

**Department of Mathematics and Science Education
Secondary Science Teacher Education Program
Spring Semester 2008
ESCI 4450/6450, ESCI 4460/6460, and ESCI 3450**

Class Meeting Time: M-F 8:00-9:55

Meeting Locations: 220 Aderhold Hall; Morgan County High School and Clarke County Middle School
(The course web-link is WEBCT for the upload of all course assignments).

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Introduction

In these courses you will have opportunities to participate in many of the responsibilities that science teachers do as a part of their daily professional life. You will be observing and teaching in both the middle and high school classrooms in 4-week rotations. In each rotation the first week will be spent observing teaching in non-science subjects of your choice, during the second week you will observe and teach in a secondary science subject (not your major areas), and in the third and fourth weeks you will observe and teach in areas that you could be expected to teach. Along with the rotations you will be engaged in many other activities that should help to prepare you for your teaching career. In addition, we will explore innovative teaching methods, participate in science fairs, present at the Georgia Science Teachers Association annual conference, and investigate how science can be learned through fieldtrips. We hope that you have a productive and enjoyable semester.

ESCI 4450/6450 Science Curriculum and Learning

Science curriculum models for students in grades 7 through 12 in relation to goals for science education and classroom practice. Development, selection, and evaluation of curriculum.

ESCI 4460/6460 Methods of Science Teaching

Science instructional strategies and classroom assessment for grades 7 through 12. Classroom management, lesson planning, and safety in the science classroom.

Prerequisite: EPSY 2020/2130 and EFND 2030/2110

ESCI 3450 Practicum in Science Education

Intensive school-based experiences in grades 7 through 12 requiring students to teach in varied cultural and regional settings (the middle school experience will be primarily outside of science).

Co-requisite: ESCI 3450 and ESCI 4450/6450

Prerequisite: EPSY 2020/2130, EFND 2030/2110, ESCI 4480/EDIT 2000

Nature of Course Syllabi

The course syllabi for ESCI 4450/6450, ESCI 4460/6460, and ESCI 3450 are plans for the courses; deviations announced to the class by the professors may be necessary. WEBCT will serve as the platform for communication and feedback about many of the course assignments. Information about how to use WEBCT to facilitate your work will be presented in an early class session.

Attendance Policy

Attendance and punctuality are critical elements of teacher professionalism. It is recognized that students (and even teachers!) get sick, attend professional meetings, and have family emergencies, but attendance and participation are prerequisites to learning. For the purposes of class attendance only, since we have 3 courses, 2 periods missed, associated with each course will be allowed. However, it will not be considered professional to miss six successive days during the practicum phases of the semester. If you miss more than six class periods during the semester, you may be dropped from the three block courses.

For the purposes of the practicum, arrive 30 minutes prior to the start of the school day. If you arrive later than 30 minutes prior, you will be considered late, which is not professional. Also, all students will be required to dress professionally to represent UGA well. "Professionally" means that no jeans or t-shirts are allowed, not even on school spirit or dress-down days, UGA students should always look professional.

Academic Honesty

The University of Georgia seeks to promote and ensure academic honesty and personal integrity among students and other members of the University community. In keeping with the University Honor Code and Academic Honesty Policy, each student is expected to do his/her academic work and to acknowledge fully any assistance and academic resources. All academic work must meet the standards contained in "A Culture of Honesty." All students are responsible to inform themselves about those standards before performing any academic work. Terms of this policy, resolution procedures, and consequences of violation are available at:

http://www.uga.edu/ovpi/academic_honesty/culture_honesty.html

Requests for Modifications

It is policy of the University of Georgia to make reasonable accommodations for qualified individuals with disabilities. If you are a person with a disability and want to request accommodations to complete your course requirements, please make an appointment with the course professors as soon as possible to discuss your request. For information on documentation requirements, contact the office of Disability Services (2-8719).

A Note about Observations

During the semester you will be observed as you teach by your university professors or graduate assistants (teaching assistant and interns), classroom teachers, and your classmates. These observations are opportunities to gain insight into your teaching through the perspectives of others. Talking about your teaching with others is an important mechanism for improving your understandings about science content, teaching, and learning. Several assignments for ESCI 4450/6450 and ESCI 4460/6460 require that you make arrangements to have professors or TA observe you teach.

