

EDUC 656: Inquiry Methods in Math and Science
August 2008 – April 2009
<http://www.sxi.sbc.edu>
Syllabus

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COURSE WEBSITE: <http://www.sxi.sbc.edu>

CATALOG DESCRIPTION:

Through a year-long inquiry based process involving hands-on investigation, discussion, and fieldwork, teachers will increase their understanding and ability to apply inquiry-based methods of teaching math and science with focus on grades 3-8. Participants will examine current research and apply knowledge in their own classes to develop, implement, and assess inquiry-based lessons.

3 semester hours

COURSE GOALS:

The course goals include:

- guiding the participants to an understanding of inquiry-based teaching, its historical roots, its research base, calls for national reform of science and math education; and applications of inquiry teaching in today's standards-driven classrooms;
- giving the teacher participants models of inquiry-based teaching in science and math relevant to the national and Virginia standards;
- filling in "gaps" and correcting misconceptions in the teacher participants' knowledge base in the content areas of science and math;
- aiding the teachers in implementing successful lessons in science and math that use an inquiry approach.

COURSE SCHEDULE and CLASS HOURS:

EDUC 656 is a long term course which begins on August 8, 2008, and is to be completed no later than the end of Spring Semester 2009. The course consists of 45 hours of integrated lecture/lab plus a minimum of 30 hours of fieldwork. The 45 hours of integrated lecture/lab will consist of:

- a two-day summer workshop (August 8 – 9, 2008; 12 instructional hours);
- three regular class meetings (5 hours each) during the Academic Year 2008-2009 to be held on the following dates: September 27, October 25; January 31;
- a minimum of three Saturday math/science content workshops (5 hours each) during the Academic Year 2008-2009;
- and a short course wrap-up at the end of the year (3 hours) to be held on March 7, 2009.

Fieldwork consists of in-class lessons prepared by the teacher participants as they work toward completion of the course assignments.

All teacher participants are expected to attend and be fully active in all sessions. Lack of participation will result in a lower grade for this course. Absence will not be excused.

Science/math content workshops will be offered approximately once per month between September and May. All participants have the opportunity to attend these workshops but a minimum of three must be completed by the participant. Registration for these Saturday workshops is the responsibility of the teacher participant and should be completed at the earliest possible time to ensure seating availability.

ASSIGNMENTS AND EVALUATION:

Summary of Assignments and Course Grade Weightings

Extended descriptions are/will be available on the course website: www.sxi.sbc.edu

Reading Assignments are given from both texts: Llewellyn and NRC.

Class Meetings 1&2 -required 10 % Friday and Saturday, August 8-9, 2008

During the summer workshop, teacher participants will be introduced to a continuum of inquiry-based approaches to teaching science, from teacher-centered demonstrations to student-centered open inquiry. Attendance at and participation in the class meetings are required. An agenda will be available one-week in advance on www.sxi.sbc.edu

Reading Assignment for Class Meetings 1&2: Chapters 1-2 Llewellyn; Foreword and Chapter 1 NRC.

Science/Math Content Workshops 20 % Self-Scheduled

Attendance at THREE Science/Math Content Workshops is REQUIRED of all Teacher-Participants in EDUC 656. Participation in these workshops is required and will count as 20% of the course grade. A Fall Schedule will be available in August; a Spring Schedule will be available by mid-December. Registration for these Saturday workshops is the responsibility of the teacher participant and should be done at the earliest possible time to ensure seating availability.

Assignment 1 10 % ***Due*** Friday, September 19, 2008

During the beginning weeks of the school year, the teacher participant will implement and assess an inquiry-based lesson in math or science, using a STRUCTURED Inquiry methodology. A reflective report of this lesson will be submitted. Teachers' papers must follow a designated format. (See below and/or see website for details.) The same designated format will be used for Assignments 2-4.

Reading Assignment for Assignment 1: Chapter 2 NRC; Chapter 4 Llewellyn, and Bell Article (handout)
Paper length will be 5-7 pages, maximum. See paper format description elsewhere in this syllabus.

