

**SOUTHERN CONNECTICUT STATE UNIVERSITY**

**Physics 101**

**Inquiries in Elementary Physics**

**Fall 2003**

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**Office Hours:**

Mon. 4-5 pm,

Tues. 7:30 pm-8:30 pm

Wed. 9-10 am, 3-5 pm

**COURSE NUMBER**

PHY101

**CREDIT HOURS:**

4 credits

**PREREQUISITES:**

None

**COURSE TITLE:**

Inquiries in Elementary Physics

**COURSE DESCRIPTION:**

Central topics and applications of physics that are relevant for elementary school educators are studied through hands-on investigations. There is an emphasis on the processes of science including observation, measurement, experimental design and testing of theories. Most in-class investigations are examples of inquiry-based science activities using the "Science and Technology for Students" equipment kits which are currently employed in K-8 classrooms nationwide. If possible, visits will be made to local elementary school science classes to observe how elementary school children respond to these materials.

**COURSE'S CONTRIBUTION TO THE PRE-SERVICE TRAINING OF PROSPECTIVE ELEMENTARY SCHOOL EDUCATORS:**

All elementary school teachers are expected to be able to provide their students with enjoyable and meaningful science experiences. In preparation for this, the Inquiries in Elementary Physics course provides the prospective teacher with two significant benefits. First, it provides an opportunity for the teacher-to-be to gain a deep understanding of a few physics topics relevant to the K-8 classroom. Second, this course gives first hand experience in how one might teach science in a collaborative, inquiry-based classroom that is designed to acknowledge and meet the diverse needs and interests of K-8 students.

**STANDARDS GUIDELINES ASSOCIATED WITH THIS COURSE**

**INTASC**  
**[Interstate New Teachers' Assessment & Support Consortium]**

**Scholarship**

- 1. Knowledge of subject matter
- 2. Knowledge of human development & learning
- 3. Instruction adapted to meet diverse learners
- 4. Use of multiple instructional strategies & resources

**Attitudes and Disposition**

- 5. Effective learning environment created
- 6. Effective communication
- 7. Lesson planning

**Integrity**

- 9. Reflection and professional development

**Leadership**

- 8. Assessment of student learning to improve teaching

**Service**

- 10. Partnership with school and community

**CCCT**  
**[CONNECTICUT COMMON CORE OF TEACHING]**

**DEMONSTRATIONS OF KNOWLEDGE**

- 1.1** understanding of student learning & development
- 1.2** understanding of need for different learning approaches
- 1.3** proficiency in reading, writing and mathematics
- 1.4** understanding of central concepts & skills, tools of inquiry and structures of discipline(s)
- 1.5** knowledge of how to design and deliver instruction
- 1.6** recognition of need to vary instructional methods

**APPLICATION OF KNOWLEDGE THROUGH**

- 2.2** selection and/or creation of learning tasks that make subject meaningful for students
- 2.4** creation of instructional opportunities supporting students' academic, social and personal development
- 2.5** use of verbal, nonverbal and media communication fostering individual and collaborative inquiry
- 2.6** employment of various instructional strategies in support of critical thinking, problem solving and skills demonstration
- 2.7** use of various assessment techniques to evaluate student learning & modify instruction

**DEMONSTRATION OF PROFESSIONAL RESPONSIBILITY THROUGH:**

- 3.1** professional conduct in accordance with the Code of Professional Responsibilities for Teachers
- 3.2** shared responsibility for student achievement and well-being
- 3.3** continuous self-evaluation regarding choices & actions on students and school community
- 3.6** demonstrations of a commitment to students and a passion for improving the profession

