UNIVERSITY OF TEXAS AT SAN ANTONIO
College of Education and Human Development
Department of Interdisciplinary Learning and Teaching

IDS 3201-901: Adv. Physical Science Lab
Spring 2008- Mondays @ 8:00-10:45 a.m.

Instructor: **Arnaldo Noyola**
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Office: **MB 2.210, Carrel # 1**
Phone: **210-392-3546**

Office hours: Tuesdays @ **1:00 p.m.- 4:00 p.m., or by appointment**
IDS Office Pool: MB 2.212 (Call 458-5969 to schedule an appointment).
Classroom: **BV 3.338**

Textbook: none

Other: Scientific calculator

Completion of core curriculum requirements, including college algebra or higher math, is a prerequisite for this course.
Grading Scale:
90-100 = A
89-80 = B
79-70 = C
69-60 = D
< 60 = F

Grade Components:
Midterm = 20%
Final = 20%
Weekly Lab exercises and reports, including Experiment Notebook = 50%
Participation = 10%

During the course of the semester, the understanding of each week's material will be evaluated by review of homework assignments that are based on lab exercises. These assignments will be averaged and the average will count 50% towards your final grade. A weekly Lab report of the lab exercises will be submitted. All Lab reports will be typed, 12-point font, using Times New Roman or Arial typeface. Lab reports will cover all aspects of the Tab Topics covered during the week.

Your lab reports will consist of the following seven parts:

1. **Identifying Information:** Your name, the names of the lab partners you worked with, the date the lab was started, the date the lab was completed, your class and section number.

2. **Title/Introduction:** In this section, include the lab report number, summarize the concept, ideas, and/or main topic of the lab exercises or experiments. In this section, summarize the concept and objectives of the experiment or lab topic. Include definitions, SBEC stds, and TEKS addressed.
3. **Materials-**Tell what materials (equipment, chemicals, glassware, etc) are needed to complete the laboratory exercise.
4. **Procedure(s)-** Outline the procedure with the raw numerical measurements and observations you made.
5. **Results:** include data and results in the section.
6. **Conclusions:** What did you conclude about the exercise? Explain any difficulties, abnormal results, etc. that you encountered in completing this laboratory exercise.
7. **References:** Website addresses, science books, etc.

The Experiment Notebook is due the last day of class and will consist of 10 science experiments of your choosing that are related to physics or chemistry. Sample websites to visit include: http://www.spartechsoftware.com/reeko/ and http://www.scifun.chem.wisc.edu. While ideas for experiments can be gathered from any science website or from other sources, the Experiment Notebook should be written in your own words. Failure to do so will result in a grade of zero for the assignment. Each science experiment should contain the following: Title and number of the experiment, the concept(s), objective(s) that the experiment is illustrating, age appropriateness, description of materials used, procedure, and a citation. The grade assigned to the notebook will be based on completeness, creativity, and age-appropriateness. Please refer to the handout entitled "Experiment Notebook Model," which describes the proper format of the Experiment Notebook. Failure to follow this format will result in a reduction of at least 10 points from the final grade of the Experiment Notebook.

Catalog Description:
Introduction to the tools, techniques, and topics of modern physical and chemical science investigations with academic applications.

Classroom Climate:
While in class, each student has the right to expect courteous treatment and has the obligation to treat others the same way. This will allow us to focus on the study of the course material.

Class Attendance:
Students are responsible for all of the material presented in this class.
Missed lab meetings: Missing class will result in a grade of zero for that day's work and participation grade. However, extenuating circumstances may warrant

non-attendance. In such cases, it is the student's responsibility to contact the instructor as soon as possible and to provide documentation such as a doctor's note. **Only ONE missed class can be made up.**
Late work: Late work will be accepted under the following limitations: per calendar day late, 5 points will be deducted from the raw score; work that is more than 14 days late will not be accepted and will result in a grade of zero for that report.
Late arrival and/or early departure: If a student arrives late or leaves early, points will be deducted from that day's lab assignment(s). Students may not depart from the laboratory session early without the instructor's express permission.
Group work: No credit will be awarded for the work that his/her group completes while the student is absent.

