Matching New Course Request

Indiana University South Bend Campus

Check Appropriate Boxes: Undergraduate credit [x] Graduate credit [] Professional credit []

1. School/Division Education

2. Academic Subject Code spuc

3. Course Number Q200 (must be cleared with University Enrollment Services)

4. Instructor Sprague

5. Course Title Introduction to Scientific Inquiry

Recommended Abbreviation (Optional) Intro. to Sci. Inquiry

(Limited to 32 Characters including spaces)

6. First time this course is to be offered (Semester/Year): FALL 08

7. Credit Hours: Fixed at 3 or Variable from to

8. Is this course to be graded S/F (only)? Yes No [x]

9. Is variable title approval being requested? Yes No [x]

10. Course description (not to exceed 50 words) for Bulletin publication:
    This course provides the elementary education major with background in the science process skills needed to complete required science courses.

11. Lecture Contact Hours: Fixed at 2.5/wk or Variable from to

12. Non-Lecture Contact Hours: Fixed at or Variable from to

13. Estimated enrollment: 30 of which 0 percent are expected to be graduate students.

14. Frequency of scheduling: F/Sp Will this course be required for majors? Yes

15. Justification for new course: to meet general education core curr. requirements

16. Are the necessary reading materials currently available in the appropriate library? Yes

17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.

18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by: [Signature] Date 8-20-07

Approved by: [Signature] Date 9/21/07

Dean

Chancellor/Vice-President

University Enrollment Services

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.
January 8, 2008

To: Susan Thomas and Senate Committee on Curriculum

Attached you will find a matching course request for Q200 Introduction to Scientific Inquiry. The matching course request has been approved by the Elementary Education faculty, the School of Education, and the IU Education Council. It is now ready for campus approval and then remonstrance. The course is required as part of the newly approved IU Common Core Curriculum for Elementary Education.

Please let me know if I may provide further information.

Karen Clark
Assistant Dean and Associate Professor
School of Education
kbclark@iuusb.edu
520-4350

Karen Clark
Assistant Dean and Associate Professor
School of Education
kbclark@iuusb.edu
520-4350
EDUC Q200 - Introduction to Scientific Inquiry

Course provides the elementary education major with background in the process skills of science, with emphasis on the integration of these skills and science concepts.

Cr. 1-3.
Course Title: Introduction to Scientific Inquiry
Course Number: Q200
Section:

Please note: Although this course is under the governance of the School of Education, it is generally taken by students in their freshman year, long before they have applied for acceptance into the Teacher Education Program.

School of Education Mission Statement
Through our programs in the School of Education at Indiana University South Bend and our active engagement in the community, we prepare teachers and other school personnel to be competent, ethical, and reflective practitioners. Our candidates and faculty are professionals dedicated to continuous learning in order to address the needs of diverse individuals and prepare them for the complexities of a rapidly changing world. As part of a public comprehensive university and through our service to schools we strive to make a positive difference in the community within and beyond north central Indiana.

<table>
<thead>
<tr>
<th>Instructor:</th>
<th>Office:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone:</td>
<td>Office hours:</td>
</tr>
<tr>
<td>E-mail:</td>
<td></td>
</tr>
</tbody>
</table>

COURSE DESCRIPTION:
This course provides the elementary education major with background in the science process skills needed to complete required science courses.

COURSE PREREQUISITES: none

COURSE TEXT:

An important note about this textbook: This text serves as a laboratory manual for in-class and out-of-class exercises essential to the understanding of scientific thinking and inquiry. You will use the text to learn and practice the science process skills (basic science process skills and integrated science process skills) so you will be able to incorporate these skills into lessons you later plan for children. The science process skills are strongly emphasized in the Indiana Academic Standards for Elementary Science. To assess your learning of the science process skills, you will be asked to perform the tasks clearly stated in the objectives for each chapter of the text. Your instructor reserves the right to collect and check your textbook manual exercises as a means of formative assessment. If you have purchased a used book and it has been written in, you will still be held accountable for responses to questions and activities.
Standards for the Preparation of Elementary Science Teachers:

This course, Q200 Introduction to Scientific Inquiry, is one of a series of science courses you will take as an Elementary Education major.