## LEARNER OUTCOMES & ASSESSMENTS

### Expected Outcomes (and associated standards from the list above)

1. Development of conceptual understanding through observation of physical phenomena in regard to: **(INTASC 1, CCCT 1.1, 1.2,1.3,1.4)**
  - a) Electricity and electric circuits
  - b) Magnets, electromagnets and motors
  - c) Principles of motion, designing vehicles, measuring motions
  - d) Principles of time measurement
2. Ability to make and record careful scientific observations and measurements. **(INTASC 3, 4, CCCT 1.1, 1.2,1.3,1.4)**
3. Ability to reason logically about physical phenomena on the basis of available evidence. **(INTASC 1, CCCT 1.2,1.3,1.4,1.5,2.6)**
4. Ability to generate interesting questions and design experiments which provide answers. **(INTASC 1,4 CCCT 1.1,1.2,1.3,1.4,1.5)**
5. Ability to use experimental data in the development, testing and refinement of theoretical models **(INTASC 1, CCCT 1.1, 1.2,1.3,1.4,2.6)**
6. Increased knowledge of and comfort with using technology to facilitate science learning through inquiry. **(INTASC 1,2,3,4,5 CCCT 2.2, 2.5)**
7. Development of insights into how a science curriculum can meet the needs of diverse students**(INTASC 1,2,3,4,5 CCCT 2.1, 2.2, 2.4)**
8. Ability to work well in a group**(INTASC 3,5,9 CCCT 1.1, 1.2, 1.6, 2.3, 2.4, 2.5, 3.1, 3.2)**
9. Ability to help others understand scientific and mathematical material **(INTASC 1,2,3,4,5,6,9 CCCT 1.1, 1.2,1.4,1.5,1.6, 2.4, 2.5, 3.1, 3.2,3.3,3.6)**
10. Ability to gain insights from peers **(INTASC 1,2,3,4,5,6 CCCT 1.1, 1.2,1.6, 2.4, 2.5, 3.1, 3.2)**

## **Assessments (and associated standards from the list above)**

**-See *Evaluation Criteria* for more information**

1. Notebooks reflecting progress on in class activities and learning assessments must be kept by all students. You should write your answers and work for lab and in-class activities in a single loose-leaf notebook. This notebook will be collected every three weeks for quick checks of completeness, organization and spot checks of correctness. **(INTASC 1,4,6,8 CCCT 1.2, 1.3, 1.4,2.5, 2.7)**
2. Seven Quizzes and One Final Exam will be given. **(INTASC 1,6 CCCT 1.3, 1.4)**
3. Attendance and cooperative participation at all classes is mandatory. **(INTASC 3,5,6,9 CCCT 1.1,1.2, 1.6,2.3,2.2, 2.4, 2.5,3.1,3.2, 3.3,3.4)**
4. Reflection Papers: Three times during the semester you will be required to write a paper reflecting on your experiences in this course, how they relate to your professional expectations and how they relate to your other courses. You will be asked to reflect on what you did well and what you could have done better (differently). You will discuss how your experiences impact your views of what it means to be a good teacher and what professional challenges for teachers may be. You will develop a sketch of a potential lesson for a K-8 class that is based on materials that you used in this course. **(INTASC 6,7,8,9 CCCT 1.2, 1.6, 2.1,2.2, 2.4, 3.1, 3.3,3.4)**
5. Professional Conduct: *Professional conduct reflecting an understanding of an educator's role and challenges is expected and will be evaluated by your instructor and your group members three times during the semester.* **(INTASC 3,5,6,9 CCCT 1.1,1.2, 1.6,2.3,2.2, 2.4, 2.5,3.1,3.2, 3.3,3.4)**

## **MODES OF LEARNING**

There will be some, but not very much, lecturing done by the professor in this course. The vast majority of time will be spent with students working in groups on hands-on activities which help them to develop an understanding of fundamental physical principles. Students will also be expected to gain from the knowledge of their peers, and through reading. You will present written and oral discussions of your group's work and interactions.

## COURSE CONTENT OUTLINE

*For more details, see the course calander toward the end of this document.*

Week	Dates
1	<b>Sept 1-7</b> <b>Topic:</b> Electricity Activities for K-8 Students
2-4	<b>Sept 8-28</b> <b>Topic:</b> Electricity for K-8 Teachers
5	<b>Sept 29-Oct 5</b> <b>Topic:</b> Electricity Activities for K-8 Students and Household Wiring
6-8	<b>Oct 6-26</b> <b>Topic:</b> Magnets and Motors Activities for K-8 Students
9-10	<b>Oct 27-Nov 9</b> <b>Topic:</b> Motion and Design Activities for K-8 students
11-12	<b>Nov 10-17</b> <b>Topic:</b> Motion and Design for K-8 Teachers
13	<b>Nov 24-30</b> <b>Topic:</b> Educational Technologies for Elementary School Teachers
14-15	<b>Dec 1-11</b> <b>Topic:</b> Measuring Time Activities for K-8 Students
16	<b>Dec 15-20</b> <b>Final Exam Week</b>

## REQUIRED TEXTS and MATERIALS

**Texts:** Physics By Inquiry, Vol II and Science and Technology for Children Books

**Materials:** One dedicated loose-leaf notebook, simple calculator.  
Please bring both to class everyday.

## **COURSE REQUIREMENTS**

Attendance  
Six Quiz Grades  
Final Exam  
Notebook of Course Work  
Three Reflection Papers  
Professional Conduct in Class