Policy Statements:

Fitness to Teach:
Students are expected to demonstrate professional conduct and attire during class sessions (see Fitness to Teach policy document located in the Department website). All cell phones and beepers must be turned off during class periods unless prior permission has been given by the instructor.

The instructor will follow all the policies and procedures, in regards to students, as they are specified in the UTSA Faculty Handbook and the Fitness to Teach Policy document. Any incidence of scholastic dishonesty or other student discipline issues will be managed as the Handbook specifies (Faculty Handbook, Section 2.37, pages IV-3li-vi).

No electronic recording of lectures or class sessions may be done without the prior permission of the instructor. No eating, drinking, or smoking is allowed in UTSA classrooms and laboratories (Ad. Memorandum No. 54)

Disability:
If you need accommodation related to a disability, please visit me during my office hours to discuss your needs. Students with disabilities must be registered with the Office of Disability Services located in MS 2.03.18 (Main Campus, 458-4157) or BV 1.302 (Downtown, 458-2838) in order to receive support services.

Scholastic Dishonesty:
The University expects every student to maintain a high standard of individual integrity for work done. Scholastic dishonesty is a serious offense, which includes, but is not limited to, cheating on a test or other class work, plagiarism (the appropriation of another's work and the unauthorized

incorporation of that work in one's own work), and collusion (the unauthorized collaboration with another person in preparing college work offered for credit). In cases of scholastic dishonesty, the faculty member responsible for the class may initiate disciplinary proceedings against the student. In this class all UTSA procedures will be followed and the necessary paperwork will be filed with the Office of Student Life and the Division of Education. The course instructor will recommend a penalty to the Office of Student Life, which may impose an additional university penalty.

UTSA Honor Code:
"On my honor, as a student at The University of Texas at San Antonio, I will uphold the highest standards of academic integrity and personal accountability for the advancement of the dignity and the reputation of our university and myself."

Criminal Background Checks:
Criminal background checks will be conducted on all students enrolled in selected undergraduate courses in the COEHD. Since observation and interaction with minors is required for successful completion for degree programs in the COEHD, students who do not have a clear criminal background check may not be allowed to continue in the programs of the College.

Disclaimer:
The course instructor reserves the right to alter at any time any of the information presented on this syllabus at his discretion. If you are not in class, you may miss important information that directly affects your grade!

Laboratory Safety Rules

Contact with many of the chemicals we use in the laboratory may have harmful effects on the user. For some it may be enough to just inhale them. Always be careful when you are in the lab.

Personal Protective Equipment (PPE) is anything you have to wear when handling chemicals. This includes, but is not limited to:

a. Eye protection (chemical splash goggles or full face shield, depending on what you are working on) – wear these always.
b. Gloves – wear these always. When you are not working on your experiment in the lab, but wish to use a computer, a telephone, or leave the room, take off your gloves to avoid contamination.
c. Some experiments may require that a lab apron be worn.

Wear clothing that is comfortable, of natural fibers, and that will cover your body as much as possible (long sleeves, long pants). Do not wear loose clothing

– a loose sleeve may catch on glassware and cause a spill. Do wear comfortable, low leather shoes. Do not come to the lab wearing tank tops, shorts, or sandals. Also remove jewelry.

If you have long hair, be sure to tie it back so that it will not come into contact with the chemicals or with an open flame.

Open flames may be necessary in some of the experiments. Before lighting a flame, make sure no flammable solvents are nearby.

Flammable solvents or other volatile chemicals (example: alcohols such as methanol, or ketones, such as acetone) may not be heated on a hot plate in an open vessel. Set up a condensing system instead.

In an emergency:

a. Injuries such as cuts → tell the instructor immediately; if it is a serious cut, use a clean towel and apply direct pressure to the area, then notify the instructor;
b. Fires or other imminent danger → tell the instructor and the other students immediately;
c. Chemical splash into eyes → immediately get the eye(s) washed out at the eyewash station.

Be sure to know where to find the following items and how to operate them:

a. Fire extinguisher
b. Fire blanket
c. Fire alarm box
d. Safety shower
e. Eye wash station
f. Exit doors
g. Telephones

Always wash your hands before leaving the lab.

