesty.

Grades: You will receive a separate final grade for each course in the Science Semester. Final grades in each course will be assigned based on the absolute percentage of total points you earn. This is not a "curved" grading system, which means that your success in the course will not hinge on someone else's lack of success.

93.00 and above -- A	80.00-82.99 ---- B-	67.00-69.99 ---- D+
90.00-92.99 ---- A-	77.00-79.99 ---- C+	63.00-66.99 ---- D
87.00-89.99 ---- B+	73.00-76.99----- C	60.00-62.99 ---- D-
83.00-86.99 ---- B	70.00-72.99 ---- C-	Below 59.99 ---- F

Weighting of final course grades. In **BISC 104, GEOL 113, & SCEN 102**, assignments will be weighted as follows when calculating the final course grades:

Assignment or activity	Number of points for each assignment	Anticipated contribution to each final course grade
End of investigation exams	200	40%
Investigation final project	100	20%
Course laboratory	See laboratory syllabi for details	15%
Group evaluations	5	5%
Daily assignments	5-10	20%

In **EDUC 341**, assignments will be weighted as follows when calculating the final course grade:

Assignment or activity	Relative contribution to final course grade
Final course exam	20%
Mid-term course exam	20%
Investigation 3 final project	20%
Participation*	10%
Individual assignments	30%

(*Participation includes attendance, contribution to class discussions, individual assignments pertaining to group work, and reflective writing assignments)

Due Dates for Exams, Projects and Peer Evaluations: This table contains due dates for the major examinations, projects and peer evaluations. Due dates for daily assignments, interim products of investigations, reflective writings, lab activities and other assignments will be announced in class and posted on the WebCT Calendar. The best way to plan for these other course requirements is to expect to have at least one assignment due every day.

Course Event	Date
Last group work for Investigation 1	Monday, February 27
Exam on Investigation 1	Tuesday, February 28
Peer group evaluation 1	Tuesday, February 28
EDUC 341 Individual Assignment 1	Thursday, March 2
EDUC 341 Individual Assignment 2	Thursday, March 16
EDUC 341 Midterm	Tuesday, March 21
Final project Investigation 2	Thursday, March 23
Exam on Investigation 2	Friday, March 24
Peer Group Evaluation 2	Friday, March 24
Final project Investigation 3	April 26 and 27
Peer group evaluation 3	Friday, April 28
Final project Investigation 4	Wednesday, May 17
Exam on Investigation 4	Friday, May 19
EDUC 341 Final	Monday, May 22

Books Required for this Course: The table below sets forth the authors' name or other identifier of the books which will be used in various parts of this course, the course that they are listed under in the two bookstores which have been surveyed, and some observations made on Feb 1 and Feb 2.

Book	Bookstore location
Cherry – River Ran Wild Krajick – Teaching Science in Elementary Classrooms	EDUC 341 secs 41-44
Krogh – Biology - 3 rd edition	BISC 104 secs 41-44
Tarback/Lutgens – Foundations of Earth Science Sargent – Crab Wars	GEOL 113 secs 41-44
Hewitt - Conceptual Physical Science Explorations	SCEN 102, secs 41-44

In addition to these books, the following learning resources will be used extensively in this course:

Classroom reference texts (Gore 208, in the metal cabinet)

Supplemental readings and links to the Internet on the UNIV 110 WebCT home page

Morris Library and reference room consultants

Course instructors and other "expert" consultants

The internet, in particular data bases on the internet