PHSC 170: Physical Science for Future Teachers  
LO 1229 – T/Th 10:45 am -12:30 pm

Instructor Information

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

Help Sessions  
Location: LO 1228  
Times: Thursdays, 12:30-1:30pm & by appointment (email me!)

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 identified by the date of the revision as part of the file name. Dates of examinations will never be moved forward.

CURIOSITY

“Every kid starts out as a natural-born scientist, and then we beat it out of them. A few trickle through the system with their wonder and enthusiasm for science intact.”  
– Carl Sagan, famous astronomer and host of the original COSMOS series.

A key objective of this class is to give you a set of tools that you can use to help cultivate curiosity in elementary classrooms. Project-based learning that integrates engineering design, trial-and-error, and opportunities to connect to everyday experiences are some examples we will utilize. While there are a number of curricular decisions that can motivate curiosity and exploration, a lot of it boils down to a teacher’s attitude and approach towards science. By creating explicit spaces for questions and exploration, teachers can spur creativity and inquiry.

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.

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.

Team based learning  
Research shows 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’ll work with the same team the entire semester, and you won’t 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. This procedure is 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.

LOOK at the world around you
NOTICE things that are changing
WONDER how they work
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.

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Quizzes (approximately daily):</td>
<td>20%</td>
<td>(75% Individual, 25% Team)</td>
</tr>
<tr>
<td>Daily question &amp; voting</td>
<td>10%</td>
<td>(100% Individual)</td>
</tr>
<tr>
<td>Elementary School</td>
<td>10%</td>
<td>(Team teaching, individual reports)</td>
</tr>
<tr>
<td>Science Notebooks</td>
<td>20%</td>
<td>(100% Individual)</td>
</tr>
<tr>
<td>Homework</td>
<td>10%</td>
<td>(75% Team, 25% Individual)</td>
</tr>
<tr>
<td>Peer assessment</td>
<td>10%</td>
<td>(Team assessment of your individual work)</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
<td>(75% Individual, 25% Team)</td>
</tr>
</tbody>
</table>

Plus-minus grading will be utilized for this course based on converting the course average to grades as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93-100</td>
</tr>
<tr>
<td>B+</td>
<td>86-89</td>
</tr>
<tr>
<td>B</td>
<td>83-85</td>
</tr>
<tr>
<td>C</td>
<td>76-79</td>
</tr>
<tr>
<td>C+</td>
<td>73-75</td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 60</td>
</tr>
</tbody>
</table>

Rounding: Final course average scores are rounded to the nearest integer.

"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 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.

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 (per year from a 5-day schedule). 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. Emergency situations must be documented with a doctor’s note or police report.

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").

The finished products of collaboration should be in your own words with clear indications that you individually understand the material. Two students may never turn in identical or nearly identical work.

While the class depends heavily on team work, there are individual assignments to be completed on your own. It is the student’s responsibility to know which assignments are team-based and which are individual so that you can work accordingly.
Daily Question

STEP 1: After each class session, you will go on Moodle and submit a single question inspired by what happened during class.

One Question: Your question can seek clarification about something you don’t understand or extend the learning from the class.

When? You must complete the Daily Question within 24 hours of our class session to get credit. This timeline ensures that the ideas are fresh in your mind and forces you to recall what happened during class (jogging your memory, which improves retention).

STEP 2: Once all questions have been submitted, you will have access to all your classmates’ questions. Which questions would you like to discuss in class the next day? Your tasks:

- Read the entries
- Assign 5 votes for the questions you like best. You can either vote “Yes” (Plus) for the best entries or “No” (Minus) for ones that really don’t meet your expectations.

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

Goals and motivation for Daily Questions

- Research shows that the more time you take to reflect on your learning, the deeper and richer your learning becomes. Formulating a question is a way to reflect on the class period and activate your curiosity simultaneously. Student questions often connect to prior experiences or observations about everyday life. The more you connect new learning to prior understanding, the better you will remember the new ideas.

Assessment

- You receive full credit for every Daily Question you complete on time and for each session in which you vote.
- I award a bonus points if your question is chosen as the top question. Vote for your own question (and other meaningful ones)!
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 (our claim, evidence, reasoning rubric is posted on Moodle) and providing comments:
   a. Accuracy of Reasoning: Your team must mark any inaccurate statements in red, along with a brief note about what would be correct.
   b. Completeness of Reasoning: Your team must describe key pieces of missing information.
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).

