OAKLAND UNIVERSITY SCHOOL OF EDUCATION AND HUMAN SERVICES
TEACHER DEVELOPMENT AND EDUCATIONAL STUDIES
COURSE SYLLABUS
Winter, 2018

1. COURSE:

SCS 2060; Science for the Elementary Teacher; 4 credit hours; Elementary Education Program, Department of Teacher Development and Educational Studies (Wednesday, 5:30-8:50 PM, Pawley Hall Room 150)

2. CATALOGUE DESCRIPTION:

Develops science concepts and processes based on recent elementary school curricula in the fields of earth, physical and chemical science. For elementary education majors only; includes laboratory experiences.

3. DROP DATE INFORMATION:

The last day to drop this class with 100% tuition refund is January 17, 2018. This information is found at: http://www.oakland.edu/important-dates

4. COURSE EVALUATION:

Course evaluations are available approximately 2 weeks prior to the final day of classes at http://www.oakland.edu/evals. You can access all your course evaluations by entering your Grizzly ID number and password. You will be asked to rate the course and the instructor on 20 items. Written comments are also encouraged. The last day of class is the last day to complete the evaluation. A summary of the results is not available to the professor until after final grades have been submitted. Your feedback is taken seriously, and you are encouraged to be honest in your evaluations. Your participation is greatly appreciated.

5. AUTHORIZED INSTRUCTOR:

INSTRUCTOR:	**Brian Peterson**
OFFICE:	485 B Pawley Hall
OFFICE HOURS:	After class and **by appointment**
PHONE:	(248) 370-2613
FAX:	(248) 370-2639
E-MAIL:	**bcpeter3@oakland.edu**

Career Services is the career resource for students of all levels within the School of Education and Human Services! Denise McConkey, Career Consultant for SEHS, can assist with resume/cover letter reviews, mock interviews, job search strategies/resources, career advising, social media branding, networking events and much more! Schedule an appointment with Denise via Handshake at oakland.joinhandshake.com. Visit oakland.edu/careerservices for more information.

6. PREREQUISITES:

Grade of 2.0 in one of (BIO 104 or BIO 1002), (BIO 110 or BIO 1004), (BIO 111 or BIO 1200), (BIO 113 or BIO 1300), (BIO 300 or BIO 3000), (CHM 104 or CHM 1040), CHM 157 (no longer offered), CHM 167 (no longer offered), (CHM 300 or CHM 3000), (ENV 308 or ENV 3080), (GEO 106 or GEO 1060), (PHY 101 or PHY 1010), (PHY 104 or PHY 1040), (PHY 105 or PHY 1050), (PHY 106 or PHY 1060), (PHY 115 or PHY 1150), (PHY 120 or PHY 1200), (PHY 151 or PHY 1510), or (SCI 100 or SCI 1000). [NOTE: It is the student's responsibility to ensure that prerequisites are met prior to registering for this course.]

7. REQUIRED TEXTBOOKS OR READINGS:

Great Source Education Group. (2006). *ScienceSaurus: A student handbook.* Wilmington, MA: Author.

National Academy of Sciences (n.d.) *A Framework for K-12 Science Education: Practices, Crosscutting Concepts and Core Ideas*. Available at http://www.cslnet.org/wp-content/uploads/2013/07/Next-Generation-Science-Framework-Final-Report.pdf

(No need to print the Framework, it is on-line)

[Recommended] Rillero, P. & Eddis, S. (2017). Mastering science content for middle school teaching and the NES general science exam. Retrieved from https://www.amazon.com/Mastering-Science-Content-Teaching-General-ebook/dp/B06XXPQLWG/ref=sr_1_1?ie=UTF8&qid=1499981452&sr=8-1&keywords=mastering+science+content+for+middle for purchase (1.99) and accessible through kindle reading application on smart phones, tablets, or computer operating systems.

8. LEARNING GOALS FOR CANDIDATE PERFORMANCE:

1. Knowledge Base: Demonstrate an ability to use a variety of elementary level lab / field techniques and equipment in teaching basic physical and earth science concepts.
2. Performance Excellence: Demonstrate readiness to assume responsibility for classroom teaching by facilitating hands-on, elementary level *science-related learning activities.*
   - Create, modify and assess appropriate curricula to meet cognitive, affective, and psychomotor learning objectives in science education.
   - Use a variety of instructional resource materials related to the teaching of science.
3. Technology: Demonstrate the ability to use information technology to support student learning and personal productivity; and use appropriate available technology for the development/enhancement of the curriculum.
4. Assessment: Use assessment to evaluate and improve student learning and personal professional performance.
5. Continuous Improvement: Use research, best practices, and assessment to evaluate and improve student learning and personal professional practice.

9. COURSE TOPICS: See attached course outline.

10. FIELD EXPERIENCE:

Students may be provided with an opportunity to attend a professional science teaching conference or professional development workshop as an integral component of the course when such events are scheduled within the semester.

11. METHODS OF INSTRUCTION:

This course requires the active participation of students. Methods of instruction include: lecture / demonstration; laboratory / field experiences; media presentations; review and analysis of teaching strategies / materials; library research; collaborative / cooperative learning.

12. PERFORMANCE ASSESSMENT:

Attendance and Participation (35 points)

Maximum benefit for students involves, not only engaging in the hands-on activities provided, but also sharing with others your personal ideas, plans, feelings, and experiences. Regular attendance and class participation is extremely important in this course. Participating in class activities and experiments is an integral component to success in this class. Each student is expected to prepare for, and take an active part in, class discussions, activities, and collaborative group work. This requires students to complete assigned reading and homework prior to their due dates.

