

PHSC 170: Physical Science for Future Presidents

LO 1229 – M/W 11:00a-12:45p

Instructor Information

Matthew d'Alessio
(Professor in Dept. of
Geological Sciences)

Help Sessions

Location: LO 1228

Times: Mon 9:30-10:30a &
by Appointment

Phone: 818.677.3647

Email:

matthew.dalessio@csun.edu

Special needs

I am committed to accommodating those with special physical or learning needs. Please let me know.

Fine Print

It is the responsibility of each student in this course to know and follow all written guidance given by the instructor.

Unforeseen circumstances during the semester might require changes to the syllabus. In this event, a revised syllabus will be posted to Moodle at least one week in advance of the implementation of the change. The original syllabus will remain and the revised syllabus will be identified by the date of the revision as part of the file name. Dates of examinations will never be moved forward.

Electronic Equipment

Class time is a few short hours a week to devote to focused learning. Save phone calls, text messages, web surfing, and other activities for designated breaks or after class. Many K-12 schools have "No cell phone" policies, so you might as well get used to it now. Keep your cell phone out of your own sight so you won't be tempted.

Course Objectives

Our course makes progress on three fronts:

Science Content. Comprehend the science content you will guide your students through as future teachers.

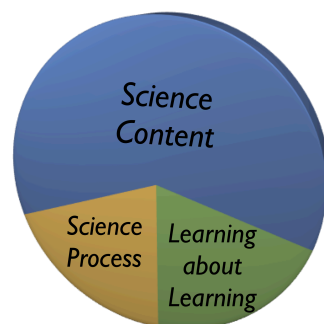
- Understand how the principles of conservation of mass, conservation of energy, and interactions can explain most of the world.

Science Process. Understand the scientific process, which includes:

- Looking at the world, noticing changes, and wondering about the causes of those changes – be willing to ask questions!
- Automatically using data and scientific reasoning to support and self-assess ideas
- Making mistakes and revising your thoughts to fix them

Learning about Learning. Be better prepared to transfer your knowledge to your future students

- Being aware of common preconceptions
- Practice identifying misconceptions
- Practice providing constructive feedback that will help your future students address their misconceptions.



A class for future teachers

Teaching is one of the most gratifying professions you can imagine, but it is also serious and challenging work. Teachers often spend more time with their students than many parents, and over a career you might deeply touch over a thousand lives (parent to over a thousand children!). You therefore have the responsibility to be a positive role model. You can't be late (or if you are, you'll be fired). You can't yell every time you get a little frustrated (or if you do, you'll be much less effective). You can't lie (your students will always catch you). In many cases, you can't even go to the bathroom. Teachers are superstars. If you want to be one, now is the time to start practicing these skills of excellence. This class has high expectations for learning and integrity, and low tolerance for excuses.

Team based learning

Research shows that you can learn more from your peers than you can from professors. To facilitate this learning, you will spend a good portion of the class working in teams. You will work with the same team the entire semester, and you will not be able to choose your team. Since having unprepared teammates can impact your experience, there is a procedure for giving feedback to your teammates and even "firing" a student from your team posted on the Moodle website for our class (In past experience, we rarely need to employ this policy). Almost all required teamwork will be in class, so there is no need to worry about coordinating your schedules.

Grades

The grading policy in this class gives merit to four general areas:

- Your individual mastery of course material.
- Your team's mastery of course material. Assessed throughout the semester as team based challenge problems, quizzes, assignments, and exams.
- Your contributions to the team. Includes being prepared, asking questions, helping teach other teammates, and helping answer questions. Assessed by peer evaluations once during term and once at end of the term.
- Your ability to teach all members of the team. On the final exam only, 5% of your score will be the average of your teammates' scores. If they fail, your score is lower. If this sounds unfair, wait until you get into the classroom. Teachers are assessed 100% on the score of their students. If students don't learn, the teacher fails.

I will calculate your grade using the categories in the table below. Numbers in parentheses indicate what portion of that category is based on your individual score versus team scores.