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
<th>Course Prerequisites</th>
<th>Responsible Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q200 Introduction to Scientific Inquiry</td>
<td>3</td>
<td>none</td>
<td>Education</td>
</tr>
<tr>
<td>T100 (This course number may change to Q201) Biology for Elementary Teachers</td>
<td>3</td>
<td>Q200 (or may be taken with Q200)</td>
<td>Biology</td>
</tr>
<tr>
<td>T105 (This course number may change to Q202) Physical Science for Elementary Teachers</td>
<td>3</td>
<td>Q200, Math T101, T100</td>
<td>Physics/Chemistry</td>
</tr>
<tr>
<td>T106 (This course number may change to Q203) Earth/Space Science for Elementary Teachers</td>
<td>3</td>
<td>Q200, T100</td>
<td>Physics</td>
</tr>
</tbody>
</table>

A few definitions:

This course series is designed to help you become a "scientifically literate" person. According to the National Science Education Standards:

Scientific literacy means that a person can ask, find, or determine answers to questions derived from curiosity about everyday experiences. It means that a person has the ability to describe, explain, and predict natural phenomena. Scientific literacy entails being able to read with understanding articles about science in the popular press and to engage in social conversation about the validity of the conclusions. Scientific literacy implies that a person can identify scientific issues underlying national and local decisions and express positions that are scientifically and technologically informed. A literate citizen should be able to evaluate the quality of scientific information on the basis of its source and the methods used to generate it. Scientific literacy also implies the capacity to pose and evaluate arguments based on evidence and to apply conclusions from such arguments appropriate.¹

This course, Q200, is an introduction to scientific inquiry. The National Science Education Standards define inquiry as:

...a multifaceted activity that involves making observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.²

As a student enrolled in a program leading to a bachelor's degree and majoring in Elementary Education you will be required to meet many standards. Only upon demonstrating that you have met these standards, through testing and building portfolios, will you be permitted to graduate and apply for a teaching license.


A little background on standards:

Prior to 1996, the National Science Teachers Association (a membership-driven organization of science teachers) began a national conversation regarding the quality of science teaching in the United States. As a result, the National Science Education Standards (often referred to as NSES) were developed in an effort to set high standards for the preparation of science teachers as well as for the teaching of science in our schools. Drawing heavily from these National Science Education Standards, all 50 states now have initiatives related to standards and accountability.

In Indiana, The Indiana Professional Standards Board (often referred to as IPSB) has developed a set of standards for the preparation of elementary teachers. These standards are called The Indiana Professional Standards Board Generalist Standards for Teachers of Early and Middle Childhood. The standard relating specifically to the preparation of future teachers of science states:

**IPSB Standard 2.** Curriculum Teachers of Early and Middle Childhood know, understand and use the central concepts, tools of inquiry, and structure of content for students across the K-6 grades and can create meaningful learning experiences that develop students’ competence in subject matter and skills for various developmental levels.

b Science. Teachers of Early and Middle Childhood know, understand, and use the fundamental concepts in the subject matter of science including physical, life, earth and space science as well as concepts in science and technology, science in personal and social perspectives, the history and nature of science, the unifying concepts of science and the inquiry processes scientists use in discovery of new knowledge to build a base for scientific literacy.³

While the standards stated above are helpful, it is easy to see that they are intended to serve only as broad guidelines and not as specific performances. The National Science Teachers Association offers more specific statements in the form of recommendations in their document *Standards for Science Teacher Preparation*⁴. The following recommendation and its accompanying chart, including text and numbering, are taken directly from that document. It is included in this syllabus to enable you, the student, to self-assess your own progress through the series of science courses you will take. Please notice that the standards listed here are matched to the course objectives.