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 frequent quizzes and should be prepared to deal with this larger exam.
**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 may sometimes have students you dislike whom you’ll have to work with 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 2017

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

<table>
<thead>
<tr>
<th>Section</th>
<th>Class#</th>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intro</td>
<td>1</td>
<td>Tue</td>
<td>29-Aug</td>
<td>Intro/Food Calorimetry</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Thu</td>
<td>31-Aug</td>
<td>Food Calorimetry</td>
</tr>
<tr>
<td>Energy</td>
<td>3</td>
<td>Tue</td>
<td>5-Sep</td>
<td>Questions / Energy Stations</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Thu</td>
<td>7-Sep</td>
<td>Motion K-2</td>
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<tr>
<td></td>
<td>5</td>
<td>Tue</td>
<td>12-Sep</td>
<td>Interactions &amp; Energy</td>
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<tr>
<td></td>
<td>6</td>
<td>Thu</td>
<td>14-Sep</td>
<td>Friction &amp; Energy</td>
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<tr>
<td></td>
<td>7</td>
<td>Tue</td>
<td>19-Sep</td>
<td>Interactions, Friction, Energy, &amp; Conservation of Energy</td>
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<tr>
<td>Renewable Energy</td>
<td>8</td>
<td>Thu</td>
<td>21-Sep</td>
<td>Online Day (Rosh Hashana): Conservation of Energy</td>
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<td></td>
<td>9</td>
<td>Tue</td>
<td>26-Sep</td>
<td>Collision Engineering Challenge</td>
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<td></td>
<td>10</td>
<td>Thu</td>
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<td>Renewable Energy I</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Tue</td>
<td>3-Oct</td>
<td>Renewable Energy II</td>
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<td></td>
<td>12</td>
<td>Thu</td>
<td>5-Oct</td>
<td>Renewable Energy III</td>
</tr>
<tr>
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<td>14</td>
<td>Thu</td>
<td>12-Oct</td>
<td>HEAT I: Small Particle Theory &amp; Temperature</td>
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<tr>
<td></td>
<td>15</td>
<td>Tue</td>
<td>17-Oct</td>
<td>HEAT II: Material Properties</td>
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<td>16</td>
<td>Thu</td>
<td>19-Oct</td>
<td>CHEMISTRY I: Physical v. Chemical Changes</td>
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<tr>
<td></td>
<td>17</td>
<td>Tue</td>
<td>24-Oct</td>
<td>CHEMISTRY II: Temperature and Chemical Reactions</td>
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<tr>
<td></td>
<td>18</td>
<td>Thu</td>
<td>26-Oct</td>
<td>CHEMISTRY III: Matter in Middle School</td>
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<tr>
<td>Chemistry</td>
<td>19</td>
<td>Tue</td>
<td>31-Oct</td>
<td>Pancake Engineering Prep</td>
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<td></td>
<td>20</td>
<td>Thu</td>
<td>2-Nov</td>
<td>Online Day: TBD</td>
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<td>21</td>
<td>Tue</td>
<td>7-Nov</td>
<td>Pancake Engineering I</td>
</tr>
<tr>
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<td>22</td>
<td>Thu</td>
<td>9-Nov</td>
<td>Pancake Engineering II</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>Tue</td>
<td>14-Nov</td>
<td>Pancake Engineering III</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>Thu</td>
<td>16-Nov</td>
<td>Pancake Engineering IV</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>Tue</td>
<td>21-Nov</td>
<td>HEAT: Thanksgiving In Action</td>
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<tr>
<td></td>
<td>26</td>
<td>Thu</td>
<td>23-Nov</td>
<td>Thanksgiving</td>
</tr>
<tr>
<td>Shadows &amp; Light</td>
<td>27</td>
<td>Thu</td>
<td>28-Nov</td>
<td>Light K-2: Shadows &amp; Light</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>Tue</td>
<td>30-Nov</td>
<td>Light 3-5: How We See I</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>Tue</td>
<td>5-Dec</td>
<td>Light 3-5: How We See II</td>
</tr>
<tr>
<td>Conclusion</td>
<td>29</td>
<td>Thu</td>
<td>7-Dec</td>
<td>Wrap-Up</td>
</tr>
</tbody>
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#### Final Exam
12/14/2017, Thursday 10:15a - 12:15p  Live Oak 1229 (our regular classroom)

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