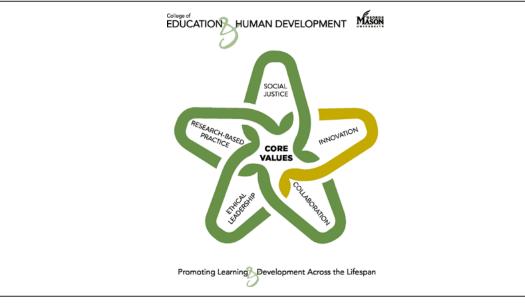
"What greater or better gift can we offer the Republic than to teach and instruct our youth?"

Cicero

George Mason University College of Education and Human Development Secondary Education Program

EDCI 573:001 TEACHING SCIENCE IN THE SECONDARY SCHOOL Fall Semester, 2014



Instructor:	Dr. Stephen Burton
Date and Time:	August 27 – Dec 10 (Wednesdays 4:30-7:10 pm)
Class Location:	Thompson 2020
Telephone:	616-502-2175
E-mail:	sburton7@gmu.edu
Office Hours:	By appointment
TEXT BECOUDCE	•

Text Resources

• Herr, N. (2008). The sourcebook for teaching science: Strategies, activities and instructional resources (Grades 6-12). San Francisco: Jossey-Bass.

ONLINE RESOURCES

- Achieve, Inc. on behalf of the twenty-six states and partners that collaborated on the NGSS (2013). Next Generation Science Standards (2013). Achieve, Inc. Available online at http://www.nextgenscience.org/next-generation-science-standards
- Commonwealth of Virginia (2010). *Standards of Learning for Virginia Public Schools*. Richmond, Virginia. Retrieved on August 14, 2011 from <u>http://www.doe.virginia.gov/testing/index.shtml</u>
- Commonwealth of Virginia (2003). Science Standards of Curriculum Framework Guides. Retrieved on August 14, 2007 from http://www.pen.k12.va.us/VDOE/Instruction/sol.html#science.

- National Research Council (1996). National science education standards. Washington, DC: National Academy Press. Available online at http://www.nap.edu/openbook.php?record_id=4962
- National Science Teachers' Association. *Science Class* newsletter. Retrieved on August 14, 2007 from <u>http://www.nsta.org/publications/enewsletters.aspx</u>.
- American Association for the Advancement of Science (1993). Benchmarks for Science Literacy. Retrieved on August 14, 2007 from http://www.project2061.org/tools/benchol/bolframe.htm.
- McComas, W. F. (1998). The principle elements of the nature of science: Dispelling the myths. Retrieved on August 14, 2007 from http://coehp.uark.edu/pase/TheMythsOfScience.pdf.
- Peters, E. E. (2006). *Why is teaching the nature of science so important?* Retrieved on August 14, 2007 from <u>http://www.vast.org/content/File/v1n1/linkedwhole.pdf</u>.
- American Chemical Society (2007). *Educators & Students page*. Retrieved on August 14, 2007 from <u>http://www.chemistry.org/portal/a/c/s/1/educatorsandstudents.html</u>.
- American Chemical Society (2003). *Safety in Academic Chemistry Laboratories Accident Prevention for Faculty and Administrators*. (800 227-5558) Free single copies or online: <u>http://membership.acs.org/c/ccs/pubs/sacl_faculty.pdf</u>
- U.S. Government Printing Office (2007). *Code of Federal Regulations*. Retrieved on August 14, 2007 from http://www.gpoaccess.gov/cfr/index.html.
- U.S. Department of Labor (2007). *Occupational Health and Safety Administration*. Retrieved on August 14, 2007 from <u>http://www.osha.gov/</u>.
- American National Standards Institute (2007). *American National Standards Institute Homepage*. Retrieved on August 14, 2007 from <u>http://www.ansi.org/</u>.
- Maryland Public Schools (2007). *Legal Aspects of Laboratory Safety*. Retrieved on August 14, 2007 from http://mdk12.org/instruction/curriculum/science/safety/legal.html.