**NSTA Standard 1: Content**

*Science Content Recommendations*

Recommends for Elementary Generalists

A.1. Elementary teachers without a specialization should be prepared to teach science with a strong emphasis on observation and description of events, manipulation of objects and systems, and identification of patterns in nature across subjects. They should be prepared to effectively engage students in concrete manipulative activities that will lead to the development of desired concepts through investigation and analysis of experience.

---


NSTA Standard 1: Content (continued from previous page)...

Standards for the Preparation of Elementary Science Teachers

A.1. Elementary generalists should be prepared to lead students to understand the unifying concepts of science, including:

1. Multiple ways we organize our perceptions of the world and how systems organize the studies and knowledge of science.
2. Nature of scientific evidence and the use of models for explanation.
3. Measurement as a way of knowing and organizing observations of constancy and change.
4. Evolution of natural systems and factors that result in evolution or equilibrium.
5. Interrelationships of form, function, and behaviors in living and nonliving systems.

A.2. In relation to biology, elementary generalists should be prepared to lead students to understand:

6. Features distinguishing living from nonliving systems.
7. Characteristics distinguishing plants, animals, and other living things.
8. Multiple ways to order and classify living things.
9. Ways organisms function and depend on their environments.
10. Ways organisms are interdependent.
12. Growth, change, and interactions of populations to form communities.

A.3. In the physical sciences, elementary generalists should be prepared to lead students to understand:

13. Properties of matter such as mass, solubility, and density.
14. Combinations of matter to form solutions, mixtures, and compounds with different properties.
15. Variations in the physical and chemical states of matter and changes among states.
16. Ordering and classification of matter and energy and their behaviors.
17. Factors affecting the position, motion and behavior of objects.
18. Properties of simple machines and tools, such as levers and screws.
20. Types of energy, energy sources, and simple transformations of energy.

A.4. In the Earth and space sciences, elementary generalists should be prepared to lead students to understand:

21. Natural objects in the sky and why they change in position and appearance.
22. Causes of the seasons and seasonal changes.
23. Changes in the atmosphere resulting in weather and climate.
25. Basic properties of rocks, minerals, water, air, and energy.

---

26. Differences between renewable and nonrenewable natural resources.

A.5. To create interdisciplinary perspectives and to help students understand why science is important to them, elementary generalists should be prepared to lead students to understand:

27. Differences between science as investigation, and technology as design.
28. Impact of science and technology on themselves and their community, and on personal and community health.
29. How to use observation, experimentation, data collection, and inference to test ideas and construct concepts scientifically.
30. How to use metric measurement and mathematics for estimating and calculating, collecting and transforming data, modeling, and presenting results.

NSTA Standard 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 non-science, 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:
   a. Understand the historical and cultural development of science and the evolution of knowledge in their discipline.
   b. Understand the philosophical tenets, assumptions, goals and values that distinguish science from technology and from other ways of knowing the world.

NSTA Standard 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 inquiry, teachers of science must demonstrate that they:
   a. Understand the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge.  

IUSB ACCREDITATION
IUSB teacher and human services training programs are accredited by the National Council for Accreditation of Teacher Education (NCATE) and by the North Central Association of Colleges and Secondary Schools. The Commission on Teacher Training and Licensing of the Indiana Professional Standards Board has approved all IUSB teacher education programs.

INTERSTATE NEW TEACHER ASSESSMENT AND SUPPORT CONSORTIUM STANDARDS

The programs leading to licensing are designed to meet IUSB standards which are aligned with those of the Interstate New Teacher Assessment and Support Consortium (INTASC). Students must demonstrate that they have the knowledge, skills, and dispositions indicated by each standard.