No Extra credit. There will be no individual extra credit, though there will be occasional team bonus points awarded for winning competitions, meeting class goals, etc.

"Incomplete", Withdrawal from the Course, Change Of Grade, Dropping

Faculty in our department adhere to the "incomplete" and "withdrawal" policies and deadlines published in the Schedule of Classes. Grades of Incomplete are almost never given for this course. They can only if be given if the student meets ALL the requirements set forth in University policy for Incompletes, including that the student:

- 1) Has a passing grade in the work completed
- 2) Has completed a substantial portion of the work in the course
- 3) Is able to complete the remaining work independently, with minimal assistance from the instructor.

Show your calculations and thinking

Part of science is documenting how you arrived at an answer so that others may repeat your work or find errors in it. On all assignments, *ZERO credit will be given for answers that do not show the calculations carefully and completely and/or provide explanations about how you arrived at your answer.*

Quizzes (approximately weekly):	30%	(75% Individual, 25% Team)					
Daily Reports	10%	(100% Individual)					
Homework	10%	(75% Team, 25% Individual)					
Make-your-own-textbook	10%	(100% Individual)					
Peer assessment	10%	(Team assessment of your individual work)					
Final Exam	30%	(75% Individual, 20% Team, 5% teaching)					
Plus-minus grading will be utilized for this course based on converting the course average to grades as follows:							
	B+	86-89	C+	76-79	D	60-69	
A	93-100	B	83-85	C	73-75	F	< 60
A-	90-93	B-	80-82	C-	70-72		
Rounding: Final course average scores are rounded to the nearest integer.							

About this course

This course is designed based on several very successful courses. I would like to give credit where credit is due. Many activities using guided inquiry are taken with minimal or no modification from *Physical Science of Everyday Thinking* (<http://petpset.net/>), a class developed, refined, and improved at SDSU and several other Universities. The drive for socially-relevant content material comes from *Physics for Future Presidents* by Richard Muller (<http://physics.berkeley.edu/physics10/teaching/Physics10/PffP.html>).

If You Miss A Class Meeting: Leave Days

Teachers typically get 10-12 days of sick leave that they can miss without penalty. In this class, **you can miss two days, no questions asked and with no penalty.** Any assignments from that day, including quizzes, will be excluded from your course grade with no penalty. To request a leave day, you must **fill out the form on Moodle either before your absence or within 7 days after.** After using your leave days, you will receive no credit for days you miss.

Absences due to athletics or long-term medical issues: I do consider extenuating circumstances. CSUN student-athletes and those with serious medical problems must follow the leave day policy and receive exactly two leave days of no penalty with no questions asked. If you know a schedule of additional days you will miss, we can make arrangements to have you take quizzes early or turn in homework digitally to minimize the impact on your individual score. You will not, however, receive full credit for any team-based activities on days you miss beyond the two leave days because you will not be present to help your team. Athletes must provide this documentation at the beginning of the semester and medical issues must be documented as soon as reasonably possible.

At the end of the semester, I will buy back your unused leave days with points, much like a retiring teacher gets extra money for unused leave time.

You are responsible for obtaining all material for days you miss, not the instructor.

Late Assignments

Late assignments are **not accepted.** Our leave-day policy generously excuses you for work that you miss.

Final Exam

The final exam will not be administered late unless arrangements are made prior to the 10th week in the semester. Per University policy, the final exam will NOT be administered prior to the scheduled time slot under any circumstances.

Academic dishonesty, copying, cheating

Be very mindful of your academic integrity! In the past, I have typically referred several cases to the VP of Student affairs each semester. Please help me and you avoid that process...

I expect high standards of academic integrity from future teachers so there is a **zero-tolerance rule** for academic dishonesty in this class. I will refer all cases of academic dishonesty (including copying, allowing others to copy your work, plagiarism, failing to cite your source, copying/pasting text from the internet even with modifications, misrepresentation of others' work as your own, violations of the collaboration policy below, etc.) to the VP of Student Affairs' office for arbitration and possible disciplinary action. The first offense will result in, *at minimum*, the reduction of your final grade by one partial letter grade (A- becomes B+), the second offense will result in an F for the class. It is not worth the risk to cheat or let someone copy your work in this class.