Textbooks Required

Chiappetta, E. L., & Koballa, T. R. (2006). *Science instruction in middle and secondary schools*. Upper Saddle River, NJ: Merrill Prentice-Hall.

Wilson, E.O. (2002). *The future of life*. New York: Alfred A. Knopf.

Semester Requirements and Grading Summary

- 1. Attendance and participation 15% (=150 points)**
- 2. Development of NSTA Standards Assignments 50% (=1150 points)**
 - Standard #1: Content = 75 points**
 - Standard #2: Nature of Science = 75 points**
 - Standard #3: Inquiry = 75 points**
 - Standard #4: Issues = 100 points**
 - Standard #5: General Skills in Teaching = 300 points**
 - Learning Environment Plan = 100 points**
 - Demonstration Lesson = 100 points**
 - Laboratory Lesson = 100 points**

- Standard #6: Curriculum = 150 points**
- Standard #7: Science in the Community = 100 points**
- Standard #8: Assessment = 100 points**
- Standard #9: Safety and Welfare = 100 points**
- Standard #10 Professional Growth = 100 points**

3. Teaching Practicum 25% (= 500 points)

4. Final Portfolio 10% (= 200 points)

Total Possible Points = 2000 points

Grades are assigned by summing each students' points and dividing by 2000 to obtain a percentage with 93-100 percent = A; 90-92 percent = A-; 87-89 percent = B+; 83-86 percent = B; 80-82 percent = B-; 77-79 percent = C+; 73-76 percent = C; 70-72 percent = C-; etc.

ESCI 4450/6450: Science Curriculum and Learning

In this course, you will learn about essential aspects of science curriculum and how curriculum can be used to enable student learning. The course is organized around three major themes: (1) science is a way of thinking and investigating as well as a body of knowledge, (2) effective instructional planning enables and facilitates student learning, and (3) standards and assessment are inextricably linked, guiding how teachers teach and what students learn. Topics to be addressed include: the nature of science, inquiry, social context of science teaching, context of science, curriculum, and professionalism.

The following driving questions will be explored in this course:

1. What is the nature of science? How can school science help students become scientifically literate citizens?
2. What does inquiry look like in the context of school science?
3. How can community resources and students' interests be used to plan science lessons that are relevant and appropriate?
4. What innovative instructional materials are available for use in guiding students' science learning?
5. How can teachers plan instructional units to actively engage students in meaningful science learning?
6. What are your personal teaching goals and philosophy of teaching? How can participation in activities of the professional community of science teachers enable you to develop as a teacher?

Course Goals

By the end of this semester, you will be able to:

- Demonstrate your understanding of what constitutes a curriculum and plan a unit of study within your area of content specialization.
- Plan and teach lessons that focus on issues and science in the school community and know how the community is part of the school and vice versa.
- Show that you understand the hierarchical organization of core concepts in the science discipline you will teach.
- Plan an instructional unit that help student learning and develop an interest in science.
- Be able to create and classroom environment that is safe and has the welfare for all who are a part of your teaching.

Course Participation

1. Attendance and participation (50 points) – (explained in the introduction to the block courses).

ESCI 4450/5450 Curriculum Course Assignments

If you have questions about any assignment, please consult the professors or TA. The assignments may have a performance (i.e., teaching) component and a written component (all assignments must be typed).

For full descriptions of the standards and their relationship to teaching see the course handbook:

- 2. Standard #4: Issues = 100 points**
- 3. Standard #6: Curriculum = 150 points**
- 4. Standard #7: Science in the Community = 100 points**

- 5. Standard #9: Safety and Welfare = 100 points**
6. Standard #10 Professional Growth = 100 points
Total Points = 600 points

ESCI 4460/6460: Methods of Science Teaching

In this course, you will learn the essential elements of planning, teaching, and assessment in the secondary science classroom. The course is organized around three major themes: (1) engaging students in active learning in science, (2) teaching science for all students, and (3) continuing to learn from your own teaching. Topics to be addressed include: science content, teaching skills, assessment, and environment for learning. The following driving questions will be explored in this course:

1. How do adolescents learn science? What is the difference between learning and just completing the task?
2. How can teachers plan instruction to actively engage students and present a variety of representations?
3. How can teachers teach so that all students may learn science?
4. How can teachers organize the classroom environment to facilitate student learning?
5. What are the most effective ways to assess students' science learning?