Class Meeting 3 -required 5 % Saturday, Sept. 27, 2008

Attendance at and participation in the class meeting is required. This will be a further opportunity for teachers to reflect on, and discuss the Assignment 1 lesson. An agenda will be available one-week in advance on www.sxi.sbc.edu

Reading Assignment for Class Meeting 3: Chapter 3 Llewellyn; Chapter 3 NRC.

Assignment 2 10 % ***Due*** Friday, October 17, 2008

During the second month of the school year, the teacher participant will implement and assess a second inquiry-based lesson in math or science, using a GUIDED Inquiry methodology. A reflective report of this lesson will be submitted. Teachers' papers must follow a designated format. (See below and/or see website for details.) The same designated format will be used for Assignments 3-4.

Feedback from Assignment 1 should be used to inform or reflect on the lesson.

Reading Assignment for Assignment 2: Chapter 4 NRC; Chapter 7 Llewellyn.

Paper length will be 5-7 pages, maximum. See paper format description elsewhere in this syllabus.

Class Meeting 4 -required 5 % Saturday, October 25, 2008

Attendance at and participation in the class meeting is required. This will be a further opportunity for teachers to reflect on, and discuss the Assignment 2 lesson. An agenda will be available one-week in advance on www.sxi.sbc.edu

Reading Assignment for Class Meeting 4: Chapters 5 and 6 Llewellyn

Assignment 3**10 %****Due** Friday, January 23, 2009

In the middle of the school year, the teacher participant will implement and assess a third inquiry-based lesson in math or science, using an *OPEN Inquiry methodology*. A reflective report of this lesson will be submitted. Teachers' papers must follow a designated format. (See below and/or see website for details.) The same designated format will be used for Assignment 4. Feedback from Assignment 2 should be used to inform or reflect on the lesson.

Reading Assignment for Assignment 3: Chapters 6 and 7 NRC

Paper length will be 5-7 pages, maximum. See paper format description elsewhere in this syllabus.

Class Meeting 5 - required**5 %**

Saturday, January 31, 2009

Attendance at and participation in the class meeting is required. This will be a further opportunity for teachers to reflect on, and discuss the Assignment 3 lesson. An agenda will be available one-week in advance on www.sxi.sbc.edu

Reading Assignment for Class Meeting 5: Chapters 8-9 Llewellyn

Assignment 4**20 %****Due** Friday February 27, 2009

The teacher participant will implement and assess an inquiry-based lesson in math or science which is reflective of feedback given on the earlier assignments and course meetings. The teacher will use an inquiry approach, as he/she deems appropriate for the topic/lesson. A description of the method used and a justification should be given. A reflective report of this lesson will be submitted. Teachers must follow the designated format. (See Assignment 2.) These reports will focus on what worked, what didn't work, and what the teacher's plans are for the future.

Reading Assignment for Assignment 4: Chapter 10 Llewellyn

Paper length will be 5-7 pages, maximum. See paper format description elsewhere in this syllabus.

SHORT Class Meeting 6 -required**5 %**

Saturday, March 7, 2009

This will be a SHORT class meeting.

Attendance at and participation in the class meeting is required. This will be a further opportunity for teachers to reflect on and discuss the course, overall. An agenda will be available one-week in advance on www.sxi.sbc.edu

TEXTBOOKS:

Required (provided free of charge to teacher participants)

All Reading Assignments given in the syllabus are from these texts.

- National Research Council (2000). *Inquiry and the National Science Education Standards: A Guide for Teaching and Learning*, Washington, DC: National Academy Press.
- Douglas Llewellyn (2002). *Inquire Within: Implementing Inquiry-Based Science Standards*, Thousand Oaks, CA: Corwin Press.

PAPERS:

In terms of mechanics, all written work is expected to be at a professional standard, double-spaced (1.5x spacing also acceptable), 12-point Times or Times New Roman font, with 1" margins, and referenced in a standardized format. Failure to do so will result in a one letter decrease in the assignment grade.

The designated format of the assignments (Assignments 1-4) is shown below. It is expected that the papers will be of 5-7 pages in length. Papers which demonstrate the teacher's careful reading of the text assignments will be considered for higher grades.