Do not bring food or beverages into the laboratory. Neither eating, nor drinking or smoking is allowed in the laboratory.

Always wait with your work in the laboratory until you have ensured that an instructor is there to help you if problems arise.

Prepare for your lab session beforehand so that you know what is expected of you. If you have any doubts along the way, ask your instructor.

Keep the aisles and walkways clear and drawers and cabinet doors closed while you are working.

Do not ever use mouth suction to pipette chemicals and avoid inhaling or tasting chemicals.

If you have to insert glass tubing into a rubber stopper, do so with minimal force. First use a lubricant such as glycerol on the tube and the stopper, then protect your hands by wrapping the tubing in a towel before pushing the tube into the stopper.

Before touching glassware, make sure it is not hot.

Children are not allowed in the laboratory.

Preparation for Lab Sessions

Carefully read the description of any scheduled experiments before the session begins. This may require you to read additional materials.

If there are any pre-lab exercises, do them to the best of your ability and bring them to the lab. Such exercises are intended to help you better understand what you are about to do and to aid you in necessary calculations and observations.

Write yourself an outline of the experiment and include applicable data tables and questions you might have about the process or outcome. You may use your laboratory manual for such notes.

During the Lab Session

As you carry out the experiment(s), don't forget to keep track of your observations. Write them down in your manual.

If, as you compare your observations with expected data, you find that your data is questionable, check your procedure and setup to make sure everything is prepared as it is supposed to be. It is then best to repeat the experiment to get better data. You may wish to consult your instructor first.

Clean up after yourself.

Pay attention to your instructor and make sure you are not missing explanations on the experiment(s).

ALWAYS BE SAFE.

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SBEC SCIENCE STANDARDS

SBEC Science Standards I, II, III, and VIII will be addressed in this lab course. These are the standards in which you should be competent in seeking Texas teacher certification.

Standard I. **The science teacher manages classroom, field, and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens.**

Teacher Knowledge: What Teachers Know
Teachers of Students in Grades 4–8
The beginning teacher knows and understands:
1.1k safety regulations and guidelines for science facilities;
1.2k safety regulations and guidelines for science instruction;
1.3k procedures for the appropriate storage, handling, use, disposal, care, and maintenance of chemicals, materials, specimens, and equipment;
1.4k sources of information about laboratory safety;
1.5k procedures for the safe handling and ethical care and treatment of organisms and specimens;
1.6k procedures for responding to an accident in the laboratory, including first aid;
1.7k legal issues associated with accidents and injuries that occur in the classroom, field, or laboratory;
1.8k potential safety hazards in the field (e.g., insect bites, poisonous plants); and
1.9k the importance of providing laboratory space and equipment for all students, including those with special needs.

Application: What Teachers Can Do
Teachers of Students in Grades 4–8
The beginning teacher is able to:
1.1s employ safe practices in designing, planning, and implementing all instructional activities (e.g., laboratory, field, demonstrations);
1.2s determine sufficient space and classroom arrangement for carrying out laboratory activities;
1.3s provide students with continuous instruction and training in safe techniques and procedures for all laboratory and field activities, student demonstrations, and independent projects;
1.4s read and interpret safety information about chemicals on a Materials Safety Data Sheet (MSDS) and on other chemical labels, including household products;
1.5s check equipment for safety (e.g., cracks in glassware, proper grounding of electrical equipment) prior to use;
1.6s create, implement, and enforce rules and safety procedures to promote and maintain a safe learning environment during laboratory and field activities;
1.7s implement regular procedures to inventory and maintain appropriate safety equipment; and
1.8s optimize quick and safe access to all safety equipment (e.g., eyewash station, sink, safety shower, fire blanket, and extinguisher).