Collaboration policy

The team based learning model clearly values collaboration, but do not confuse teamwork with letting other students think for you. *You may only collaborate and share when ALL participants have properly prepared.* All individuals wishing to discuss answers to homework assignments must answer, "I have done the reading carefully, made a full and honest attempt to answer this question, have given it thought, and am now hoping to discuss the problem with someone else." If you cannot honestly make these statements, then working with others is a violation of the collaboration policy (i.e., "cheating").

Daily Report

STEP 1: After each class session, you will go on Moodle and fill out a short form to reflect on the most recent class session.

Key Idea: What was the one key idea of the class? What were some of the supporting pieces that you learned?

One Question: You'll also have the opportunity to write one question about something you didn't understand or want to know more about.

When? You must complete the Daily Report within 24 hours of our class session to get credit.

How Long? I expect this to take about 10-15 minutes. (It may take longer at first)

STEP 2: Once all main ideas and questions have been submitted, I will post all of them anonymously on a special voting website. Your tasks:

- Read the entries
- Assign 5 votes for the main ideas AND 5 votes for the questions. You can either vote "Yes" for the best entries or "No" for ones that really don't meet your expectations.

When? You must complete voting by the time the next class session begins.

How Long? I expect this to take about 10-15 minutes.

Goals and motivation for Daily Reports

- Research shows that the more time you take to reflect on your learning, the deeper and richer your learning becomes. Daily reports force you to process each class period shortly after the experience.
- There are two numerical ratings you will give on each daily score: 1) Your frustration level; and 2) How much you learned. These will give me valuable feedback, get you thinking about what type of educational experiences work best for you, and help you monitor your own learning process.

Assessment

- You receive full credit for every Daily Report you complete on time.
- The voting website does not allow me to track individual votes. To encourage the class to vote, I will award bonus points to the entire class every time that 90% (32) students register all their votes correctly.

Step 1: Daily Report

The screenshot shows a Moodle 'Questionnaire Preview' page. It contains four sections:

- 1 Main Idea:** A text box for writing the main idea of the class period and key things learned.
- 2 Question:** A text box for writing one question about the class period.
- 3 Class Metrics:** A table for rating frustration and learning. The table has columns for ratings 1 through 6 and two rows: 'Boring, Learned nothing' and 'Smooth sailing, Not frustrated'. Below the table is a legend: '1' corresponds to 'Wor! I learned a lot' and '6' corresponds to 'Ugh, Ready to quit'. There are radio buttons for each rating.
- 4 (totally optional) Blank space:** A text box for additional comments to Professor d'Alessio.

Step 2: Vote

The screenshot shows the Google Moderator 'Daily Questions' page. It displays a list of questions submitted by users, each with a 'Post a response' button and a 'Remove' button. The questions are:

- "Why is the sky blue?"
- "My question is better..."
- "This is a question?"

The page also shows a search bar, a 'Submit a question' button at the bottom, and a 'Back to Top' link.

Homework

About half the homework assignments are reading assignments introducing new ideas we will apply in class. The other half are questions that help you practice what you learned. That part is pretty normal for a class. What's different in our class is the way we provide comments and assign a grade.

Logistics

1. Every student completes the written homework assignment.
2. The next day, I select one student from each team at random to provide their homework assignment to the team.
3. Your team then has about 10 minutes to "Grade" the assignment. Grading consists of rating the assignment on the three criteria (a rubric will be posted on Moodle) and providing comments:
 - a. Accuracy: Your team must mark any inaccurate statements in red, along with a brief note about what would be correct.
 - b. Completeness: Your team must describe key pieces of missing information.
 - c. Clarity & Logical reasoning
4. Your team turns in the one team homework assignment with mark-up from the team.