Other articles/handouts will be distributed in class or posted on-line at the course website. (Your GMU email address is required for communication with the course instructor and for using Blackboard!)

COURSE MATERIALS ONLINE

The Blackboard site can be found at http://mymasonportal.gmu.edu. Use the same login as your GMU email. Materials will be added throughout the semester based upon needs from the course.

COURSE DESCRIPTION

EDCI 573 is the first course in a two-part sequence of science methods courses for pre-service and provisionally licensed science teachers. The course is designed to build fundamental knowledge of science teaching and learning including standards-based curriculum design and research-based teaching strategies. The course focuses on developing inquiry-based lessons for students to investigate science and assessing student understanding of science and the nature of science. The teachers will plan lessons for students to learn science, implement lessons in a high school classroom, observe students learning, and evaluate their teaching and student outcomes. Field experience is a required part of this course.

NATURE OF COURSE DELIVERY

A variety of teaching strategies will be used to explore the themes of the day. All students will continuously analyze and evaluate teaching strategies, as well as science content, processes, and ways of knowing in science.

GOALS

The pre-service and provisionally licensed teacher will:

- Build a repertoire of science teaching and assessment strategies by reading, writing, observing, participating in, and reflecting on the teaching and learning of science; RESEARCH-BASED PRACTICE; SPA STANDARDS 1, 3, 5, 6, 8, 10
- Develop strategies to help students become scientifically literate, think critically and creatively, understand the nature of science, and see the importance of science as a way of knowing; ETHICAL LEADERSHIP; INNOVATION; SPA STANDARDS 2, 3, 4
- Plan standards-based (local, state, and national) units of science study including daily lesson plans for students that reflect research in effective science teaching and learning; RESEARCH-BASED PRACTICE; SPA STANDARD 5, 6, 8, 10
- Construct science lessons that include alignment of objectives, activities, and assessments that address the needs of a variety of student populations including English language learner, special needs students, and gifted and talented students; ETHICAL LEADERSHIP; SPA STANDARDS 8, 10
- Learn about science laboratory safety and plan teaching activities that highlight safety; ETHICAL LEADERSHIP; SPA STANDARD 9
- Work collaboratively with peers to teach and discuss science and science teaching. COLLABORATION; SPA STANDARD 10
- Incorporate environmental sustainability into teaching paradigms and into daily life. SOCIAL JUSTICE; SPA STANDARD 4

RELATIONSHIP TO PROGRAM GOALS AND PROFESSIONAL ORGANIZATIONS

EDCI 573 is the first course in a two-course sequence of science methods courses for students seeking a secondary school teaching license in earth science, biology, chemistry, or physics. The course builds on students' knowledge of their subject matter. The course focuses on the teaching of science as called for by the state and national science standards and as outlined by the National Council for Accreditation of Teacher Education (NCATE), the National Science Teachers Association (NSTA), and the Interstate New Teacher Assessment and Support Consortium (INTASC). EDCI 573 builds a repertoire of science teaching and assessment strategies to facilitate student learning.

FIELD EXPERIENCE SIGNUP

The State of Virginia requires a number of hours of field work before you can do your internship. You will acquire 15 of those hours during this class. The university will place you in the field.

The website to sign up is http://cehd.gmu.edu/endorse/ferf.

COMMUNICATION

If you would like to get in touch with me, email is the best form (<u>sburton7@gmu.edu</u>). During usual circumstances, turnaround time is 24-36 hours. You can also reach me on my cell phone at 616-502-2175. However, please text me first using that phone asking if I can receive a call at that time. If I do not respond right away, then I am unavailable. I will, however, text back later and we can schedule a time to talk on the phone.

LEARNING OBJECTIVES AND ASSESSMENTS:

Below are the major learning objectives that you will be held accountable for in this course and the assessments that will be used to evaluate your achievement of the objectives.

