I. Catalog Description and Credit Hours of the Course

A review of the basic content of physics coupled with pedagogical models appropriate for teaching in the elementary or secondary classroom. This course is not intended for students with an undergraduate or graduate physics major. (3)

II. Prerequisites

Graduate student status and permission of instructor.

III. Purposes or Objectives of the Course

This course will provide a fundamental background in physics for those wishing to be effective teachers, curriculum designers and science coordinators. Another purpose of this course is to strengthen the physics knowledge of teachers who are certified in areas other than physics. Students will be introduced to a variety of teaching strategies and web resources while they are involved in ‘learning by doing’ experiences in the classroom.

IV. Expectations of Students

Attend class regularly, take class notes, and participate in classroom discussions.

Work all assigned homework problems.

Actively participate in performing laboratory experiments and to demonstrate originality in the laboratory reports.

Demonstrate competence in the subject matter by performing satisfactorily on examinations.

V. Course Content or Outline

<table>
<thead>
<tr>
<th>Lecture Topics</th>
<th>Class Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Introduction and General Topics</td>
<td>3</td>
</tr>
<tr>
<td>1. Pre-test</td>
<td></td>
</tr>
<tr>
<td>2. Units</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Force and Motion</td>
<td>15</td>
</tr>
</tbody>
</table>
1. Motion and Acceleration
2. Vectors
3. Newton’s Laws
4. Universal Law of Gravitation
5. Torque
6. Projectile Motion
7. Circular vs. Rotary Motion
8. Machines
9. Momentum and Impulse

C. Electricity and Magnetism
   1. Electrostatics
   2. Circuits
   3. Magnetism

D. Waves
   1. Frequency And Period
   2. Waves In General
   3. Sound
   4. Light – Spectrum, Refraction, Reflection

E. Heat
   1. Heat, Temperature And Misconceptions
   2. Transfer Of Energy

E. Nuclear
   1. Nuclear Structure
   2. Radioactive Decay
   3. Particles

F. Special Topics
   1. Six Flags Physics Day – How To Prepare A Class
   2. Vector Day
   3. Albert Einstein’s Birthday Activities

**Laboratory Experiments**

- Vectors And Displacement (Where Am I)
- Acceleration -- (Bicycle Lab)
- Combining Forces
- Energy And Power (Human Horsepower)
- Energy In Coins
- Electric Fields
- Coulomb’s Law
- C.A.S.T.L.E. Lab
- Parallel And Series Circuits
- Speed Of Sound
- Reflection Of Light
- Refraction Of Light

**VI. Textbooks and Other Required Material**

B. Classroom and Laboratory Activities for PH618, possibly a packet to purchase.

VII. **Basis for Student Evaluation**

- Exams and quizzes: 25 to 35%
- Participation in class activities: 10 to 20%
- Laboratory reports: 20 to 30%
- Final exam: 10 to 30%

VIII. **Programs Served by this Course**

Required core course of the MNS in Science Education degree option.
MNS in Biology, Chemistry or Geosciences for students with an interest in education.
MA in Elementary or Secondary Education for students with an interest in science education.