Assessment

- The team receives one grade based on the *quality of the grading* they do as a team. Did you correctly find and mark all inaccurate statements? Did you correctly describe the missing pieces of information? Your team is not penalized if your teammate did not do a good job with the homework originally.
- If the randomly selected teammate is not present or has not completed the assignment, that student receives a zero for the assignment. I select another student's work so that the team can complete the assignment as normal.
- If you use a leave day, you will not be penalized for missing your HW.

Goals and motivation for our Homework system

- As future teachers, you will spend more time giving feedback to students than actually answering questions yourself. This skill takes practice.
- Traditional grading and feedback has a major flaw: it takes time! The teacher must invest a huge amount of time, which also means there is a long delay between when students complete the work and when they get feedback. This time delay makes it harder for students to learn from their mistakes because they have forgotten them. Our system provides an active feedback mechanism while cutting back on the teacher's workload. As future teachers, you should strive to find these win-win arrangements!

Important!

It is scary to have your work "on display" for others to critique. We must work together to create a supportive class climate. We all make mistakes, struggle, and get things wrong.

The people that we call "brilliant geniuses" are not brilliant because they never make mistakes; they are remarkable because they learn very quickly from their mistakes, correct them, and keep going.

Quizzes

There are no period-long midterm exams in this class, but there are 10 quizzes spaced approximately every week.

Goals and motivation for Quizzes

- High-stakes exams (such as a single midterm) introduce extra stress and therefore assess how well students deal with stress in addition to how well they have learned the material.
- Having one or two exams encourages students to “tune out” for a long section of the semester and then cram for the exam.
- Long exams take a long time to grade. We can provide better feedback on shorter exams.

Logistics

- Quizzes occur at the BEGINNING of the class period so that we will have time to discuss the answers. If you arrive after the quiz starts, you will not get extra time. If you arrive after the quiz, you will receive a zero.
- A typical quiz might have three questions on it:
 - One question will be review from a previous quiz (either an identical question or a question related to something assessed on a previous quiz).
 - Two questions will cover new material.
- After you turn in the quiz you take individually, your team will get together to answer the one or more of the questions as a team.
- We will discuss the answers to the quiz immediately after the team turns in the exam so that you leave knowing your likely score, what you did correctly, and what you did wrong.

Assessment

Typical questions will be “enhanced multiple choice.” This means there will be a multiple choice question with one best answer worth 10 points total. You must select the correct answer and then EXPLAIN why that answer is correct. Your explanation will be graded on our common rubric (posted on Moodle):

- 1 pt for selecting the correct answer
- 3 points Accuracy in your explanation
- 3 points for Completeness
- 3 points for Clarity & Logical Reasoning

Your total grade on the quiz will be a combination of your individual and team scores:

- Total Score = 75% Individual + 25% Team

No late quizzes. If you use a leave day, you will be excused from taking the quiz and will not be penalized for missing it. If you do not use a leave day or do not have any remaining, you will receive a zero.

Final Exam

There will be one cumulative final exam. By that time, you will have been tested on all the material in the weekly quizzes and should be prepared to deal with this larger exam.

Make-your-own textbook project

There is no written textbook for this class. Instead, each team will be writing and illustrating its own textbook that covers all the elements of the California Science Content standards during the semester.

Goals and motivation for Textbook project

- Actual textbooks are expensive. The University has asked faculty to find lower cost alternatives.
- Creating content drives a much higher level of understanding than merely consuming it.
- Each student gets an opportunity to express creativity in a way not typically offered in many science classes.

Logistics

- After we complete each teaching unit, each student will illustrate one of the Science Content Standards from grades K-6.
- The contribution must fit on a single 8.5" x 11" page (a regular sheet of computer paper).
- The Standard should be written clearly at the top of the page.
- Other than that, there are no limits. You can write a whole book, draw, copy pictures from web pages or magazines, paint, etc... The submission can be done by hand or on a computer.
 - ANY WORK COPIED, BORROWED, OR MODIFIED FROM ANOTHER SOURCE MUST GIVE PROPER CITATION TO THAT SOURCE. (See the academic integrity rules for the course).