LEARNING OBJECTIVES:	Assessment:
A student will be able to consistently write measureable objectives	Lesson Plan 2
A student will be able to develop assessments aligned with measureable objectives	Lesson Plan 2
A student will be able to design a lesson in which students are actively engaged and follow a student-centered theory	Lesson Plan 2
A student will be able to use assessment data to evaluate student achievement of objectives	Lesson Plan 2
A student will be able to design a lesson in which students will learn characteristics of the nature of science	Lesson Plan 2
A student will be able to examine student achievement of objectives to evaluate and modify their lessons	Microteaching Reflection Paper
A student will be able to describe the safety issues and solutions for lessons	Lesson Plan 2, Safety Assignment
A student will be able to organize curriculum topics to build integrated student knowledge	Lesson Plan 2
A student will be able to explain the characteristics of the nature of science in context of actual science.	Nature of Science Assignment
A student will be able to be reflective about their own teaching and the teaching of others based upon evidence.	Reflection Questions, Microteaching Reflection Paper, Field Experience Paper

GRADING

High quality work and participation is expected on all assignments and in class. Attendance at all classes for the entire class is a course expectation. For each unexcused absence, the course grade will be reduced by 5% points. All assignments are graded. Each graded assignment will be assessed using a scoring rubric which will be handed out before the assignment is due. All assignments are due at the beginning of class on the day they are due. Graded assignments that are late will automatically receive a ten percent grade reduction (one full letter grade lower).

POLICY ON INCOMPLETES

GRADING SCALE

 $\begin{array}{l} A &= 93\text{-}100\% \\ A\text{-} &= 90\text{-}92\% \\ B\text{+} &= 88\text{-}89\% \\ B &= 80\text{-}87\% \\ C &= 70\text{-}79\% \\ F &= Below \ 70\% \end{array}$

If circumstances warrant, a written request for an incomplete must be provided to the instructor for approval prior to the course final examination date. Requests are accepted at the instructor's discretion, provided your reasons are justified and that 80% of your work has already been completed. Your written request should be regarded as a contract between you and the instructor and must specify the date for completion of work. This date must be at least two weeks prior to the university deadline for changing incompletes to letter grades.

Assignments

Science education research shows that frequent assessment of small amounts of material is most effective for learning science. Therefore, in this class formal and informal assessment will be continuously provided on assignments and class activities. Assessment is used as a tool for information that informs both learning and teaching, so this two-way communication loop is necessary for optimal learning.

Assessments	Points	Due Date
Lesson Plan Critiques	5	Sept 17
Nature of Science Assignment (PBA)	9	Oct 1
Lesson Plan 1	5	Oct 22
Lesson Plan 2	18	Nov 5
Safety Assignment (PBA)	10	Nov 19
Microteaching Paper	18	Dec 3
Clinical Interview Paper	7	Dec 5
Field Experience Report	13	Dec 10
Reflection Questions	5	Varied
Professionalism	10	Ongoing

PROBLEM BASED ASSESSMENTS (PBA) AND TASK STREAM

In this course, there are two performance based assessments required. These are the Nature of Science Assignment and the Safety Assignment. Every student registered for any Secondary Education course with a required performance-based assessment (will be designated as such in the syllabus) is required to submit these assessments to TaskStream (regardless of whether a course is an elective, a onetime course or part of an undergraduate minor.) Evaluation of your performance-based assessment will also be provided using TaskStream. Failure to submit the

assessment to TaskStream will result in a the course instructor reporting the course grade as Incomplete(IN). Unless this grade is changed upon completion of the required TaskStream submission, the IN will convert to an F nine weeks into the following semester.