**SPECIAL STATEMENTS and UNIVERSITY POLICIES**

* Academic Honesty Statement
  It is the responsibility of the student to know of the prohibited actions such as cheating, fabrication, plagiarism, academic, and personal misconduct, and thus, to avoid them. All students are held to the standards outlined in the code. Please reference the entire code for a complete listing at: [http://www.dsa.indiana.edu/code/](http://www.dsa.indiana.edu/code/)

* Accommodations for Religious Observances Statement
  If any student will require academic accommodations for a religious observance, please provide me with a written request to consider a reasonable modification for that observance by the end of the second week of the course. Contact me after class, during my office hours, or by individual appointment to discuss the issue. If after discussion we reach no consensus, either party or both should seek the advice of the Department Chair or the Dean, and if no consensus is reached, then the advice of the Vice Chancellor of Academic Affairs ("VCAA"). Either the instructor or the student may appeal the VCAA’s decision to the Office of Affirmative Action within ten business days of the determination.

* Commitment to Diversity
  The School of Education at IUSB is committed to preparing preservice teachers, school leaders, and school counselors to support learning for all students. Each class and learning experience helps candidates develop the knowledge, dispositions, and performances needed to meet the needs of students in today's diverse classrooms.

* Commitment to Technology
  The School of Education at IUSB is committed to preparing preservice teachers, school leaders, and school counselors who have the knowledge, dispositions, and performances needed to effectively use technology to help all students learn. Candidates are expected to incorporate technology throughout their coursework and field experiences.

* Electronic mail (email) is the official means of communication with students at Indiana University South Bend. A student’s failure to receive or read official university communications sent to the student’s official email address does not absolve the student from knowing and complying with the content of the official communication. It is recommended that students check email messages at least once daily. The university provides a simple method for students to forward email from the official university email address to another email address of the student’s choice. However, students who choose to have email forwarded to another email address do so at their own risk.

* Disabilities Statement
  If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Disabled Student Services (Administration Building, room 149, telephone number 520-4832), as soon as possible to work out the details. Once the Director has provided you with a letter attesting to your needs for modifications, bring the letter to me. For more information, please visit the website for Office of Disabled Student Services [www.iusb.edu/~sbdss/services.shtml](http://www.iusb.edu/~sbdss/services.shtml)

* Field Experience Note: You may be required to provide a criminal history check to
school districts before participating in field placements and/or student teaching. School districts may deny a field placement or student teaching assignment based on a misdemeanor or felony conviction. The application process for a teaching license in Indiana requires a current criminal history check. Convicted felons may not hold a teaching license in Indiana.

**COURSE GOALS:**
As a student in this course, you will:

- examine the nature of science,
- experience creating scientific understandings from inquiry-based interactions, reflect on your own experiences with inquiry learning,
- develop/refine the basic and integrated science process skills necessary to be successfully engaged in scientifically oriented questions, develop thorough understandings of some of the science content from the National Science Standards, and
- develop a thorough understanding of constructivist scientific inquiry.

**Performance Objectives:** (parentheses indicate matching standards, IPSB and NSTA standards)

**Student will be able to:**
1. Describe how the nature of science is related to the basic science process skills (NSTA #1A.1.1, #2a,b; IPSB #2b)
2. Name and describe the unifying concepts of science. (NSTA #1A.1; IPSB #2b)
3. Describe the nature of scientific evidence and the use of models for explanation. (NSTA #1A.1.2; IPSB #2b)
4. Given an object, substance or event, be able to construct a list of qualitative and quantitative observations about that object, substance or event, using the senses. (NSTA #1A.1.2, #3a; IPSB #2b)
5. Given an event in which a change is involved, be able to construct a list of qualitative and quantitative observations about the changes before, during and after they occur. (NSTA #1A.1.2, #3a; IPSB #2b)
6. Describe an object or event in sufficient detail so that another person can identify it. (NSTA #3a; IPSB #2b)
7. Construct a map showing relative distances, positions and sizes of objects with sufficient accuracy so that another person can locate a particular place or object using the map. (NSTA #1A.1.3., #3a; IPSB #2b)
8. Given a set of objects, list observable properties that could be used to classify the objects. (NSTA #1A.1.2, #3a; IPSB #2b)
9. Given a set of objects, construct binary as well as other single stage classification schemes for the objects. (NSTA #1A.1.1, #3a; IPSB #2b)
10. Given a set of objects, construct a multistage classification scheme and identify the properties on which the classification is based. (NSTA #1A.1.1, #3a; IPSB #2b)
11. Given a set of objects, identify properties by which the set of objects could be serially ordered and construct a serial order for each property. (NSTA #1A.1.1, #3a; IPSB #2b)
12. Select the appropriate metric unit for measuring any property (length, volume, temperature, mass, and weight) of a given object. (NSTA #1.A.1.3., #3a; #1.A.5.30; IPSB #2b)