Standard II. **The science teacher understands the correct use of tools, materials, equipment, and technologies.**

Teacher Knowledge: What Teachers Know
Teachers of Students in Grades 4–8
The beginning teacher knows and understands:
2.1k procedures for the storing, securing, and routine maintenance of scientific equipment used in instructional activities;
2.2k correct and safe operating procedures for scientific equipment used in instructional activities;

2.3k concepts of precision, accuracy, and error with regard to reading and recording numerical data from a scientific instrument;
2.4k the international system of measurement (i.e., metric system);
2.5k the use of grade-appropriate equipment and technology for gathering, analyzing, and reporting data; and
2.6k the use of technology to acquire, assess, analyze, interpret, and communicate information.

Application: What Teachers Can Do
Teachers of Students in Grades 4–8
The beginning teacher is able to:
2.1s select and use appropriate tools, technology, materials, and equipment needed for instructional activities;
2.2s instruct and monitor students' use of materials, tools, and instruments;
2.3s make science resources accessible to all students;
2.4s recycle, reuse, and conserve laboratory resources as appropriate;
2.5s use the appropriate number of significant figures to record and report numerical data;
2.6s perform unit conversions within the international system of measurement (i.e., metric system);
2.7s perform conversions within and across measurement systems;
2.8s use techniques to calibrate measuring devices as appropriate;
2.9s organize, display, and communicate data in a variety of ways (e.g., charts, tables, graphs, diagrams, written reports, oral presentations);
2.10s gather, organize, display, and communicate data using appropriate technology (e.g., Internet, graphing calculators, spreadsheets); and
2.11s evaluate the validity of data and data sources.

Standard III. **The science teacher understands the process of scientific inquiry and its role in science instruction.**

Teacher Knowledge: What Teachers Know
Teachers of Students in Grades EC-4 and 4–8
The beginning teacher knows and understands:
3.1k how scientists use different types of investigation, depending on the questions they are trying to answer;
3.2k principles and procedures for designing and conducting an inquiry-based scientific investigation;
3.3k the characteristics of various types of scientific investigations (e.g., descriptive studies, controlled experiments, comparative data analysis);
3.4k how current knowledge and theories guide scientific investigations;
3.5k the use of technology in scientific research; and
3.6k appropriate methods of statistical analysis and measures (e.g., mean, median, mode, correlation).

Application: What Teachers Can Do
Teachers of Students in Grades 4–8
The beginning teacher is able to:
3.1s design and conduct inquiry-based scientific investigations, including nonexperimental and experimental designs;
3.2s plan and implement instruction that provides opportunities for all students to engage in scientific inquiry by using various appropriate combinations of the following processes:
- ask a scientific question;
- formulate a testable hypothesis;
- select appropriate equipment and technology for gathering information related to the hypothesis;
- make observations and collect data taking accurate and precise measurements;
- organize, analyze, and evaluate data to find data trends and patterns and make inferences; and
- communicate and defend a valid conclusion about the hypothesis under investigation;

3.3s link inquiry investigations to students' prior knowledge and experience;

3.4s focus inquiry-based instruction on questions and issues that are relevant to students;
3.5s use strategies to assist students in identifying, refining, and focusing scientific ideas and questions guiding an inquiry activity;
3.6s guide students in making systematic observations and measurements;
3.7s use a variety of tools and techniques to access, gather, store, retrieve, organize, and analyze data;
3.8s provide opportunities for students to use higher-order thinking skills, logical reasoning, and scientific problem solving to reach conclusions based on evidence;
3.9s develop, analyze, and evaluate different explanations for a given scientific result;
3.10s identify potential sources of error in a given inquiry-based investigation; and
3.11s develop criteria for assessing student participation in and understanding of the inquiry process.

Standard VIII. **The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in physical science.**

Teacher Knowledge: What Teachers Know
Teachers of Students in Grades EC–4*
Physical Science
The beginning teacher knows and understands:
8.1k properties of objects and materials;
8.2k concepts of force and motion;
8.3k concepts of heat, light, electricity, and magnetism; and
8.4k conservation of energy and energy transformations.
*See 8.5k below.