## **EVALUATION CRITERIA**

### **Grade Break-up:**

Your course grade will be determined as follows:

Final Exam Grade:	25%
Quizzes:	25%
Attendance	15%
Reflection Papers:	15%
Notebook Checks	10%
Professional Conduct	10%

*Final Exam:* The final exam is mandatory and cumulative. It will be based on the in-class work and will be open notebook. In other words, keeping a complete, organized notebook that you are confident contains correct information is the best way to prepare for the final exam.

*Quizzes:* As shown in the course calander below, there will be seven quizzes given during the semester. Your lowest single quiz grade will be dropped. The remaining grades will be equally weighted to produce a quiz average.

*Attendance:* Attendance in this course is mandatory. Attendance will be noted each and every class period. You are allowed two missed classes. After that, absences will count against your grade regardless of the reason unless you present a written medical excuse. Arriving for class more than 15 minutes late will count as  $\frac{1}{2}$  of a missed class.

*Reflection Papers:* Three times during the semester you will be required to write a paper reflecting on your experiences in this course, how they relate to your professional expectations and how they relate to your other courses. You will be asked to reflect on what you did well and what you could have done better (differently). You will discuss how your experiences impact your views of what it means to be a good teacher and what professional challenges for teachers may be. You will develop a sketch of a potential lesson for a K-8 class that is based on materials that you used in this course.

*Notebook Checks:* You should write your answers and work for lab and in-class activities in a single loose-leaf notebook. This notebook will be collected every three weeks for quick checks of completeness, organization and spot checks of correctness.

*Professional Conduct:* Professional conduct reflecting an understanding of an educator's role and challenges is expected and will be evaluated by your instructor and your group members three times during the semester. These evaluations are similar to simple course evaluations that you complete in response to you college courses at the end of the semester.

**Dropping Grades and Make-up Work:**

You will be allowed to drop two absences, one quiz grade, and one notebook check. However, there are no make-ups for anything. There are no make-up labs, quizzes, notebook reviews or exams without a written excuse or prior arrangement. If something happens during the semester which you believe is an extenuating circumstance, please see Professor Cummings. Otherwise, work missed due to general illnesses/ life crisis/ child care problems must be dropped under the policy outlined above.

**Academic Integrity Policy:**

The development of teamwork skills is a course objective. Hence, all students are expected to actively participate in a collaborative group of students when working in class. I encourage you to work together on assignments. However, each student must turn in her/his own class write-up containing only work to which she/he contributed. Write-ups from groups of students will not be accepted. No student will submit work in the name of any other student. This is considered cheating by both students involved and will be handled according to the policy for academic dishonesty stated below. Collaboration of any sort during an examination or quiz is prohibited and considered academic dishonesty. The first occurrence of academic dishonesty will result in an F for the assignment. The second occurrence will result in an F for the course.

**Diverse Learning Needs and This Course:**



Independent of any formal diagnosis or documentation, if you believe that your level of learning or the accuracy of my assessment of your knowledge would benefit from some accommodation (for example, a different work group, extra time on exams, access to a dictionary, a reader....), please let me know.

Students with disabilities and diverse learning needs are welcome in this class and will be accommodated.

## TENTATIVE COURSE CALENDAR

As noted in the calendar below, quizzes will be given every other Friday. A "reflection paper" will be due on the first Friday of October, November and December. In addition, the final exam will be held as scheduled by the university December 15-20, 2003.

