**Point Loma Nazarene University**
**PSC112: Earth and Space Science for Teachers (3 hr)** Spring 2018


Department of Physics and Engineering

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| Instructor: Dr. Paul D. Schmelzenbach | Meeting: TR 9-10:15 LBRT 202 |
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**Materials** – *Earth Science*, by Tarbuck and Lutgens, 14th edition

**Description** – An introductory survey of the disciplines of geology, oceanography, meteorology, and astronomy with discussion of philosophical and societal issues. This course focuses on topics necessary for the California multiple subject teaching credential (K-8).

**Learning Outcomes** – After completing this course you will be able to

1. apply basic scientific principles to address Earth science questions and make informed decisions about scientific matters likely to confront educated citizens
2. explain everyday observations of the natural world in terms of planetary processes
3. apply an evidence-based, logical, scientific approach to ask and address questions about our planet and solar system
4. articulate the relevance of Earth Science to individuals and to society;
5. solve problems relevant to introductory Earth Science and interpret solutions.
6. have content expertise in the "Physical Science Disciplinary Core Ideas" described in the Next Generation Science Standards, specifically:
   (a) describe the formation and observable physical characteristics of minerals (e.g., quartz, calcite, hornblende, mica, common ore minerals)
   (b) describe different types of rocks (i.e., sedimentary, igneous, and metamorphic)
   (c) identify characteristics of landforms, such as mountains, rivers, deserts, and oceans
   (d) explain chemical and physical weathering, erosion, deposition, and other rock-forming and soil-changing processes and the formation and properties of different types of soils and rocks
   (e) describe layers of the earth (crust, lithosphere, mantle, and core) and plate tectonics, including its convective source
   (f) explain how mountains are created, identify the factors that cause volcanoes and earthquakes to occur
   (g) describe the effect of these phenomena on the earth's surface, ecosystems, and human society
   (h) know the commonly cited evidence supporting the theory of plate tectonics
   (i) identify factors influencing the location and intensity of earthquakes
   (j) describe the effects of plate tectonic motion over time on climate, geography, and distribution of organisms
   (k) describe as well more general changes on the earth over geologic time as evidenced in landforms and the rock and fossil records, including plant and animal extinction
   (l) identify potential technological solutions to reduce the impact of these natural Earth processes on humans and society and to reduce human impact on Earth's processes.
   (m) explain the influence and role of the sun and oceans in weather and climate and the role of the water cycle
   (n) describe causes and effects of air movements and ocean currents (based on convection of air and water) on daily and seasonal weather and on climate

(o) describe the importance of technology with regard to predicting and mitigating the impact of severe weather and other natural hazards.

(p) compare the characteristics of bodies of water, such as rivers, lakes, oceans, and estuaries

(q) describe tides and explain the mechanisms causing and modifying them, such as the gravitational attraction of the moon, sun, and coastal topography

(r) understand the water cycle, including the properties of water and how changes in the form of water are driven by energy from the sun and gravity

(s) know that Earth's hydrosphere interacts with Earth's other major systems to affect Earth's surface materials and processes.

(t) identify and describe the components of the solar system (e.g., planets, comets, asteroids)

(u) describe their predictable patterns of motion around the sun

(v) explain time zones in terms of longitude and the rotation of Earth

(w) understand the reasons for changes in the observed position of the sun, moon, and stars in the sky during the course of the day and from season to season

(x) name and describe bodies in the universe (e.g., sun, stars, galaxies) in terms of apparent brightness and/or relative size.

**Homework** Through the semester, to improve your understanding to topics you will be completing various homework assignments. On homework sets collaboration between you and your peers is fine, but your work needs to be your own. Late homework will not be accepted unless their is a documented emergency.

**Projects and Activities** During the semester there were be several in-class activities, and 3 projects. Late projects will not be accepted unless their is a documented emergency. Activities cannot be made-up but the lowest two scores will be dropped.

**Preclass questions** Each class day there will be three preclass questions to answer electronically. These will be due by 10 pm the evening before class. Your responses to Preclass questions are graded on the following scale: 2=demonstrates reading/thinking; 1=room for improvement or late but before class, 0=unsatisfactory or submitted after class. For credit preclass questions must be submitted prior to class.