Professionalism

See *Graduate School of Education Dispositions for A Career Educator* section above and follow the instructions to sign the form stating you will behave professionally during this course. You cannot earn the points for professionalism UNTIL you have completed and signed the form. Attendance is an important component of professionalism to consider as well. Learning depends on the active engagement of the participant and frequent checking by the instructor as to the progress of the learner. Smaller assignments will be given as necessary in class in order to inform your learning and my teaching. Your participation in these assignments is essential to valuable class discussions and will help to "chunk" the large assignments into smaller, more attainable learning goal. Your classmates depend on your comments to extend their learning. Attendance for each class is necessary – please contact the professor BEFORE any absence. Attendance at all classes for the entire class is a course expectation. For each unexcused absence, the course grade will be reduced by 5% points.

TENTATIVE CALENDAR (SUBJECT TO CHANGE BASED ON STUDENT NEEDS):

DATE	Торіс
Aug 27	What is learning? What is important for students to learn?
Sept 3	How students learn science? What are big ideas? What are misconceptions?
Sept 10	Constructivism, big ideas and backwards design
Sept 17	Writing Objectives and Teaching with inquiry
Sept 24	Assessment – Planning Lesson 1
Oct 1	Organizing learning – teacher toolkit 1
Oct 8	Planning Lesson 1
Oct 15	Planning Lesson 1 – teacher toolkit 2
Oct 22	Planning Lesson 2
Oct 29	Planning Lesson 2
Nov 5	Micro-teaching – 4 Groups
Nov 12	Micro-Teaching – 4 groups
Nov 19	NO FORMAL CLASS MEETING - Online Assignment – Safety Assignment
Nov 26	NO CLASS THANKSGIVING
Dec 3	Safety Discussion, Reflecting on Lessons
Dec 10	NO CLASS - ASSIGNMENTS DUE

SUSTAINABILITY AND DISPOSITIONS INFORMATION

SUSTAINABILITY AT GMU

George Mason University is focusing on making our community "greener" and reducing the impact on the environment. This course will contribute to this effort in the following ways. I hope that you will create other ways to contribute to contribute to this effort.

- Handouts will be available electronically through the Blackboard platform
- All assignments will be submitted through the blackboard on a Wiki site established fir each individual student.
- You should consider reducing waste in your teaching practice (ex: unnecessary paper) and in developing your unit plan
- Incorporate teaching sustainability in the content of your lesson plans (for example, human's role in reducing their impact on the environment.) Think about what the next generation needs to know about "greening".

COLLEGE EXPECTATIONS AND UNIVERSITY HONOR CODE

- Students are expected to exhibit professional behaviors and dispositions at all times. See *Graduate School of Education Dispositions for A Career Educator* section below and follow the instructions.
- Students must adhere to the guidelines of the George Mason University Honor Code [See <u>http://oai.gmu.edu/honor-code/</u>].
 - Please note the following.
 - "Plagiarism encompasses the following:
 - 1. Presenting as one's own the words, the work, or the opinions of someone else without proper acknowledgment.
 - 2. Borrowing the sequence of ideas, the arrangement of material, or the pattern of thought of someone else without proper acknowledgment." (from Mason Honor Code online at http://mason.gmu.edu/~montecin/plagiarism.htm)
 - Paraphrasing involves taking someone else's ideas and putting them in your own words. When you paraphrase, you need to cite the source using APA format.
 - When material is copied word for word from a source, it is a direct quotation. You must use quotation marks (or block indent the text) and cite the source.
 - Electronic tools (e.g., SafeAssign) may be used to detect plagiarism if necessary.
 - Plagiarism and other forms of academic misconduct are treated seriously and may result in disciplinary actions.
- Students must follow the university policy for Responsible Use of Computing [See http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/
- Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.
- The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu/].
- Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See http://ods.gmu.edu/].

- Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
- The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing [See <u>http://writingcenter.gmu.edu/</u>].

For additional information on the College of Education and Human Development, Graduate School of Education, please visit our website [See <u>http://gse.gmu.edu/</u>].

