Instructor Information

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

Phone: 818.677.3647
Email: matthew.dalessio@csun.edu

Office Hours
Location: LO 1228
Times: Mondays 4-5p, or Happily done by appointment!

Guiding Questions
When it comes to teaching earth science, which techniques work best, why do they work, and how can we tell that they are working?

- What skills does it take to be good geoscientists? Specifically, what cognitive abilities?
- How do these skills work in the human brain? What does research on cognition say?
- What teaching techniques can we use to improve our students' ability at these tasks? How can we implement these ideas in real classrooms?

Thematic Areas
For each topic within the course, we will always return to three themes:

Approach
My goal is to model best teaching practices. That means that we will explore a range of activities and formats.

Target Audience
Students interested in teaching at any level from K-12 to university. While some discussions will be more appropriate to a specific education level, be sure to say something if you have a question about how an idea could apply to the level you do/will teach.

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 "firing" a student from your team posted on the Canvas website for our class. In past experience, we rarely need to employ this policy. Most required teamwork will be in class, so there is no need to worry about coordinating your schedules.

Reading
There is no textbook for this course. Reading comes from individual articles and book chapters. About half are research papers and half are review articles.

All articles will be available on Canvas. To avoid copyright issues, many of them will only be available to you when you are ON CAMPUS at CSUN. You can download PDF’s while you are here and then take them home.

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

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

These policies and schedules are subject to change in the event of extenuating circumstances.
Grades

Like many graduate classes, you will get out of this class what you put in. I have tried to structure the class in such a way that it encourages you to prepare for class, reflect on your learning, and apply your knowledge.

I will calculate your grade using the categories in the table below. An explanation of each category is on the next page.

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

Academic dishonesty, copying, cheating

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.

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of Day Reflections</td>
<td>20%</td>
</tr>
<tr>
<td>Weekly Quizzes</td>
<td>20%</td>
</tr>
<tr>
<td>Peer assessment</td>
<td>10%</td>
</tr>
<tr>
<td>Mini Research Project</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
</tbody>
</table>

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 one day, no questions asked and with no penalty. To request a leave day, you must fill out the form on Canvas either before your absence or within 7 days after. Using a leave day excuses you from taking the next weekly quiz and submitting the End of Day reflection for the missed class period. You will, however, have to take the previous weekly quiz with no late penalty. After using your leave days, you will receive no credit for the End of Day Reflection or quizzes on days you miss. I do consider extenuating circumstances.

Late Assignments

Assignments are assigned with specific timing and deadline for an educational reason. There is therefore a significant penalty for missing one of these deadlines.

The Leave Day policy should cover many of your needs. But if you miss other material, the following policies apply:

- Weekly “End of Day Reflections” submitted after the due date but before the next class period will receive 50% credit. After that, they will receive no credit.
- Weekly quizzes can be taken before class the following week for 50% credit.
- Late mini research projects will receive ZERO credit, so plan accordingly.
End of Day Reflections
After each class period, you will submit a summary of what happened in the class. The format will change each week and will vary based on the content we cover. When discussing concept maps, your summary will be in concept map form. When discussing technology in the classroom, your summary will take the form of a 140 character Twitter post, etc.

Reflections are due by ______ each week. This is to ensure the material is fresh in your mind.

Your reflection must also include one question suitable for showing up on our weekly quiz. Once we discuss Bloom’s Taxonomy, you will need to identify the cognitive level of your question. You will receive credit for questions at the lowest two levels of the taxonomy (remembering & understanding), but I will give bonus points for questions at a higher level.

Weekly Quizzes
We will have a quiz each week that covers material from previous class sessions AND factual questions related to the reading assigned for that day. Questions come from your submissions and my own library. Length will vary from quiz to quiz.

Peer Assessment
We will work in teams during much of the semester. Your teammates will evaluate your contributions to the team and give you feedback about them.

Mini Research Project
During the last third of the course, you will have the opportunity to complete a research project in geoscience education. The project can either be based on observations or a “controlled teaching experiment” if you are currently teaching or have a friend willing to help you.

Final Exam
The exam will consist of culminating questions delivered as multiple choice and free response questions in Canvas. It will be timed and ‘open world’, meaning you can consult your notes and any published resource including articles from class, books, websites, videos, etc. Communicating with other people during the exam is prohibited (including texting, email, talking, posting on message boards, mental telepathy, etc...).