**Exams** – Three examinations will be given during the semester on February 1, February 27and April 5. A fourth smaller test will be on April 24. The final examination will be on May 1 at 10:30. Exams cannot be made up, unless under extreme circumstances discussed and arrangements made with the professor before the exam.

**Final Grades** – The grade you earn in this course is based on the scale shown to the right. The points you receive during the course are weighted accordingly:

- Homework: 25%
- Activities & Projects: 15%
- Preclass: 5%
- Tests (3): 35%
- Final Exam: 20%

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| A | 100 - 91.0 |
| A- | 91.0 - 89.5 |
| B+ | 89.5 - 87.5 |
| B | 87.5 - 81.0 |
| B- | 81.0 - 79.5 |
| C+ | 79.5 - 77.5 |
| C | 77.5 - 71.0 |
| C- | 71.0 - 69.5 |
| D+ | 69.5 - 67.5 |
| D | 67.0 - 61.0 |
| D- | 61.0 - 57.0 |

**University Mission**: Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a

learning community where grace is foundational, truth is pursued, and holiness is a way of life.

**Department Mission**: The Physics and Engineering Department at PLNU provides strong programs of study in the fields of Physics and Engineering. Our students are well prepared for graduate studies and careers in scientific and engineering fields. We emphasize a collaborative learning environment which allows students to thrive academically, build personal confidence, and develop interpersonal skills. We provide a Christian environment for students to learn values and judgment, and pursue integration of modern scientific knowledge and Christian faith.

**Attendance**– Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day. Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Class Attendance in the Undergraduate Academic Catalog.

**Academic Honesty** – Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic Honesty for definitions of kinds of academic dishonesty and for further policy information.

**Academic Accommodations** –If you have a diagnosed disability, please contact PLNU's Disability Resource Center (DRC) within the first two weeks of class to demonstrate need and to register for accommodation by phone at 619-849-2486 or by e-mail at DRC@pointloma.edu. See Disability Resource Center for additional information. For more details see the PLNU catalog: http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic Accommodations. Students with learning disabilities who may need accommodations should discuss options with the instructor during the first two weeks of class.

**Class Enrollment** – It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

**Credit Hour** – In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 3 unit class delivered over 16 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

**Final Exam** – The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in th course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same

day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

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Course Calendar

| | Topics | Reading |
|---|---|---|
| 1/11 | Introductions to Earth Science | (chapter 1) |
| 1/16 | Matter and Minerals | 2.1-2.6 |
| 1/18 | Rocks: Materials of the Solid Earth | 3.1-3.5 |
| 1/23 | Weathering: Soil, and Mass Wasting | 4.1-4.3; 4.9-4.13 |
| 1/25 | Running Water and Ground Water | 5.1-5.8 |
| 1/30 | Glaciers | 5.9-5.12; 6.1-6.7 |
| 2/1 | Deserts and Wrap-Up | 6.9-6.11 |
| 2/6 | Exam #1 | |
| 2/8 | Plate Tectonics | 7.1-7.11 |
| 2/13 | Plate Tectonics; Earthquakes | 8.1-8.8 |
| 2/15 | Earthquakes and Volcanoes | 9.1-9.7 |
| 2/20 | Volcanoes | 9.8-9.12 |
| 2/22 | Crustal Deformation | 10.1-10.7 |
| 2/27 | Geological Time | 11.1-11.7 |
| 3/1 | Exam #2 | |
| 3/6 | Spring Break | |
| 3/8 | Spring Break | |
| 3/13 | The Ocean Floor | 13.1-13.7 |
| 3/15 | Ocean Water; Tides | 14.1-14.5; 15.9 |
| 3/20 | Dynamic Ocean | 15.1-15.8 |
| 3/22 | The Atmosphere | 16.1-16.9 |
| 3/27 | Clouds | 17.1-17.10 |
| 3/29 | Easter Break | |
| 4/3 | Wind | 18.1-18.8 |
| 4/5 | Global Temperature and Climates; Wrap up | 20.8-20.11 |
| 4/10 | Exams 3 Chapters 13-18; 20 | |
| 4/12 | Astronomy Basics | 21.1-21.6 |
| 4/17 | The Solar System | 22.1-22.5 |
| 4/19 | Light | 23.1-23.7 |
| 4/24 | Astronomy Test | |
| 4/26 | Wrap-up and Review | |