13. Given a set of metric units, state equivalent metric unit measures using prefixes (that is, perform conversions within the metric system). (NSTA #1.A.1.3., #3a; #1.A.5.30; IPSB #2b)

14. Measure the temperature, length, volume, mass, or force of any object to the nearest tenth (0.1) unit. (NSTA #1.A.1.3., #3a; #1.A.5.30; IPSB #2b)

15. Given an object or event, construct a set of inferences from your observations about that object or event. (NSTA #3a; #1.A.5.29; IPSB #2b)

16. Given additional observations about the object or event, identify the inferences that should be accepted, modified or rejected. (NSTA #3a, A.5.29; IPSB #2b)

17. Distinguish among observation, inference, prediction. (NSTA #3a, A.5.29; IPSB #2b)

18. Make prediction based on observed patterns of evidence. (NSTA #3a; IPSB #2b)

19. Construct test for predictions. (NSTA #3a; IPSB #2b)

20. Use new observations to revise prediction and inferences. (NSTA #3a; IPSB #2b)

21. Make predictions using graphed data. (NSTA #3a; IPSB #2b)

22. Identify the variables in a written statement or description of an investigation. (NSTA #3a; IPSB #2b)

23. Classify the variables as independent (manipulated) or dependent (responding). (NSTA #3; IPSB #2b)

24. Construct a table of data when given a written description of the measurements made during an investigation. (NSTA #1.A.1.1, #3a; IPSB #2b)

25. Write data pairs form a table of data. (NSTA #3a; IPSB #2b)

26. Match data pairs with points on a graph. (NSTA #3a; IPSB #2b)

27. Construct a graph when provided with a brief description of an investigation and a table of data. (NSTA #3a; IPSB #2b)

28. Draw a best-fit line when given a graph. (NSTA #3a; IPSB #2b)

29. Describe in writing the relationship between variables on a graph. (NSTA #3a; IPSB #2b)

30. Conduct an investigation and construct a table of data. (NSTA #3a; A.5.29; IPSB #2b)

31. Construct a graph of the data and a statement of the relationship between variables. (NSTA #3a; #1.A.5.29; IPSB #2b)

32. Identify the dependent and independent variables and the constants in an experiment (NSTA #3a, #1.A.5.29; IPSB #2b).

33. Identify the hypothesis being tested when supplied with a description of an investigation. (NSTA #3a; #1.A.5.29; IPSB #2b)

34. Construct a hypothesis when provided with a problem. (NSTA #3; #1.A.5.29; IPSB #2b)

35. State how the variables are operationally defined in an experiment when given a description of the investigation. (NSTA #1.A.1.2, A.5.29; #3a; IPSB #2b)

36. Construct operational definitions variables. (NSTA #3a, IPSB #2b)
37. Design an experiment to test a given hypothesis. (NSTA #1A.1.2, A.5.29; #3a; IPSB #2b)
38. Construct a hypothesis, design, and conduct an investigation for a problem you have identified or chosen to study. (NSTA #1A.1.2, #1.A.5.29; #3a)