Course Goals

By the end of this semester, you will be able to:

- Demonstrate knowledge of the fundamental skills needed for planning, teaching, and assessing in the secondary classroom.
- Show that you can effectively engage students in active science learning through multiple teaching strategies.

Course Requirements and Grading Summary

If you have questions about any assignment, please consult the professors. The assignments may have a performance (i.e., teaching) component and a written component (all assignments must be typed).

- 1. Attendance and participation (50 points)** – (explained in the introduction to the block courses).
 - 2. Standard #1: Content = 75 points (based on E.O. Wilson's Future of Life -- Curriculum Unit)**
 - 3. Standard #2: Nature of Science = 75 points**
 - 4. Standard #3: Inquiry = 75 points**
 - 5. Standard #5: General Skills in Teaching = 300 points**
 - Learning Environment Plan = (100 points)**
 - Demonstration Lesson = (100 points) (align with E.O. Wilson's Future of Life)**
 - Laboratory Lesson = (100 points) (align with E.O. Wilson's Future of Life)**
 - 6. Standard #8: Assessment = 100 points**
- Total Points = 575 points**

Grades are assigned by summing each students' points and dividing by 500 to obtain a percentage with 93-100 percent = A; 90-92 percent = A-; 87-89 percent = B+; 83-86 percent = B; 80-82 percent = B-; 77-79 percent = C+; 73-76 percent = C; 70-72 percent = C-; etc.

ESCI 3450: Practicum in Science Education

In this practicum, you will interact with students and teachers in schools. The intent of this practicum is to allow you to experience science teaching and learning in middle and high school classrooms. The practicum will also enable you to test some of your developing understandings about students, teaching, planning, assessment, and the learning environment. The topics addressed in the practicum are the same as those described for ESCI 4450/6450 and ESCI 4460/6460. While in science classrooms, you will observe, work with small groups of students, assist classroom teachers in many ways, and teach lessons. It is important to remember that while in schools and interacting with teachers and students, **YOU ARE THE UNIVERSITY of GEORGIA** (see attendance policy for standards of professional dress/ promptness).

The driving questions and course goals for this practicum are the same as those for ESCI 4450/6450 and ESCI 4460/6460. Your time in science classrooms should enable you to develop more informed answers for the overarching aims and questions and achieve the goals within a context of secondary science.

Course Requirements and Grading Summary

- 1. Attendance and participation (50 points)** – (explained in the introduction to the block courses).
- 2. Judging 2 Science Fairs = 25 points/Fair = 50 points**
- 3. Soaring in Science Day = 25 points**
- 4. GSTA Presentation = 50 points**
- 5. Teaching at the high school level = 200 points**
- 6. Teaching at the middle school level = 200 points**
- 7. Fieldtrips (Georgia Nature Center/Sandy Creek/Botanical Garden/Stinky Creek/Museum) – 100 points**
- 8. Field Journal Entries (5 points per entry) 210 points (you must have 42 entries).**
- 9. Interview a “Partner in Education” 15 points**
- Teaching Experiences = 800 points**

Grades are assigned by summing each students' points and dividing by 500 to obtain a percentage with 93-100 percent = A; 90-92 percent = A-; 87-89 percent = B+; 83-86 percent = B; 80-82 percent = B-; 77-79 percent = C+; 73-76 percent = C; 70-72 percent = C-; etc.

Final Portfolio 10% (= 200 points)

A selection of 20 evidences, 2 each that represent the (ten) National Science Standards for Teachers and reflect your preparation for the teaching profession at the end of the course. These pieces will be enter into your portfolio on WEBCT and should be added throughout the semester.