GRADUATE SCHOOL OF EDUCATION DISPOSITIONS FOR A CAREER EDUCATOR

Students are expected to exhibit professional behavior and dispositions. The Virginia Department of Education and the National Council for Accreditation of Teacher Education promote standards of professional competence and dispositions. Dispositions are values, commitments, and professional ethics that influence behaviors toward students, families, colleagues, and all members of the learning community. The Graduate School of Education expects students, faculty, and staff to exhibit professional dispositions through a:

I. Commitment to the profession

- Promoting exemplary practice
- Excellence in teaching and learning
- Advancing the profession
- Engagement in partnerships

II. Commitment to honoring professional ethical standards

- Fairness
- Honesty
- Integrity

III. Commitment to key elements of professional practice

- Belief that all individuals have the potential for growth and learning
- Persistence in helping individuals succeed
- High standards
- Safe and supportive learning environments
- Systematic planning
- Intrinsic motivation
- Reciprocal, active learning
- Continuous, integrated assessment

IV. Commitment to being a member of a learning community

- Professional dialogue
- Self-improvement
- Collective improvement
- Reflective practice

- Trustworthiness
- Confidentiality
- Respect for colleagues and students
- Critical thinking
- Thoughtful, responsive listening
- Active, supportive interactions
- Technology-supported learning
- Research-based practice
- Respect for diverse talents, abilities, and perspectives
- Authentic and relevant learning
- Responsibility
- Flexibility
- Collaboration
- Continuous, lifelong learning
- V. Commitment to democratic values and social justice
 - Understanding systemic issues that prevent full participation
 - Awareness of practices that sustain unequal treatment or unequal voice
 - Advocate for practices that promote equity and access
 - Respects the opinion and dignity of others
 - Sensitive to community and cultural norms
 - Appreciates and integrates multiple perspectives

GO TO THE FOLLOWING WEBSITE, DOWNLOAD SIGN AND PROVIDE THE FOLLOWING DOCUMENT AGREEING TO DEMONSTRATE THE ABOVE PROFESSIONAL DISPOSITIONS:

http://cehd.gmu.edu/assets/docs/cehd/Dispositions%20for%20a%20Career%20Educator.pdf

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OTHER RESOURCES

Barnekow, D. J. (1998). Graphic organizers for science. Portland, ME: J. Weston Walsh.

- Bybee, R.W., Powell, J.C., & Trowbridge, L.W. (2008). *Teaching secondary school science: Strategies for developing scientific literacy*. Upper Saddle River, NJ: Pearson.
- Cothron, J. H., Giese, R. N., Rezba, R. J. (2005). *Students and Research*. Dubuque, Iowa: Kendall/Hunt.
- Hassard, J. (2005). *The art of teaching science: Inquiry and innovation in middle school and high school.* New York: Oxford University Press.
- Johnson, D. W. & Johnson R. T. (1999). *Learning together and alone: Cooperative, competitive, and individualistic learning*. Boston: Allyn and Bacon.
- Kagan, S. (1994). Cooperative Learning. San Clemente, CA: Resources for Teachers, Inc.
- Keely, P., Eberle, F., & Farrin, L. (2005). Uncovering student ideas in science: 25 formative assessment probes. Arlington, VA: National Science Teacher Association Press.
- Llewellyn, D. (2002). *Inquire within: Implementing inquiry-based science standards*. Thousand Oaks, CA: Corwin Press.
- McComas 2008. Proposal for core nature of science content in popular books on the history and philosophy of science: lessons for science education. In Lee, Y.J. & Tan, A.L. (Eds.) *Science education at the nexus of theory and practice.* Rotterdam: Sense Publishers.
- National Resource Council. (2005). How Students Learn: Science in the Classroom. Committee on How People Learn, A Targeted Report for Teachers, M.S. Donovan and J.D. Bransford, Editors. Division of Behavioral and Social Science and Education. Washington, DC: The National Academies Press.
- Slavin, R. E. (1995). Cooperative learning. Boston: Allyn and Bacon.
- Tomlinson, C. A. (1999). *The differentiated classroom: Responding to the needs of all learners*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Wiggins, G. & McTighe, J. (1998). *Understanding by design*. Alexandria, VA: Association for Supervision and Curriculum Development.