**STUDENT EVALUATION:**
Students must attain a grade of A C or better in all required education courses. Q200 is an education course. Grades will be computed by a point system. Points will be converted to a percentage of the total points. The following grading scale will be used:

<table>
<thead>
<tr>
<th>98-100%</th>
<th>A+</th>
<th>88-89%</th>
<th>B+</th>
<th>78-79%</th>
<th>C+</th>
<th>68-69%</th>
<th>D+</th>
</tr>
</thead>
<tbody>
<tr>
<td>92-97%</td>
<td>A</td>
<td>82-87%</td>
<td>B</td>
<td>72-77%</td>
<td>C</td>
<td>62-67%</td>
<td>D</td>
</tr>
<tr>
<td>90-91%</td>
<td>A-</td>
<td>80-81%</td>
<td>B-</td>
<td>70-71%</td>
<td>C-</td>
<td>60-61%</td>
<td>D-</td>
</tr>
</tbody>
</table>
*Class Attendance and participation are part of your grade:*

Get in the habit of signing the attendance sheet as you enter the classroom. You must sign the attendance sheet in the first ten minutes of class in order to be counted present for each class and you must stay for the duration of the session. Please note that you are automatically given 30 points, which count in the total points, for attendance and active participation. By not missing any classes you will retain these 30 attendance points. For each class missed, though, 10 points will be deducted from the total points. The point system is designed so that if you are already doing well in the class, one or two

<table>
<thead>
<tr>
<th>Course Criterion Areas</th>
<th>Possible Points</th>
<th>Rubric provided</th>
<th>Date due</th>
<th>My Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance and active and collaborative participation in cooperative learning teams • 10 points lost per absence up to 4 absences • 5 absences = must withdraw from the class</td>
<td>30 points for 100% attendance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment #1 over the Basic Science Process Skills Chapters 1-7 (objectives #1-21)</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstration Presentation in class (objective #3) • Research an assigned content-based science standard. Locate and present to the class a 5-10 minute (max) science demonstration matching that standard. Include an accurate explanation of the concept and demonstrate your ability to use appropriate scientific vocabulary. • Submit to the instructor a written copy of the demo, formatted as directed, along with a reflection paper and the reflection rubric provided. Due one week following your presentation. • Submit to the &quot;file box&quot; a copy of the demonstration for peers to copy if they wish. Be sure to cite references thoroughly and accurately on all copies.</td>
<td>20</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inquiry Project: (objectives #37, 38) • Conduct a Scientific Experiment of your own and submit an Experiment Report (see textbook chapter 17 example) on your experiment. • Participate in a collaborative peer review of someone else's inquiry project</td>
<td>50</td>
<td>Yes (see the textbook)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment #2 over the Integrated Science Process Skills: Chapters 8-17 (objectives #22-38)</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Periodic quizzes and lab manual checks • Your course instructor reserves the right to give unannounced quizzes and check lab manuals for accuracy and completion as s/he feels necessary. Doing so will affect the total number of points for the class.</td>
<td>0-20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comprehensive Final Exam</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total points</td>
<td>400-420</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
misses will not dramatically affect your grade. Please talk to your instructor if major problems arise. Any student missing 5 or more classes for a course meeting twice/week, or 3 classes for a course meeting once/week will be required to withdraw from the course. Please be responsible for keeping your own record of the number of classes you have missed.