You can complete the exam from any location on the planet that has access to Canvas, but you must complete it during the assigned exam time slot. In the event of a calamity or disaster (either natural or human), we will make other arrangements about exam timing.
There is a quiz at the beginning of class EVERY class period (except the final project presentation day)
Each day, students are responsible for completing
1) an End of Day Reflection

<table>
<thead>
<tr>
<th>Section</th>
<th>Week</th>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
<th>Classroom Activities</th>
<th>Readings Due Today*</th>
<th>Target ideas*</th>
</tr>
</thead>
<tbody>
<tr>
<td>How People Learn</td>
<td>1</td>
<td>Mon</td>
<td>28-Jan</td>
<td>Intro / Brain Growth / Concept Maps</td>
<td>Human Likert Scale; Draw-a-science-teacher; Word Association Fun; What makes a good science class gallery walk; Concept Map about Shoes</td>
<td>1,2,3,4</td>
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<td></td>
<td>2</td>
<td>Mon</td>
<td>4-Feb</td>
<td>Misconceptions</td>
<td>Private Universe Video; Concept maps &amp; Misconceptions about sight; Formative assessment probes</td>
<td>1, 2</td>
<td>4,5,6,7</td>
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<tr>
<td></td>
<td>3</td>
<td>Mon</td>
<td>11-Feb</td>
<td>Novice v. Expert Thinking</td>
<td>Misconception strategies; Misconceptions gallery walk; Blink audio book; Poor-man's eye-tracking</td>
<td>3, 4, 5</td>
<td>6,7,8</td>
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<tr>
<td></td>
<td>4</td>
<td>Mon</td>
<td>18-Feb</td>
<td>Metacognition</td>
<td>Bloom's Taxonomy sorting activity; Think-aloud problem solving: Identifying a fault;</td>
<td>6, 7, 8</td>
<td>8,9</td>
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<tr>
<td>Teaching Techniques</td>
<td>5</td>
<td>Mon</td>
<td>25-Feb</td>
<td>Lectures / Attention Span</td>
<td>Lectures work v. Don't work debate; Attention span monitoring protocol example; Pros &amp; Cons of Presentation Software</td>
<td>Last names A-J: 9; K-Z: 10</td>
<td>10, 11</td>
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<tr>
<td></td>
<td>6</td>
<td>Mon</td>
<td>4-Mar</td>
<td>Alternatives to Lectures</td>
<td>Clickers in action demo; Interactive Teaching Methods jigsaw; Powerpoint slide critique; Clickers in the K-12 classroom discussion; Field trip experience virtual gallery walk; Field trip vignette reading</td>
<td>11, 12</td>
<td>11</td>
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<td></td>
<td>7</td>
<td>Mon</td>
<td>11-Mar</td>
<td>Field Trips</td>
<td>Attitudes towards field trips survey; 3 Dimensions of Novelty Intro; Video analysis of field trip; 3 Dimensions of Novelty Gallery Walk</td>
<td>13, 14</td>
<td>12, 13</td>
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<tr>
<td></td>
<td>8</td>
<td>Mon</td>
<td>18-Mar</td>
<td>SPRING RECESS</td>
<td>NO CLASS</td>
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<td></td>
<td>9</td>
<td>Mon</td>
<td>25-Mar</td>
<td>Urban Thinking</td>
<td>Schoolyard geology outdoor quest; Urban thinking overview</td>
<td>16</td>
<td>15</td>
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<tr>
<td></td>
<td>10</td>
<td>Mon</td>
<td>1-Apr</td>
<td>Cesar Chavez Day</td>
<td>NO CLASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment &amp; Research Methodologies</td>
<td>11</td>
<td>Mon</td>
<td>8-Apr</td>
<td>Qualitative v. Quantitative Research Methods</td>
<td>Qualitative v. Quantitative Debate; FICSS Study reconstruction; Research Questions Gallery Walk; Can you identify good teachers from quantitatively assessing their students’ knowledge? Debate; Gain calculation</td>
<td>17, 18</td>
<td>16, 17, 19</td>
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<td></td>
<td>12</td>
<td>Mon</td>
<td>15-Apr</td>
<td>Qualitative Data</td>
<td>Team concept map of qualitative research methods; Open coding example; Thematic coding example;</td>
<td>19, 20</td>
<td>16, 17, 18</td>
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<tr>
<td></td>
<td>13</td>
<td>Mon</td>
<td>22-Apr</td>
<td>Quantitative Assessment and Multiple Choice Questions</td>
<td>Critique our Quiz; Common pitfalls of multiple choice test question writing; Item analysis introduction &amp; worksheet; Research projects methods pair-share discussion</td>
<td>21, 22, 23</td>
<td>19</td>
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<tr>
<td></td>
<td>14</td>
<td>Mon</td>
<td>29-Apr</td>
<td>Affective Domain &amp; Science Phobia / REVIEW</td>
<td>Non-cognitive barriers to learning; Intro to affective domain; Attitudes towards science Intro; Affective domain role playing; A reflection on the course structure, content, and what we learned.</td>
<td>none</td>
<td>20</td>
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<tr>
<td></td>
<td>15</td>
<td>Mon</td>
<td>6-May</td>
<td>Final Projects</td>
<td>Final project presentations.</td>
<td>none</td>
<td>1-20</td>
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</table>

Final Exam
Mon., May 13, 5:30-7:30 pm
(Per University policy, no individual may take the final exam before the scheduled time block)

Live Oak 1227*