Texas A&M University- Corpus Christi

SMTE 3315.001, 3315.101
TR 9:30 – 11:25
Fall 2014
Office Telephone: 361-739-5771

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Foundational Approaches to Physical Science

Course Description: Emphasis will be on physical science topics such as matter, energy, motion, electricity and magnetism, sound, and light. Laboratory involvement will emphasize techniques of problem solving, data gathering, and data application. The primary focus of this course is to prepare pre-service teachers to teach physical science topics in grades EC-8.

Learning Objectives: At the completion of the course, the student will 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.

**GRADES:** Grades will be calculated for the following assignments:

- Four homework assignments @ 25 points each – 100 pts
- Four online tests @ 25 points each – 100 pts
- Mid-Term Exam – 150 pts
- Class Project – 100 pts
- Practicum – 90 pts
- Final Exam – 200 pts
- Attendance – 60 pts

**Total – 800 pts**

A 720 – 800
B 640 - 719
C 560 - 639
D 480 - 559
F below 480

**Required or Recommended Readings**


**Recommended or Supplemental Reading:**

Articles posted on Blackboard for specific units in the course

State Adopted Proficiencies/TExES competencies (COE)
Course Policies

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/Electronic Device Usage: 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.

Academic Integrity/Plagiarism: University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) 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.

Dropping a Class: I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. November 7 is the last day to drop a class with an automatic grade of “W” this term.
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.

Statement of Civility: Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

Grade Appeals: 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 (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.

Disabilities Accommodations: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call or visit Disability Services at (361) 825-5816 in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access
issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

**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.

**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.**

**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 October 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 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 MgSO$_4$ (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 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.

## SCHEDULE

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
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<tbody>
<tr>
<td>8/28</td>
<td>Introductions and expectations; the scientific method; the 5E method; Laboratory safety presentation</td>
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<tr>
<td>9/2</td>
<td>The Scientific Method, graphing</td>
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<tr>
<td>9/4</td>
<td>Measurements and Data Collection</td>
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<td>9/9</td>
<td>Calculations and data analysis</td>
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<td>9/11</td>
<td>Observing motion, forces, work and energy</td>
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<td>9/16</td>
<td>Gravity</td>
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<td>9/18</td>
<td>Simple machines; <strong>Homework 1 due</strong></td>
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<td>9/23</td>
<td>The structure of matter: atoms and atomic particles</td>
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<td>9/25</td>
<td>Periodic Table of Elements; elements, compounds, mixtures</td>
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<td>9/30</td>
<td>Physical and chemical changes</td>
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<td>10/2</td>
<td>Chemical bonds; chemical formulas</td>
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<td>10/7</td>
<td>Acids and bases</td>
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<td>10/9</td>
<td>Special molecule: Properties of water</td>
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<tr>
<td>10/14</td>
<td>Heat and temperature; review for <strong>Homework 2 due</strong></td>
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<td>10/16</td>
<td><strong>Exam I</strong></td>
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<td>10/21</td>
<td>Nature of electricity; static electricity; electrical units of measure, electrical properties of matter</td>
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<td>10/23</td>
<td>Electrical circuits</td>
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<td>10/28</td>
<td>Magnetism; energy transformations</td>
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<td>10/30</td>
<td>Properties of light; Properties of sound</td>
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<td>11/4</td>
<td>Earth science: Atmosphere <strong>Homework #3 due</strong></td>
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<td>Earth science: Hydrosphere</td>
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<td>11/11</td>
<td>Earth science: Lithosphere</td>
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<td>11/13</td>
<td>Rocks; rock cycle</td>
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<td>11/18</td>
<td>Weather and climate</td>
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<td>11/20</td>
<td>Space science topics; <strong>Homework #4 due</strong></td>
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<td>11/25</td>
<td><strong>Course project Conference: Planet Earth</strong></td>
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<tr>
<td>12/2</td>
<td><strong>EXAM II</strong></td>
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<td>12/4</td>
<td><strong>No class</strong></td>
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<tr>
<td>12/9</td>
<td><strong>PRACTICUM</strong></td>
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