ATTACHED ARE TWO PERFORMANCE BASED ASSESSMENTS REQUIRED FOR NCATE/NSTA ACCREDITATION.

PERFORMANCE BASED ASSESSMENT 1

NATURE OF SCIENCE AND SCIENTIFIC INQUIRY ASSIGNMENT

Provide a product (lab write up, paper, presentation, poster) of an example where you think that you show that you have done scientific inquiry specifically in your certification field (biology, chemistry, earth science, physics). Provide a written reflection highlighting how your experience has assisted you in addressing the 9 core nature of science ideas (see table below). Further, describe in relative detail how you developed and used at least 10 of the science process skills (see table below). Finally, explain whether you feel that you might apply scientific inquiry in your classroom to teach a science concept.

NATURE OF SCIENCE-

- Science cannot answer all questions
- Science employs multiple methods and types of reasoning that share many common factors, habits of mind and norms
- Science produces, demands, and relies on empirical evidence
- Scientific knowledge is tentative, durable, and self-correcting
- Laws and theories are related but distinct kinds of scientific knowledge and play central roles
- Science is a creative endeavor
- Social, historical and cultural factors play a role in the construction of scientific knowledge
- Science and technology are not the same but impact one another
- Science has a subjective element

SCIENCE PROCESS SKILLS

- Classification describes patterns in nature and is a human construct
- Measurement standardized and reproducible way of collecting empirical evidence
- Observation description of the natural world intended to be free from interpretation
- Analysis interpreting empirical evidence
- Synthesis
- Using hypotheses to make predictions
- Generating falsifiable questions
- Finding appropriate resources/information/data to evaluate questions
- Generating falsifiable hypotheses
- Using models as a way to examine phenomena
- Identifying patterns
- Generating investigations and ability troubleshoot
- Dissemination of knowledge
- Generating inferences

McComas 2008. Proposal for core nature of science content in popular books on the history and philosophy of science: lessons for science education. In Lee, Y.J. & Tan, A.L. (Eds.) *Science education at the nexus of theory and practice*. Rotterdam: Sense Publishers.

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investigation					mathematics to
investigation					report their
					investigation or
					solve problems.
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NATURE OF SCIENCE ASSIGNMENT RUBRIC

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Standard	Unsatisfactory	Acceptable	Target	Accomplished
2b -	Candidate cannot	Candidate can	Candidate can	Candidate can
Understand	explain any of the	explain all of the	fully explain all	fully explain all of
the	following	following	of the following	the following
philosophical	characteristics of	characteristics of	characteristics of	characteristics of
tenets,	the nature of	the nature of	the nature of	the nature of
assumptions,	science:	science in a	science way BUT	science way AND
goals, and	1. Science cannot	superficial way:	DO NOT connect	connects them to
values that	answer all	1. Science cannot	them to their	their research
distinguish	questions.	answer all	research product:	product:
science from	2. Science	questions.	1. Science cannot	1. Science cannot
technology	produces,	2. Science	answer all	answer all
and from	demands, and	produces,	questions.	questions.
other ways of	relies on empirical	demands, and	2. Science	2. Science
knowing the	evidence.	relies on	produces,	produces,
world;	3. Science and	empirical	demands, and	demands, and
	technology are not	evidence.	relies on	relies on empirical
	the same but	3. Science and	empirical	evidence.
	impact one	technology are	evidence.	3. Science and
	another.	not the same but	3. Science and	technology are not
		impact one	technology are	the same but
		another.	not the same but	impact one
			impact one	another.
			another.	