Daily Practicum Tasks

1. Find the appropriate place to park in the school lot. Introduce yourself at the office as a future science teacher representing the University of Georgia. Always be patient and courteous, “wear” a smile, and comment positively about the school, students, and teachers. Your positive comments may make someone’s day, it’s infectious, and they will remember and look forward to your arrival each day.
2. “Sign in” in the office upon your arrival, use your nametag, and “sign out” when you exit the school. Remember that the principal is responsible for knowing at all times, who is in their building. You are required to follow UGA safety procedures, even if the teacher and students are not following the safety requirements, for example goggles for eye protection. You may look out of place, but will ensure safety).
3. Walk around the campus so you get to know more about the high school and middle school science areas, where the faculty restrooms are located, etc.
4. If one exists, consider visiting the faculty workroom to find out what goes on there. It is recommended that you not discuss politics or religious affiliations. For issues that involve the politics of the school, remain neutral or quiet—you are a visitor and guest of the school, not a sounding board, mediator, or negotiator. Similarly, some teachers may use the faculty workroom to complain about colleagues or students. Avoid the discussion, but learn from what you hear.

Possible Practicum Experiences

1. Examine the school’s web site. From the web site or other sources, learn about the school motto, mascot, philosophy and rules. If you don’t find the student handbook and school calendar, ask where this information can be obtained. The student handbook includes information about school rules, grading, homework arrangements, curriculum, extracurricular activities, etc.
2. Make a sketch of the classrooms you are working in and learn the names of students. Do this the first day and memorize the names of students the first night. This is not only the first element of effective classroom management, but it shows the students that you care about who they are. Ask your teacher about how she/he prepares for the first day of school, introduces the year’s work and

classroom rules. What are the safety rules in the science classroom and how are emergencies handled, first aid, and fire extinguishers? Is students' work displayed in the classroom? If teachers are using a computerized system for record keeping, ask to see how it is done. 3. Conduct interviews with first-year teachers and ask them about the joys and challenges that they associate with their jobs. Write a report summarizing the teachers' responses and giving your opinion about whether you share their ideas about the joys and challenges of teaching.

3. Interview a science teacher who has served as the mentor for beginning teachers in the past. Ask the teacher about his or her expectations for a beginning science teacher in the areas of lesson planning, instruction, classroom management, and learning assessment. Prepare a report summarizing your findings and drawing conclusions regarding your own preparation for science teaching.
4. The Georgia Science Teachers Association (GSTA) is the community of science teachers in Georgia that has an annual conference when you can learn what your colleagues are doing from around the state. Vendors are also present with books and resources available with many free samples.
5. The National Science Teachers Association (NSTA) is the largest organization in the world committed to the advancement of science teaching. Access the NSTA web site [www.nsta.org] and check out its teacher resources, events for science teachers, and professional journals—*The Science Teacher*, for high school teachers, and *Science Scope*, for middle school teachers. Join NSTA as a student.
6. Start a notebook of science teaching ideas and materials. Organize your notebook into sections (e.g., classroom management, assessment, safety, demonstrations, etc.) and add your reflections.
7. Interview two students about their science learning experiences. In a paragraph, describe how their comments reflected the themes of scientific literacy: (1) science as a way of thinking, (2) science as a way of investigating, (3) science as a body of knowledge, and (4) science, technology and society.
8. Gather instructional materials from a teacher that he or she uses to teach students about the nature of science. Compare the concepts taught by the teacher with those discussed by Dr. William McComas, in his 1998 chapter about the myths of science. [This chapter will be provided for you on WEBCT]
9. Administer Chiappetta and Koballa's "Myths of Science" quiz to several teachers or students and then discuss their answers with them. Write a paragraph that describes their responses to the quiz and thinking about the nature of science. [p. 90 of your textbook].
10. Draw a floor plan for a middle school or high school classroom that would facilitate quality science instruction and reduce the probability of student misbehavior. On the floor plan, show the location of students' and teacher's desk, student laboratory stations, safety equipment (e.g., first aid kit, fire blanket, safety shower, etc.), materials and equipment storage, chalkboard or overhead projector and screen, and doorways. Also draw lines to represent student traffic patterns.
11. Observe a science class taught by a veteran teacher and pay particular attention to how he or she addresses the areas of classroom management, including interpersonal relationships, organization and management, and lesson design and teaching. Arrange to meet with the teacher after the class to discuss your observations. Direct the discussion to have the teacher talk about his or her reasons for the management decisions and strategies you observed.
12. Talk with a school principal or the assistant principal in charge of discipline. Ask about the school's disciplinary procedures and under what conditions it is considered appropriate for teachers to send students to the school office for discipline. 13. Select a concept or topic from a middle or high school science course that you believe students find boring. Develop a plan to teach the concept or topic.
13. Interview two science teachers about their lesson assessment practices.
14. Develop a set of class rules that you would display in your classroom. Show the class rules to science teachers and ask what changes they would recommend. Write a paragraph that describes how you would introduce class rules to students. Include in your paragraph information about the level of student involvement in constructing the class rules.
15. Ask a veteran science teacher to assess his or her own lesson assessment practices using the checklist presented in Table 6.3 of the textbook. Discuss your own thoughts with him or her about lesson assessment and determine what changes he or she would suggest to improve the checklist.
16. Interview two science teachers about the Georgia Performance Standards for the courses that they teach. Ask how they new standards will impact their teaching and student learning.
17. Show your map of the core concepts in the science discipline you plan to teach to veteran science teachers. Have them comment on your map and describe a map that they might construct.
18. Talk with teachers about technology that they consider valuable resources for teaching science.

19. Ask teachers to allow you to examine curriculum units that they have developed. After examining the units, talk with the teachers about them. Ask about the vision and philosophy that supports the unit.
20. Make arrangements to observe a lesson taught by a veteran middle or high school science teacher and to speak with the teacher after the lesson. Ask the teacher about the lesson's purpose, planning, instruction, classroom management, and assessment. Write a paragraph about your experience.
21. Find out what resources are available for teaching science. Also, check out the library/media center for science books, videos, etc. What is the annual science budget? Is it different for other subjects?
22. Interview any two of the following school staff people to gain their perspectives of the school, their role in the lives of students and teachers, and why they enjoy their careers: office staff worker, cook, custodian, nurse, guidance counselor, security officer, bus driver, etc.
23. During one lesson observation make a seating chart and record the distribution of classroom discussion by making a tally of the way the period is spent. Your recording categories could be: discussion, worksheet assignments, group work, question-and-answer, student note taking, etc. Your tallies may reveal differences by gender, race, or room position. Write a summary of observations.
24. Observe two lessons that are other than science. Carefully focus on the style of instruction. How do the lessons compare to science lessons? What seems to make science lessons unique?
25. Request a copy of the year's syllabus for the classes you observe. Also, ask for some sample lesson plans and tests. Become familiar with the Georgia Performance Standards for classes you observe.
26. Teach as often as possible. First consider team-teaching with a peer or your mentor teacher. Also, request to teach small groups of students. Then, try to teach a lesson or part of a lesson on your own.

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| <p>1. Content. Teachers of science understand and can articulate the knowledge and practices of contemporary science. They can interrelate and interpret important concepts, ideas, and applications in their fields of licensure; and can conduct scientific investigations. To show that they are prepared in content, teachers of science must demonstrate that they (a) understand and can successfully convey to students the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields as recommended by the National Science Teachers Association;</p> | |
| <p>(b) understand and can successfully convey to students the unifying concepts of science delineated by the National Science Education Standards;</p> | |
| <p>(c) understand and can successfully convey to students important personal and technological applications of science in their fields of licensure;</p> | |
| <p>(d) understand research and can successfully design, conduct, report and</p> | |
| <p>(e) evaluate investigations in science; and understand and can successfully use mathematics to process and report data, and solve problems, in their field(s) of licensure.</p> | |
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| <p>2. Nature of Science. Teachers of science engage students effectively in studies of the history, philosophy, and practice of science. They enable students to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science. To show they are prepared to teach the nature of science, teachers of science must demonstrate that they</p> | |
| <p>(a) understand the historical and cultural development of science and the evolution of knowledge in their discipline;</p> | |
| <p>(b) understand the philosophical tenets, assumptions, goals, and values that distinguish science from technology and from other ways of knowing the world; and</p> | |
| <p>(c) engage students successfully in studies of the nature of science including, when possible, the critical analysis of false or doubtful assertions made in the name of science.</p> | |
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| <p>3. Inquiry. Teachers of science engage students both in studies of various methods of scientific inquiry and in active learning through scientific inquiry. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to develop concepts and relationships from empirical experiences. To show that they are prepared to teach through inquiry, teachers of science must demonstrate that they (a) understand the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge; and</p> | |
| <p>(b) engage students successfully in developmentally appropriate inquiries that require them to develop concepts and relationships from their</p> | |

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| observations, data, and inferences in a scientific manner. | |
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| <p>4. Issues. Teachers of science recognize that informed citizens must be prepared to make decisions and take action on contemporary science- and technology-related issues of interest to the general society. They require students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values. To show that they are prepared to engage students in studies of issues related to science, teachers of science must demonstrate that they</p> <p>(a) understand socially important issues related to science and technology in their field of licensure, as well as processes used to analyze and make decisions on such issues; and</p> | |
| <p>(b) engage students successfully in the analysis of problems, including considerations of risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals and values of the students.</p> | |
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| <p>5. General Skills of Teaching. Teachers of science create a community of diverse learners who construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies. To show that they are prepared to create a community of diverse learners, teachers of science must demonstrate that they</p> <p>(a) vary their teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding; (b) successfully promote the learning of science by students with different abilities, needs, interests, and backgrounds;</p> | |
| <p>(b) successfully promote the learning of science by students with different abilities, needs, interests, and backgrounds;</p> | |
| <p>(c) successfully organize and engage students in collaborative learning using different student group learning strategies;</p> | |
| <p>(d) successfully use technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science;</p> | |
| <p>(e) understand and build effectively upon the prior beliefs, knowledge, experiences, and interests of students; and</p> | |
| <p>(f) create and maintain a psychologically and socially safe and supportive learning environment.</p> | |
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| <p>6. Curriculum. Teachers of science plan and implement an active, coherent, and effective curriculum that is consistent with the goals and recommendations of the National Science Education Standards. They begin with the end in mind and effectively incorporate contemporary practices and resources into their planning and teaching. To show that they are prepared to plan and implement an effective science curriculum, teachers of science must demonstrate that they</p> <p>(a) understand the curricular recommendations of the National Science Education Standards, and can identify, access, and/or create resources and activities for science education that are consistent with the standards; and</p> | |

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| (b) plan and implement internally consistent units of study that address the diverse goals of the National Science Education Standards and the needs and abilities of students. | |
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| 7. Science in the Community. Teachers of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage students in science-related studies or activities related to locally important issues. To show that they are prepared to relate science to the community, teachers of science must demonstrate that they (a) identify ways to relate science to the community, involve stakeholders, and use community resources to promote the learning of science; and | |
| (b) involve students successfully in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community. | |
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| 8. Assessment. Teachers of science construct and use effective assessment strategies to determine the backgrounds and achievements of learners and facilitate their intellectual, social, and personal development. They assess students fairly and equitably, and require that students engage in ongoing self-assessment. To show that they are prepared to use assessment effectively, teachers of science must demonstrate that they (a) use multiple assessment tools and strategies to achieve important goals for instruction that are aligned with methods of instruction and the needs of students; | |
| (b) use the results of multiple assessments to guide and modify instruction, the classroom environment, or the assessment process; and | |
| (c) use the results of assessments as vehicles for students to analyze their own learning, engaging students in reflective self-analysis of their own work. | |
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| 9. Safety and Welfare. Teachers of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field. To show that they are prepared, teachers of science must demonstrate that they (a) understand the legal and ethical responsibilities of science teachers for the welfare of their students, the proper treatment of animals, and the maintenance and disposal of materials; | |
| (b) know and practice safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction; | |
| (c) know and follow emergency procedures, maintain safety equipment, and ensure safety procedures appropriate for the activities and the abilities of students; and | |
| (d) treat all living organisms used in the classroom or found in the field in | |

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| a safe, humane, and ethical manner and respect legal restrictions on their collection, keeping, and use. | |
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| 10. Professional Growth. Teachers of science strive continuously to grow and change, personally and professionally, to meet the diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment. To show their disposition for growth, teachers of science must demonstrate that they | |
| (a) engage actively and continuously in opportunities for professional learning and leadership that reach beyond minimum job requirements; | |
| (b) reflect constantly upon their teaching and identify ways and means through which they may grow professionally; | |
| (c) use information from students, supervisors, colleagues and others to improve their teaching and facilitate their professional growth; and | |
| (d) interact effectively with colleagues, parents, and students; mentor new colleagues; and foster positive relationships with the community. | |