Week	Sun	Monday	Tues	Wed	Thr	Fri	Sat
1		<b>Sept 1</b> Labor Day	<b>2</b> <b>Classes Start</b>	<b>3</b> <b>Topic:</b> Introductions and assessments	<b>4</b>	<b>5</b> <b>Topic:</b> Electricity Activities for K-8 Students	<b>6</b>
2	<b>Sept 7</b>	<b>8</b> <b>Topic:</b> Electricity for K-8 Teachers	<b>9</b>	<b>10</b> <b>Topic:</b> Electricity for K-8 Teachers	<b>11</b>	<b>12</b> <i>Quiz 1</i>	<b>13</b>
3	<b>Sept 14</b>	<b>15</b> <b>Topic:</b> Electricity for K-8 Teachers	<b>16</b>	<b>17</b> <b>Topic:</b> Electricity for K-8 Teachers	<b>18</b>	<b>19</b> <b>Topic:</b> Electricity for K-8 Teachers	<b>20</b>
4	<b>Sept 21</b>	<b>22</b> <b>Topic:</b> Electricity for K-8 Teachers	<b>23</b>	<b>24</b> <b>Topic:</b> Electricity for K-8 Teachers	<b>25</b>	<b>26</b> <i>Quiz 2</i>	<b>27</b>
5	<b>Sept 28</b>	<b>29</b> <b>Topic:</b> Electricity Activities for K-8 Students	<b>30</b>	<b>Oct 1</b> <b>Topic:</b> Electrical Wiring 101	<b>2</b>	<b>3</b> <i>Reflection Paper Due</i>  <b>Topic:</b> Standards in CT Science Ed.	<b>4</b>
6	<b>Oct 5</b>	<b>6</b> <b>Topic:</b> Magnets and Motors Activities for K-8 Students	<b>7</b>	<b>8</b> <b>Topic:</b> Magnets and Motors Activities for K-8 Students	<b>9</b>	<b>10</b> <i>Quiz 3</i>	<b>11</b>
7	<b>Oct 12</b>	<b>13</b> <b>Topic:</b> Magnets and Motors Activities for K-8 Students	<b>14</b>	<b>15</b> <b>Topic:</b> Magnets and Motors Activities for K-8 Students	<b>16</b>	<b>17</b> <b>Topic:</b> Magnets and Motors Activities for K-8 Students	<b>18</b>
8	<b>Oct 19</b>	<b>20</b> <b>Topic:</b> Magnets and Motors Activities for K-8 Students	<b>21</b>	<b>22</b> <b>Topic:</b> Revisiting Electricity based on what we now know.	<b>23</b>	<b>24</b> <i>Quiz 4</i>	<b>25</b>

9	<b>Oct 26</b>	<b>27</b> <b>Topic:</b> Motion and Design Activities for K-8 students	<b>28</b>	<b>29</b> <b>Topic:</b> Motion and Design Activities for K-8 students	<b>30</b>	<b>31</b> <b>Topic:</b> Motion and Design Activities for K-8 students	<b>Nov 1</b>
10	<b>Nov 2</b>	<b>3</b> <b>Topic:</b> Motion and Design Activities for K-8 students	<b>4</b>	<b>5</b> <b>Topic:</b> Motion and Design Activities for K-8 students	<b>6</b>	<b>7</b> <i>Quiz 5</i>  <i>Reflection Paper Due</i>	<b>8</b>
11	<b>Nov 9</b>	<b>10</b> <b>Topic:</b> Motion and Design for K-8 Teachers	<b>11</b>	<b>12</b> <b>Topic:</b> Motion and Design for K-8 Teachers	<b>13</b>	<b>14</b> <b>Topic:</b> Motion and Design for K-8 Teachers	<b>15</b>
12	<b>Nov 16</b>	<b>17</b> <b>Topic:</b> Motion and Design for K-8 Teachers	<b>18</b>	<b>19</b> <b>Topic:</b> Educational Technologies for Elementary School Teachers	<b>20</b>	<b>21</b> <i>Quiz 6</i>	<b>22</b>
13	<b>Nov 23</b>	<b>24</b> <b>Topic:</b> Educational Technologies for Elementary School Teachers	<b>25</b>	<b>26</b> <b>Thanksgiving Break</b>	<b>27</b>	<b>28</b> <b>Thanksgiving Break</b>	<b>29</b>
14	<b>Nov 30</b>	<b>Dec 1</b> <b>Topic:</b> Measuring Time Activities for K-8 Students	<b>2</b>	<b>3</b> <b>Topic:</b> Measuring Time Activities for K-8 Students	<b>4</b>	<b>5</b> <i>Quiz 7</i>  <i>Reflection Paper Due</i>	<b>6</b>
15	<b>Dec 7</b>	<b>8</b> <b>Topic:</b> Measuring Time Activities for K-8 Students	<b>9</b>	<b>10</b> <b>Topic:</b> Measuring Time Activities for K-8 Students  <b>Last Day of Class</b>	<b>11</b>	<b>12</b> <b>Reading Day</b> <b>No Class</b>	<b>13</b>
16	<b>Dec 14</b>	<b>15</b> 	<b>16</b>	<b>17</b> <b>Final Exams</b> 	<b>18</b>	<b>19</b>	<b>20</b>