Application: What Teachers Can Do
Teachers of Students in Grades EC–4*
Physical Science
The beginning teacher is able to:
8.1s select appropriate techniques, procedures, and tools to observe and record properties of materials (e.g., size, shape, temperature, magnetism, hardness, mass, conduction, density);
8.2s analyze changes in the position and motion of an object subject to an unbalanced force;
8.3s apply properties of fundamental forces (e.g., push or pull, friction, gravity, electric force, magnetic force) to analyze common objects (e.g., toys, playground equipment), experiences, and situations;
8.4s describe and analyze changes in the states of matter caused by the addition or removal of heat energy; and
8.5s describe the properties of various forms of energy (e.g., mechanical, sound, heat, light) and analyze how energy is transformed from one form to another in a variety of everyday situations.

Standard VIII. **The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in physical science.**

Teacher Knowledge: What Teachers Know
Teachers of Students in Grades 4–8
Physical Science
The beginning teacher knows and understands:
8.5k all content specified for teachers in grades EC–4;
8.6k the relationship between force and motion;
8.7k physical and chemical properties and changes in matter;
8.8k energy and energy transformations; and
8.9k the conservation of matter and energy.

Application: What Teachers Can Do

Teachers of Students in Grades 4–8

Physical Science

The beginning teacher is able to:

8.6s apply all skills specified for teachers in grades EC–4, using content and contexts appropriate for grades 4–8;

8.7s measure, graph, and describe changes in motion and analyze the relationship between force and motion in a variety of situations including simple machines, the flow of blood through the human body, and geologic processes;

8.8s investigate physical properties of solids, liquids, and gases;

8.9s analyze physical and chemical changes in matter;

8.10s apply properties and characteristics of waves to analyze sound, light, and other wave phenomena;

8.11s interpret the periodic table and chemical formulas and equations;

8.12s apply the law of conservation of energy to analyze a variety of phenomena (e.g., specific heat, chemical and nuclear reactions, efficiency of simple machines);

8.13s apply the law of conservation of matter to analyze a variety of phenomena (e.g., water cycle, decomposition); and

8.14s analyze the transfer of energy in a variety of situations (e.g., the production of heat, light, sound, and magnetic effects by electrical energy; the process of photosynthesis; weather processes).

UTSA Diversity Statement

The University of Texas at San Antonio (UTSA) is committed to the success of every student, staff and faculty member – on campus, at work and in life. For all members of our university community to excel, we must preserve freedom of thought and expression and promote a climate of respect that honors the rights, safety, dignity and worth of every individual. We choose to be members of this community and pledge our respect for the well-being of all its members.

To further strengthen our wonderful UTSA community, we affirm the following values:

- **RESPECT**. We respect the dignity, worth and contribution of all individuals.
- **INCLUSIVENESS**. We include people of every race, culture, ethnicity, ability, religion, gender, sexual orientation and socio-economic status, and we include a diversity of ideas and points of view.
- **RESPONSIBILITY**. We take responsibility for struggling against and eliminating hate, injustice, discrimination, harassment, bigotry, violence or intimidation of any kind.
- **SELF-EXAMINATION**. We examine our own biases and struggle against racism, sexism, homophobia and other forms of oppression.
- **CIVILITY**. We recognize differences among people as a natural thing and see each new experience working with diverse groups as an opportunity to be better than we were before. We listen, and when we disagree, we work to resolve all disagreements with integrity.
- **INTEGRITY**. We practice personal and academic integrity and value service, citizenship and leadership.
- **CELEBRATION**. We celebrate all of the many backgrounds, experiences, similarities and differences among members of the university community.

For all our differences, we share one world.
To embrace diversity is to welcome the differences and delight in the sharing.

Department of Interdisciplinary Learning and Teaching Mission and Goal Statements:

Mission

The mission of the Department of Interdisciplinary Learning and Teaching is to foster the intellectual and professional growth and integrity of students and faculty through critical reflection and dialogue, civic responsibility, and leadership.