Introduction: (approximately 1 page)

- Explain the context of the lesson (who are you teaching, where are you teaching).
- Provide a brief narrative describing the science or math content and key concepts for this lesson.
- List key SOLs for this lesson.
- List the key objectives for the lesson.

Lesson Plan: (approximately 1 page)

- Describe the inquiry activities of the lesson, i.e., what you did and what the students did.
- Describe the elements of the lesson that make it structured, guided, or open inquiry.

Assessment: (approximately 2 pages)

- Describe your assessment plan, including formative assessment (pre-lesson and embedded assessment strategies) and your summative assessments.
- Describe the results of your assessments and analyze what this evidence tells you about student achievement in an inquiry-based classroom.

Future Plans: (approximately 2 pages)

- Analyze the lesson for strengths and weaknesses. In your analysis, think about the decisions that you made about inquiry objectives and activities. Were they appropriate? How would you modify this lesson for future use? How will the experience that you gained from teaching this lesson help you plan your next inquiry lesson?
- How would you summarize the impact of this lesson on teaching and learning in your classroom?

Academic Honesty:

Academic honesty is fundamental to the activities and principles of higher education. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. The Sweet Briar College honor statement declares that: *Sweet Briar students do not lie, cheat, steal, or violate the rights of others. Therefore, I pledge to uphold all standards of honorable conduct. I will report myself and others for any infraction of this pledge.*

Deadlines

Deadlines are an important part of the successful completion of any course and are necessarily inflexible in order to provide feedback to all students in a timely manner. All papers and projects have been assigned with ample time. Given that unexpected situations arise from time to time, the instructors are willing to work with you. Please discuss any changes needed in a timely manner with the course instructors. It is the participants' responsibility to be in touch with the professor about graded work and deadlines. Late work will be penalized unless advanced notice has been given. If an emergency arises that prevents the timely submission of your work, please contact both professors via email to let them know of the delay. Professional conduct in this respect is expected of all students in this course. Participants who do not hand in assignments may be dropped from the class roll and the participant's school administrator will be contacted about the change in status (from graduate credit to continuing education).

Grading Scale

90 - 100	A range (spans A- to A)	Excellent
80 - 89	B range (spans B- to B+)	Good
70 - 79	C range (spans C- to C+)	Average
60 - 69	D range (spans D- to D+)	Poor
less than 60	F	Failure

Enrollment and Completion of the Course

Enrollment in the course will be completed on the first day of the summer workshop, August 8, 2008. No late additions will be accepted.

If for any reason, you need to drop the course during the academic year – you need to notify all three of the course instructors, as well as the Project Assistant (Jessica Griffith, jgriffith@sbc.edu) **and also** the Registrar (381-6179). Once you have dropped the course, your instructional time in the SCHEV program to date will be converted to continuing education units (points) and you will receive documentation to that effect.

SELECTED REFERENCES & RESOURCES:

- American Association for the Advancement of Science (1993). *Benchmarks for Science Literacy*, Project 2061. Washington, DC: Oxford University Press.
- Driver, R., Leach, J. (1996). *Young people's images of science*. Philadelphia: Open University Press.
- Duschl, R. (1989). *Restructuring science education: The importance of theories and their development*. Wolfeboro, N.H.: Teachers College Press.
- Lemke, J.L. (1990). *Talking science: Language, learning, and values*. Norwood, N.J.: Ablex Publishing Corporation.
- National Research Council. (1996). *National Science Education Standards*. Washington DC: National Academy Press. Available <http://books.nap.edu/html/nses/html/index.html> (ISBN 0-309-05326-9)
- Rutherford, F.J. (1990). *Science for all Americans*. New York: W.W. Norton.
- *Science Framework for Virginia*. The curriculum frameworks, content and performance standards, and grade level competencies can be accessed as Microsoft Word and pdf files (Science K-8/9-12) on the Virginia Department of Education's Website: "Standards of Learning Currently in Effect for Virginia Public Schools", <http://www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml>