Foundational Approaches to Physical Science, SMTE 3315
Department of Science, Math, and Technology Education
Spring 2015

A. COURSE INFORMATION

Course number/section: SMTE 3315.A01, 3315.A02
Class meeting time: MW 9:30 – 11:25
Class location: EN 201
Course Website: Blackboard: 40479.201501[SP-15]SMTE-3315-A01-FOUND APPROACHES TO PHYS SCI

B. INSTRUCTOR INFORMATION

Instructor: Nancy Darnell, M.S.
Office location: EN 201
Office hours: MW 11:25-12:25
Telephone: 361-739-5771
e-mail: nancy.darnell@tamucc.edu, long301@yahoo.com
Appointments: upon request

C. COURSE DESCRIPTION

Catalog Course Description
Physical science topics such as simple machines, atoms, molecules, electricity and magnetism, sound, and light are taught. Laboratory involvement will emphasize techniques of problem solving, data gathering, and data application. The course is taught following an inquiry based format and is recommended for future K-8 level science educators. Safety training given during a laboratory meeting early in the semester is required for continued participation in this course.

Extended Course Description
Additional topics covered in this course include earth science and space science topics. The content is more advanced than elementary school science, however the lessons and activities may be structured to model appropriate teaching practices for the elementary school science classroom.

D. PREREQUISITES AND COREQUISITES

Prerequisites
None

Corequisites
Student must register for Section .A01 and Section .A02 simultaneously.
E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

Optional Textbook(s) or Other References

Supplies
Simple calculator

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1) Conduct simple experiments following the scientific method to test a variety of physical science phenomena. Identify and control variables in investigations.

2) Use Metric System for basic measurements with a ruler, a balance, and a graduated cylinder.

3) Describe the motion of an object and explain the effect of force on motion and the law of inertia.

4) Gather information about a chemical element from periodic table and describe basic chemical properties of the element from gathered information. Write chemical formulas.

5) Identify and describe physical properties of matter such as density, buoyancy, electrical and thermal conductivity, and magnetic properties.

6) Assemble a simple electrical circuit and be able to do simple troubleshooting.

7) Discuss different forms of energy and the Law of Conservation of Energy.
8) Describe and explain basic phenomena of the sky such as lunar phases, change of seasons and day/night.

9) Describe the Earth as a system; identify and describe the basic components of Earth systems and how they interact with each other.

10) Describe, explain, and discuss the impact of human activities on nature.

11) Demonstrate problem solving skills and be able to apply the above material to a given situation.

12) Describe/demonstrate/discuss the theoretical and pedagogical methods in teaching the above material to elementary and middle school students.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Students will participate in lecture classes, lab activities, and group presentations

Course Project: For the Course Project presentation, “Earth Science,” students will work in groups of 4. Each group chooses a topic from the list below to research and present on the day specified in the class schedule.


Each group must meet with the instructor prior to the presentation no later than February 23rd. Failing to participate in the meeting will result in point deduction. Grading rubric for the presentation will be discussed during this meeting. Each group prepares a 20-minute presentation which includes a class hands-on activity. Presentations must be compact, illustrative and interactive, and include:

• An introduction and explanation of the physical science concepts involved in the topic. Your understanding of the presented material will impact your grade.
• Illustration of the topic with graphs and/or diagrams. The ability to interpret graphs and/or diagrams, to draw the conclusion from them, and make a prediction based on it will be graded.
• A class activity that illustrates the topic or a physical science principle closely related to the topic. Organization of activity will impact your grade.
• An outline of the TEKS covered by the activity and other general advice on how to introduce the topic to K-8 audiences must be included.
Homework: There will be informal homeworks assigned for practice and formal homeworks assigned for a grade. The answers to informal homeworks will be posted on class Bb page in Learning Modules folder. Students must to keep up with informal homework to assure a good grade on the test. All formal homeworks are activity-based. Students will conduct a simple experiment, grow a crystal, make an electrical maze, and build a fountain. You must do your project by yourself. The due date for each project is indicated in the schedule below. There is a 5-point penalty for each extra day. There is a specific requirement for each project; make sure to read and understand it. Each project is worth 25 points.

HW#1. A science report. Student will complete a science experiment and write a report. Report will be submitted via Bb. The topic, due dates, rubric and the instructions are on the Bb under assignments.

HW#2. Crystals of two salts [choose two from NaCl (table salt), sodium tetraborate (20 Mule Team Borax), Copper Sulfate (fungicide, snail killer) and MgSO4 (Epsom Salts)]. Research how to grow these crystals. Do not blindly follow the instruction – use your knowledge about the matter. It is all about the experiment. Don’t be afraid to experiment! You must turn in two labeled plastic bags with crystals, one for each type of crystals and submit via Bb a free format one-page essay summarizing your observation of the crystals’ growth. The due date, the rubric and the instructions are on the Bb under assignments.

HW#3. An electrical circuit maze over the Earth and Space TEKS 4-5 grade. Look in the textbook for the building instructions, pg. 111-112. The design and choice of questions are subjects to grade. Submit the justification for the choice of questions via Bb. The due date, rubric and the instructions are on the Bb under assignments.

HW#4. Fountain as a model of a plumbing system. Use only recycled materials!

Instructions for the construction, the due date, and the rubric are posted on Bb. No report is necessary.

Practicum: At the end of the semester every student has to demonstrate his/her skills to measure length, mass, and volume. The accuracy of measurement will be graded.

Every student has to correctly classify rock (igneous, sedimentary or metamorphic) based on observed properties of the given three rock types.

Every student will have to complete two of the listed below tasks.

- Make necessary measurements and calculate an average speed of a moving object.
- Make necessary measurements and identify the unknown solid material by calculated
density.
• Determine the type of three unknown water solutions with use of either cabbage juice, litmus or pH paper.
• Construct a simple electrical circuit containing a battery, bulbs and a switch according to a diagram.
• Find requested information about given atom from Periodic Table. Write down names and formulas for the molecules that this element can form with each of four other elements listed in the assignment.
• Based on the given information make a graph and discuss what conclusion could be drawn from that graph. Read the given graph and make a prediction based on the graph.
• Construct a lever system. Predict and verify how much effort is needed to lift up given weight with use of that lever system.

MAJOR COURSE REQUIREMENTS AND GRADING
Formal and informal homework assignments will be given. Four online tests and two in-class exams will be given. A lab practicum will demonstrate students’ mastery of laboratory skills.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>POINTS EARNED</th>
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<tbody>
<tr>
<td>Four formal homework assignments</td>
<td>100</td>
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<tr>
<td>@ 25 points each</td>
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<tr>
<td>Four online tests @ 25 points each</td>
<td>100</td>
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<tr>
<td>Mid-term Exam</td>
<td>150</td>
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<td>Class Project</td>
<td>100</td>
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<tr>
<td>Lab Practicum</td>
<td>90</td>
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<tr>
<td>Final Exam</td>
<td>200</td>
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<tr>
<td>Attendance</td>
<td>60</td>
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<td>TOTAL FOR THE COURSE</td>
<td>800</td>
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A= 720 – 800 Points
B= 640 719
C= 560 639
D= 480 559
F= below 480
### H. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
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</thead>
<tbody>
<tr>
<td>1/21</td>
<td>Introductions and expectations; the scientific method; the 5E method; Laboratory safety presentation</td>
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<tr>
<td>1/26</td>
<td>The Scientific Method, graphing</td>
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<tr>
<td>1/28</td>
<td>Measurements and Data Collection</td>
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<tr>
<td>2/2</td>
<td>Calculations and data analysis</td>
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<tr>
<td>2/4</td>
<td>Observing motion, forces, work and energy</td>
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<tr>
<td>2/9</td>
<td>Gravity</td>
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<tr>
<td>2/11</td>
<td>Simple machines; <strong>Homework 1 due</strong></td>
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<tr>
<td>2/16</td>
<td>The structure of matter: atoms and atomic particles</td>
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<tr>
<td>2/18</td>
<td>Periodic Table of Elements; elements, compounds, mixtures</td>
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<tr>
<td>2/23</td>
<td>Physical and chemical changes</td>
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<tr>
<td>2/25</td>
<td>Chemical bonds; chemical formulas</td>
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<td>3/2</td>
<td>Special molecule: Properties of water</td>
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<tr>
<td>3/4</td>
<td>Acids and bases</td>
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<tr>
<td>3/9</td>
<td>Heat and temperature; <strong>Homework 2 due</strong></td>
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<tr>
<td>3/11</td>
<td><strong>Exam I</strong></td>
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<td>3/23</td>
<td>Nature of electricity; static electricity; electrical units of measure, electrical properties of matter</td>
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<td>Date</td>
<td>Topic</td>
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<tr>
<td>3/25</td>
<td>Electrical circuits</td>
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<td>3/30</td>
<td>Magnetism; energy transformations</td>
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<td>4/1</td>
<td>Properties of light</td>
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<td>4/6</td>
<td>Properties of sound; <strong>Homework #3 due</strong></td>
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<tr>
<td>4/8</td>
<td>Earth science: Atmosphere</td>
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<td>4/13</td>
<td>Earth science: Hydrosphere</td>
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<tr>
<td>4/15</td>
<td>Earth science: Lithosphere</td>
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<tr>
<td>4/20</td>
<td>Rocks; rock cycle</td>
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<td>4/22</td>
<td>Weather and climate</td>
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<td>4/27</td>
<td>Space science topics; <strong>Homework #4 due</strong></td>
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<td>4/29</td>
<td>Course project Conference: Planet Earth</td>
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<td>5/5</td>
<td>EXAM II</td>
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<td>5/11</td>
<td>PRACTICUM 8:00 – 10:30 am</td>
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Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

I. **COURSE POLICIES**
Attendance/Tardiness
Attendance/tardiness: SMTE 3315.001 and .101 are taught as one course. Lecture and lab are taught together. Each class period is three hours long. One point will be awarded for each hour you are present in class for a total of three points per day plus extra points for being present on the days of the final exam and practicum for 60 points total.

Students are expected to attend class every period. The curriculum of this class is designed in such way that the major learning comes from the actual class period. Don't be afraid of being late to the class; to be late is better than to be absent. If you have to miss class due to emergency or doctor’s appointment you will lose points for attendance (though some of those points can be recovered through extra points from bonus points on the exams). If there is a reason that you must miss more than one class, please talk with me to make arrangements to cover the material. Due dates for all the work for submission will be listed in the calendar on class Bb page.

Late Work and Make-up Exams
Late work will be accepted with 5 point per day penalty. Work in electronic format (e-mail) will not be accepted unless prior arrangement has been made.

Extra Credit
There will be opportunities for bonus points on some assignments and on exams

Cell Phone Use
Electronic devices may be used only as calculators. Texting, emailing, and phone use are not permitted during class. Phones may not be used as calculators during exams.

Laptop Use
Laptops may be used during lecture and labs but not during exams.

Food in Class
Food and drinks are not permitted in class except by permission from the instructor.

Missed Exam
A student must inform the instructor prior to an exam which must be missed. Arrangements must be made to take an alternative exam at a different time.

Participation
The purpose of this class is to prepare students to teach science in the elementary
classroom. Students will participate in a variety of activities suitable for use with early childhood and elementary classes.

J. COLLEGE AND UNIVERSITY POLICIES

- Academic Integrity (University)
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior. In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in receiving a grade of 0 for the assignment.

  See Full University Policy at [http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity](http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity)

- Classroom/Professional Behavior
  - Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- Deadline for Dropping a Course with a Grade of W (University)
  The grade of W will be assigned to any student officially dropping a course by Friday, April 10, 2015. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must be submitted. After April 10, 2015 a student will not be allowed to drop a course.

- Grade Appeals (College of Science and Engineering)
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the
instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  Disability Services (DS) is the hub for coordinating services and accommodations to ensure accessibility and utilization of all programs for all Texas A&M University-Corpus Christi students with disabilities. Our services are designed to meet the unique educational needs of enrolled students with documented permanent or temporary disabilities. DS provides intake and consultation services to students seeking to register with our office. DS reviews an individual’s documentation of disability and assesses eligibility for services and the determination of reasonable accommodations. For more information visit the Disability Services Office at 116 Corpus Christi Hall or go to http://disabilityservices.tamucc.edu/

- **Student Responsibility**: You are responsible for knowing all material presented in class as far as examinations are concerned. **Excused absences do not take this responsibility away.**

K. **Statement of Academic Continuity**: In the event of an unforeseen adverse event, such as a major hurricane, which makes it impossible for classes to be held on the campus of Texas A&M University–Corpus Christi, this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.