Assessment

- You will complete textbook revisions several times during the course of the semester and there will be a different focus on the grading each time. Early-on, you will receive credit for completing textbook pages and reflections. Later, the focus will be the quality of your comments to your peers and your final draft.

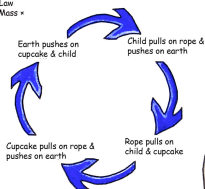
Newton's Third Law

"every force has an equal and opposite force"

There is no equation to prove this Law mathematically. However, Force = Mass × Acceleration so Force A = Force B

In some cases there are many forces acting upon one another in what is called a system. The boy is applying a "pull force" to the rope which causes the rope to apply a "pull force" back to the boy because of the tension created by the rope being connected to an object (Cupcake) with a larger mass.

The boy and his big cupcake are "push forces" that are equal to each other. Therefore they cancel each other out and nobody moves anywhere.



The child is also applying a "push force" to the earth.

Due to the fact that there is friction between the cupcake and the ground as it is being pulled, it applies a "pull force" to the rope as well as a "push force" to the earth.



This project is based on a similar project for high school physics by teacher Jeff Robbin at High Tech High in San Diego. The example to the left comes from his class.

<http://dp.hightechhigh.org/~jrobin/index.htm>

STANDARD 1D Students know that when one object exerts a force on a second object, the second object always exerts a force of equal magnitude and in the opposite direction (Newton's third law). Allie Richardson

Peer Assessments

Working with your team is a major learning goal for this class. However, I know that not every student makes an equal contribution to the team. You will use a well-tested and robust method to assess your teammates. You will give them constructive feedback about their contributions to the team and also answer some questions that allow us to assign a score to the peer assessment portion of the course grade.

Goals and motivation for Team-Based Learning

- Research shows that students learn more from their peers than they do from teachers, parents, or adult mentors. If you don't believe me, ask any parent 😊
- Teams work best when they work towards a common goal. That's why your course grade includes a number of team-based scores.
- As a teacher, you'll have to work with students you dislike all year long. Consider this a great opportunity to practice working with your team in a much simpler setting.

Goals and motivation for Peer Assessment

- Teams also work best when there is individual accountability. Some students contribute more to the team and they should be rewarded, while other students that contribute less should not get a "free ride."
- The most compassionate thing you can do as a teacher is to honestly assess your students. Tell them when they are not meeting your standards. This takes practice.
- It is impossible for the Professor of this class to accurately judge the relative contribution of each team member. Only members of the team that have been a part of the whole experience can judge that.

Logistics

- Twice during the semester you will complete a form on Moodle. The form includes:
 - A place for you to write anonymous feedback to the student, including positive things about their contribution AND areas for improvement.
 - You will have 100 points to distribute between your teammates based on their relative contributions. If they all contribute equally, you can give them an equal number of points. If one student is really unprepared, you can give them fewer of your 100 points and instead give those to the other students who contribute more.
- It's complicated, but it works pretty well and will be explained in more detail when the time comes. See the Team-Based learning FAQ on Moodle.

Assessment

- Your score is calculated based on how much work your teammates feel you do compared to other members of the team.
 - On well-functioning teams where everyone tries hard, peer assessment scores are typically 100% for all teammates!
 - A student that is frequently unprepared or absent should expect a much lower score.
 - Students whose teammates feel they are doing more than rest of the teammates will receive scores HIGHER than 100%.

PHSC 170

Fall 2012

Physical Science

Professor d'Alessio

Notes about HW:

HW Due after every class session: Daily Report on Moodle (see syllabus); Question voting.
All assignments are described in more detail on Moodle.