**TENTATIVE CLASS SCHEDULE**

<table>
<thead>
<tr>
<th>Week</th>
<th>Session #</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Session 1, 2</td>
<td>Chapter 1: Building a Foundation for Teaching Process Skills</td>
</tr>
<tr>
<td>2</td>
<td>Session 3, 4</td>
<td>Chapter 2: Observing</td>
</tr>
<tr>
<td>3</td>
<td>Session 5, 6</td>
<td>Chapter 3: Communicating</td>
</tr>
<tr>
<td>4</td>
<td>Session 7, 8</td>
<td>Chapter 4: Classifying (Binary Classification and Serial Ordering)</td>
</tr>
<tr>
<td>5</td>
<td>Session 9, 10</td>
<td>Chapter 5: Measuring metrically (distance, mass, volume, weight, )</td>
</tr>
<tr>
<td>6</td>
<td>Session 11, 12</td>
<td>Chapter 6: Inferring</td>
</tr>
<tr>
<td>7</td>
<td>Session 13, 14</td>
<td>Chapter 7: Predicting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Review for assessment next session</td>
</tr>
<tr>
<td>8</td>
<td>Session 15</td>
<td>Assessment #1 (over ch 1-7)</td>
</tr>
<tr>
<td></td>
<td>Session 16</td>
<td>Introduction to Experimenting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chapter 8: Identifying variables</td>
</tr>
<tr>
<td>9</td>
<td>Session 17</td>
<td>Chapter 9: Constructing a table of data</td>
</tr>
<tr>
<td></td>
<td>Session 18</td>
<td>Chapter 10: Constructing a graph</td>
</tr>
<tr>
<td>10</td>
<td>Session 19</td>
<td>Chapter 11: Describing Relationships between Variables</td>
</tr>
<tr>
<td></td>
<td>Session 20</td>
<td>Chapter 12: Acquiring and Processing Your Own Data</td>
</tr>
<tr>
<td>11</td>
<td>Session 21</td>
<td>Chapter 13: Analyzing Investigations</td>
</tr>
<tr>
<td></td>
<td>Session 22</td>
<td>Chapter 14: Constructing Hypotheses</td>
</tr>
<tr>
<td>12</td>
<td>Session 23</td>
<td>Chapter 15: Designing variables operationally</td>
</tr>
<tr>
<td></td>
<td>Session 24</td>
<td>Chapter 16: Designing Experiments</td>
</tr>
<tr>
<td>13</td>
<td>Session 25</td>
<td>Assessment #2 (over ch 8-17)</td>
</tr>
<tr>
<td></td>
<td>Session 26</td>
<td>Application Laboratory (Life Science)</td>
</tr>
<tr>
<td>14</td>
<td>Session 27</td>
<td>Application Laboratory (Physical Science)</td>
</tr>
<tr>
<td></td>
<td>Session 28</td>
<td>Application Laboratory</td>
</tr>
<tr>
<td>15</td>
<td>Session 29</td>
<td>Application Laboratory (Earth/Space Science)</td>
</tr>
<tr>
<td></td>
<td>Session 30</td>
<td>Application Laboratory</td>
</tr>
<tr>
<td>16</td>
<td>Finals week</td>
<td>Comprehensive Final Exam</td>
</tr>
</tbody>
</table>

**Theoretical Basis for this Course:**

The theoretical basis for this course is constructivist scientific inquiry. Constructivist scientific inquiry is a belief about learning based on the notion that reality cannot be seen as a set of truths to be given to the learner, but instead is a process by which individuals create
their own understandings from interactions between what they already know and what they encounter through interaction with objects and/or people\textsuperscript{7}.

As a student in a course based in constructivist scientific inquiry, you can expect to actively create understandings through scientific investigations. This requires that you: 1) be engaged in scientifically oriented questions, 2) give priority to evidence in responding to questions, 3) formulate your own explanations from evidence, 3) connect explanations to scientific knowledge, and 4) communicate and justify your explanations.

**To assure success in this class:**

- Attend every class.
- Be on time and settle down quickly.
- Participate actively with materials and with others in your cooperative learning group.
  - Help keep your cooperative learning group on task.
- Become familiar with the dispositions appropriate for teachers of science and display them in class and in all your field experiences.
- Reflect on what you know you know so you build confidence in what you know.
- Reflect on what you know you don’t know so you know where to focus your energy.
  - Ask questions when you don’t understand.