Standard	Unsatisfactory	Acceptable	Target	Accomplished
3a -	Candidate cannot	Candidate can	Candidate can	Candidate can
Understand	explain any of the	explain all of the	fully explain all	fully explain all of
the processes,	following	following	of the following	the following
tenets, and	characteristics of	characteristics of	characteristics of	characteristics of
assumptions	the nature of	the nature of	the nature of	the nature of
of multiple	science:	science in a	science way BUT	science way AND
methods of	1. Science cannot	superficial way:	DO NOT connect	connects them to
inquiry	answer all	1. Science cannot	them to their	their research
leading to	questions.	answer all	research product:	product:
scientific	2. Science	questions.	1. Science cannot	1. Science cannot
knowledge;	employs multiple	2. Science	answer all	answer all
	methods and types	employs multiple	questions.	questions.
	of reasoning that	methods and	2. Science	2. Science
	share many	types of	employs multiple methods and	employs multiple
	common factors, habits of mind and	reasoning that		methods and types
	norms	share many common factors,	types of reasoning that	of reasoning that share many
	3. Science	habits of mind	share many	common factors,
	produces,	and norms	common factors,	habits of mind and
	demands, and	3. Science	habits of mind	norms
	relies on empirical	produces,	and norms	3. Science
	evidence.	demands, and	3. Science	produces,
	4.Scientific	relies on	produces,	demands, and
	knowledge is	empirical	demands, and	relies on empirical
	tentative, durable,	evidence.	relies on	evidence.
	and self-correcting	4.Scientific	empirical	4.Scientific
		knowledge is	evidence.	knowledge is
		tentative, durable,	4.Scientific	tentative, durable,
		and self-	knowledge is	and self-correcting
		correcting	tentative, durable,	
			and self-	
			correcting	

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Standard	Unsatisfactory	Acceptable	Target	Accomplished
4a -	Candidate cannot	Candidate can	Candidate can	Candidate can
Understand	explain any of the	explain all of the	fully explain all	fully explain all of
socially	following	following	of the following	the following
important	characteristics of	characteristics of	characteristics of	characteristics of
issues related	the nature of	the nature of	the nature of	the nature of
to science	science:	science in a	science way BUT	science way AND
and	1. Science is a	superficial way:	DO NOT connect	connects them to
technology in	creative endeavor	1. Science is a	them to their	their research
their field of	2. Social,	creative endeavor	research product:	product:
licensure, as	historical and	2. Social,	1. Science is a	1. Science is a
well as	cultural factors	historical and	creative endeavor	creative endeavor
processes	play a role in the	cultural factors	2. Social,	2. Social,
used to	construction of	play a role in the	historical and	historical and
analyze and	scientific	construction of	cultural factors	cultural factors
make	knowledge	scientific	play a role in the	play a role in the
decisions on	3.Science has a	knowledge	construction of	construction of
such issues;	subjective element	3.Science has a	scientific	scientific
		subjective	knowledge	knowledge
		element	3.Science has a	3.Science has a
			subjective	subjective element
			element	

PERFORMANCE BASED ASSESSMENT 2 SAFETY ASSIGNMENT:

Safety Assignment

A **Safety Plan** is necessary for the health and safety of your students and yourself, as well as, for legal reasons. You will design a science safety plan which will include (1) a list of **safety rules/procedures** that ends with a **safety contract** for the parents and students to sign and date (front and back of one page – ready to distribute to students), (2) analyses of science classroom legal cases (which will be given in class), (3) a lesson analysis (provided online) that requires you to look at two labs and analyze it for safety, identifying the major aspects (one lab will be with animals), (4) a safety related assignment that engages students and teaches the importance of safety in the science classroom, and (5) active maintenance of safety equipment in a science classroom (which will be performed in class). Bring **two copies** of the entire assignment and **copies for the class** of the safety related assignment (number 3). I will copy the entire classes' safety assignments so you can use them throughout the year in your own classroom. These lessons make wonderful "emergency lesson plans."

Standard	Unsatisfactory	Acceptable	Target	Accomplished
9a -	Unable to list the	Able to list the	Given a	Within self-
Understand	legal	legal	hypothetical lab	developed lessons
the legal and	responsibilities as	responsibilities as	activity:	and unit:
ethical	a teacher	a teacher	Able to identify	Consistently
responsibilities	AND	AND	the legal	identifies the
of science	Unable to	Able to describe	responsibilities of	legal
teachers for	describe how to	how	the teacher	responsibilities of
the welfare of	address these	hypothetically	AND	the teacher
their students,	responsibilities	address these	Able to describe	AND
the proper		responsibilities	how to address	Able to describe
treatment of			these	how to address
animals, and			responsibilities	these
the			within a specific	responsibilities
maintenance			lab	
and disposal of				
materials				
~			_	
Standard	Unsatisfactory	Acceptable	Target	Accomplished
9b - Know and	Unable to list safe	Able list safe	Given a	Within self-
practice safe	practices	practices	hypothetical	developed lessons
and proper	associated with	associated with	activity:	and unit:
techniques for	non-living	non-living	Able list safe	Safely prepare,
the	materials	materials	practices	store, dispense,
preparation,		including	associated with	and dispose of
storage,		preparation,	non-living	materials used
dispensing,		storage, disposal	materials	during science
supervision,		and supervision	including	instruction
and disposal of				
11 / 11			preparation,	AND
all materials			storage, disposal	Provide
used in science			storage, disposal and supervision	Provide appropriate
			storage, disposal and supervision AND	Provide appropriate emergency
used in science			storage, disposal and supervision AND Able to	Provide appropriate emergency procedures to
used in science			storage, disposal and supervision AND Able to appropriate	Provide appropriate emergency procedures to share with
used in science			storage, disposal and supervision AND Able to appropriate outline	Provide appropriate emergency procedures to share with students for the
used in science			storage, disposal and supervision AND Able to appropriate outline emergency	Provide appropriate emergency procedures to share with students for the activity within the
used in science			storage, disposal and supervision AND Able to appropriate outline emergency procedures for the	Provide appropriate emergency procedures to share with students for the
used in science			storage, disposal and supervision AND Able to appropriate outline emergency	Provide appropriate emergency procedures to share with students for the activity within the

SAFETY ASSIGNMENT RUBRIC

Standard	Unsatisfactory	Acceptable	Target	Accomplished
9c - Know	Unable to describe	Able describe	Given a	Within self-
and follow	emergency	emergency	hypothetical	developed lessons
emergency	procedures,	procedures,	activity:	and unit:
procedures,	explain	explain the	Able to identify	Able to articulate
maintain	maintenance of	maintenance of	safety concerns	to students safety
safety	any safety	primary safety	associated,	concerns
equipment,	equipment, or	equipment and	appropriate	associated,
and ensure	determine and	determine and	emergency	appropriate
safety	address safety	address safety	procedures, and	emergency
procedures	concerns	concerns	what safety	procedures, and
appropriate	associated with a	associated with a	equipment should	what safety
for the	particular activity	particular activity	be available and	equipment should
activities and			how to maintain	be available
the abilities			that equipment	
of students				
Standard	Unsatisfactory	Acceptable	Target	Accomplished
9d - Treat all	Unable to list safe	Able to list safe	Given a	Within self-
living	and ethical	and ethical	hypothetical	developed lessons
organisms	practices	practices	activity:	and unit:
used in the	associated with	associated with	Able to list safe	Able to articulate
classroom or	living organisms	living organisms	and ethical	to students safe
found in the		including humane	practices	and ethical
field in a		and ethical	associated with	practices
safe,		treatment, safety	living organisms	associated with
humane, and		(both human and	including humane	living organisms
ethical		of the living	and ethical	including humane
manner and		organism),	treatment, safety	and ethical
respect legal		husbandry or	(both human and	treatment, safety
restrictions	1	disposal	of the living	(both human and
on their			organism),	of the living
on their collection,			husbandry or	organism),
on their collection, keeping, and			U I	organism), husbandry or
on their collection,			husbandry or	organism),

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