Section	Class#	Day	Date	Topic	HW Due Today	Quiz?
Intro	1	Mon	27-Aug	Intro/Food Calorimetry		
Energy	2	Wed	29-Aug	Food Calorimetry/Energy Stations	HW 1a: Syllabus Video; HW1b: Pre-survey	
	X	Mon	3-Sep			
	3	Wed	5-Sep	Interactions & Energy	HW 2: Read Physics for Future Presidents	Quiz
	4	Mon	10-Sep	Friction & Energy	HW 3: Evaluate Energy Diagrams	
	5	Wed	12-Sep	Conservation of Energy	HW 4a: Friction S/R Diagrams; HW 4b: Unit Conversion Intro	Quiz
	6	Mon	17-Sep	Conservation of Energy, cont'd	HW 5: Energy Calculations	
Rockets, Forces, and Motion	7	Wed	19-Sep	Rocket Project Intro	HW 5.5: MYOTB Reflect 1	
	8	Mon	24-Sep	Rocket Build Day	HW 6a: Rockets & Force; HW 6b: Read Rocket Stability article	
	9	Wed	26-Sep	Rocket Build Day	MYOTB Draft	
	10	Mon	1-Oct	Rocket Launch Day	HW8a: Peer Assessment 1; MYOTB Peer Reflection	
	11	Wed	3-Oct	Video Analysis Day	HW 9: Calculate your rocket's height	
	12	Mon	8-Oct	Rocket Analysis Day 2	HW 10: Video Analysis of your rocket	Quiz
	13	Wed	10-Oct	Rocket Analysis Day 3	TBD	
	14	Mon	15-Oct	Rocket Analysis Day 4	HW 12: Rocket Speed-Time Graphs	
Electricity	15	Wed	17-Oct	ELECTRICITY I: Bulbs & Circuits	HW 13: Explore Additional Resources	Quiz
	16	Mon	22-Oct	ELECTRICITY II	HW 14a: Childrens ideas about electricity; HW 14b: FOSS Reading	
	17	Wed	24-Oct	ELECTRICITY III: Build your own motor	HW 15a: Energy Efficiency; HW 15b: FOSS Reading	
	18	Mon	29-Oct	ELECTRICITY IV: Motor Wrap-up	HW 16: How does your motor work Storyboard	
Waves: Sound and Light	19	Wed	31-Oct	WAVES & SOUND	HW 17: Physics for Future Presidents Reading	Quiz
	20	Mon	5-Nov	LIGHT: How do we see?	HW 18: MYOTB II Draft	
	21	Wed	7-Nov	WAVES, LIGHT, & SOUND	HW 19a: Children's Ideas about Light; HW 19b: MYOTB II Peer	Quiz
Heat	X	Mon	12-Nov	Veteran's Day	NO CLASS	
	22	Wed	14-Nov	HEAT I: Small Particle Theory & Temperature	HW 20a: Gas Simulations;	
	23	Mon	19-Nov	HEAT II: Heat Transport	HW 21: Small Particle Theory & Phases	
Chemistry	24	Wed	21-Nov	HEAT III: Phase Changes	HW 22: TBD	
	25	Mon	26-Nov	CHEMISTRY I: Chemical Reactions, Physical v. Chemical Changes	HW 23a: MYOTB III Draft	Quiz
	26	Wed	28-Nov	CHEMISTRY II: Chemistry of Gasoline	HW 24a: Chemistry of Gasoline; HW 24b: MYOTB III Peer comments	
	27	Mon	3-Dec	CHEMISTRY III: Bonding I: Toaster in the bath tub	HW 25a: Read Chemistry Chapter; HW 25b: MYOTB III Final draft	Quiz
	28	Wed	5-Dec	CHEMISTRY IV: Bonding II: Periodic Table	HW 26a: TBD	
Conclusion	29	Mon	10-Dec	REVIEW	HW 28b: Knowledge Survey	Quiz

Final Exam

Wed., May 16, 10:15am-12:15pm

Live Oak 1229 (our regular classroom)

(Per University policy, no individual may take the final exam before the scheduled time block)