Goals

The Department of Interdisciplinary Learning and Teaching will create a context that nurtures interdisciplinary learners who:

- Acquire and demonstrate content and discipline knowledge
- Demonstrate an awareness and acknowledgement of and engagement in research-based, reflective, culturally responsive practices
- Are producers, disseminators, and critical consumers of research
- Demonstrate an awareness and acknowledgment of and engagement in social justice and equitable practices
- Articulate their professional philosophy and demonstrate a strong professional identity

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Tentative Schedule-Spring 2008
IDS 3201.901-Physical Science Lab
Monday 8:00-10:45 a.m. DT 3.338

Instructor: Arnaldo Noyola, **Email: arnaldo.noyola@utsa.edu**

Lab Date	Notes Activity Source	Topics	Experiments
1. January 14, 2008	Physics/Chemistry Duke CIBL Own write-ups **SBEC STDS: I, II, III, IV, & V.** **SBEC STDS: IV, & V.**	Inquiry Introductions, Lab Safety, Lab Equipment, SBEC requirements, Measurements Simple Machines Density	Paper Towers (+straws), Metric Lab Mini Catapult, Ruler Lever, Straw Balance, Balloon Size, Density Column, Fluid Density
2. January 21, 2008	**Labor Day Holiday**		
3. January 28, 2008	Own write-ups Weekly Lab Exercises **SBEC STDS: VII, VIII.**	Buoyancy	Clay Boats, What Floats your Boat, Egg Float, Float Rocks
4. February 4, 2008	Duke CIBL Own write-ups Weekly Lab Exercises **SBEC STDS: VIII**	Air Resistance	Bottled Egg, Can Crusher, Drinking Straw, Lift Water, Parachutes
5. February 11, 2008	Own write-ups Weekly Lab Exercises **SBEC STDS: VIII**	Friction, Gravity, Inertia	Factors Affecting Friction, Sliding and Stuttering, Microgravity: Can Throw, Seat Belts, Sock Drop
6.February 18, 2008	Duke CIBL NASA Own write-ups Weekly Lab Exercises **SBEC STDS: VIII**	Inertia	Marble Catch, Marbel Momenta I, Penny Catch, Penny Stack, Quick FlicK
7.February 25, 2008	Own write-ups Weekly Lab Exercises **MidTerm Exam** **SBEC STDS: VIII**	Motion Motion: Action/Reaction	Ballbearings, Balloon Rocket, Bucket Swing, CD:Graph your Motion(CBR), Rockets: Paper Rockets, Rockets:Rocket Car
8. March 3, 2008	Own write-ups TI-Calculator Labs NASA Weekly Lab Exercises **SBEC STDS: VIII**	Properties Surface Tension	Separating Matter, Drop Size, Sink or Swim, Speedboat
9. March 10, 2008	Own write-ups Weekly Lab Exercises **SBEC STDS: VIII**	Energy Pendulum	PE & KE, Store Solar Energy 2, Pencil Pendulum, CD:Swing Thing (CBR)
10. March 17, 2008	Spring Break		

11. March 24, 2008	Own write-ups TI-Calculator Labs Weekly Lab Exercises **SBEC STDS: VIII**	Light, Optics Sound	Light Angles, Light Line, Magic Penny, Scatter, Saltza, Sound, SoundII, SoundIII
12. March 31, 2008	Own write-ups Weekly Lab Exercises **SBEC STDS: VIII**	Electricity Magnetism	Charged Balloon I, Charged Balloon II, Charged Balloon III, Comparing Circuits, Electroscope, Lemon Battery, CBL2Lemon Juice, Compass Test, Floating Needle Magnet Magnetic Separation Make Electromagnet
13. April 7, 2008	Own write-ups TI-Calculator Labs Weekly Lab Exercises **SBEC STDS: VIII**	Thermodynamics Acids and Bases	Hot Cans Cold Cans, Freeze Foam, Steel Wool Jar, TEMPFreezeMelt Water Urine Analysis, Cabbage Indicator, Flame Tests
14. April 14, 2008	Duke CIBL Own write-ups TI-Calculator Labs Weekly Lab Exercises **SBEC STDS: VIII**	Chemical Reactions	Concentration of Solutions Is 1 + 1 Always 2? Decomposition of Baking Soda Atomic Fingerprints
15. April 21, 2008	Experimental Notebook Due IDEA Survey	Chemical Reactions	Families of Elements Precipitating Calcium Phosphate Molecular and Chemical Bonds
16. April 28, 2008	**Student Study Day**		
17. May 5, 2008	**Final Exam**		

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