Twenty-five points (approximately 2 points for each class) will be earned for full, positive, participation at each class period. Additionally, each student is responsible for maintaining a clean classroom environment during the semester as part of positive participation. Tardiness and partial attendance is often disruptive to class and full participation points will not be earned when this occurs. Being late for a class will result in one point (instead of two) for that date's attendance.

Because of the nature of class activities, it will be impossible to make up missed class time. However, the maximum number of points possible for the course exceeds the maximum number required for a 4.0. Thus, when a student is absent one time, it is still possible to earn a 4.0 in the course. **Points will not be earned for missed sessions, irrespective of the nature of the absence, and students need not provide a reason.**

To encourage full participation, students may earn extra credit points as follows:

3 points: Perfect attendance with no late arrivals or early departures.
2 Points: Attended all class sessions, one or two sessions arrived late or left early
1 Point: Missed one full class period
1 additional extra credit point may be earned with a completed notebook of all class activities (each activity must be fully complete). This will be shown during the final exam period.

Students will also be expected to submit evidence that the learning they accomplished as a result of having completed two online sessions. Prior to the first quiz, evidence of learning from the 5 Physical Science online tasks will be collected. Prior to the second quiz, evidence of learning from the 8 Earth Science online tasks will be collected. **Evidence of learning from each set of online sessions will earn 5 pts, for a total of 10 participation points.**

Assignments (95 points)

Students are expected to check Moodle postings *at least* weekly. Students will also be required to read selections in the required textbooks as noted on the syllabus and in class. Students will be required to complete assignments across the range of physical and earth science topics targeted by this course. The topics target Physical Science Standards in the Michigan Grade Level Content Expectations (GLCEs): Properties of Matter, Changes in Matter, Force & Motion, and Energy. The topics also target Earth Science Standards: Solid Earth, Fluid Earth, Earth Systems, and Earth in Space and Time.

Assignments aligned with each area include: an Activity Critique, Real-World Science Questions, Presentation Content Work (Background Information, Five Conceptual/Inquiry Questions with correct explanations, and 5 *new* Science Terms with correct definitions), Presentation Evaluation (by instructor), and one Scholarly Report, (conference OR teaching). For further information on specific assignments and grading criteria associated with these, please refer to the *SCS 105 Assignment Guide.*

One written assignment may be revised. All revised work must be turned in by the last regularly scheduled class period. All "real world questions" may be revised as a single as a single assignment.

Quizzes and Final Test (70 points)

Two online quizzes (15 points each) and the in-class final exam (40 points) will target questions related to understanding concepts, important science terminology, and applying what is learned through hands-on activities to new situations. In order to prepare for these quizzes and tests, students must be actively involved in class experiences, integrate understandings from assigned readings, and ask questions when concepts are not adequately understood. Students will be required to complete assigned readings posted on Moodle, attend to handouts provided in class, and remain current on readings in *ScienceSaurus.* Students will be responsible for reading information in the Science Grade Level Content Expectations. Students will also be responsible for content and vocabulary taught as part of the peer presentations. Planned online sessions will involve students in learning about physical and earth sciences through interactive activities. Information from these sessions will be assessed on each quiz and the final exam.

FOR ALL ASSIGNMENTS:

1. All formal assignments must be formatted in MS Word (.doc or docx). Written documents should be formatted with 1-inch margins, and size 12 font. Any required attachments may be scanned/photographed and submitted electronically (for print material), or complete web addresses for online sources can be included in APA-formatted citations.

2. All assignments should relate to the teaching of *science* as opposed to general teaching methods.

3. Students are encouraged to arrange to meet with the instructor for help and feedback on assignments. As future professional educators, it is expected that students will do their very best. For each assignment, spelling, grammar, organization, and clarity of written work are evaluated. Errors in these areas often result in lowered assignment grades.

4. Assignments turned in past the due date will be accepted for reduced credit (a reduction of 10% of the total points possible for the assignment for each week the assignment is late).

5. All assignments are expected to be the individual student's original work and writing. Any quoted material should appear in quotations and be properly cited and referenced with page numbers (APA style). This means that work from other students should also be referenced (e.g., sample Conceptual Change Units found in the ERL). Paraphrased material should be referenced following APA guidelines. Cheating and plagiarism are considered serious at Oakland University.

Students are strongly encouraged to complete the online Plagiarism Tutorial found on the KresgeLibrary website. All allegations of academic misconduct will be reported to the Dean of Students and, thereafter, to the Academic Conduct Committee for adjudication. Anyone found guilty of cheating in this course may receive a course grade of 0.0, in addition to any penalty assigned by the Academic Conduct Committee. Please refer to the Oakland University Undergraduate Catalog to read the full *Academic Conduct Policy* listed under *Other Academic Policies* online at http://catalog.oakland.edu/content.php?catoid=15&navoid=852#Other_Academic_Policies.

13. COURSE REQUIREMENTS AND GRADING:

Participation and Attendance	**(35 points total*)**
Attendance	25 pts.*
Online Session #1	5 pts.
Online Session #2	5 pts.
Assignments	**(95 points total)**
Activity Critique	15 pts.
Real-World Science Questions	24 pts.
Presentation Content Work (Background Information, Questions/Answers, & Terms/Definitions)	20 pts.
Presentation Evaluation	16 pts.
Scholarly Report (Conference or Teaching)	20 pts.
Quizzes and Tests	**(70 points total)**
Online Quiz 1 – physical science readings, online session #1	15 pts.
Online Quiz 2 – earth science readings, online session #2	15 pts.
Final Exam - Comprehensive	40 pts.
	TOTAL 200*

***The total may exceed maximum points listed with attendance extra credit.**

GRADING SCALE

Considered "A"s		Considered "B"s	
4.0: 100 % - 98.60	197-200 points	3.5: 90.59 - 88.60	177-180 points
3.9: 98.59 - 96.60	193-196 points	3.4: 88.59 - 86.60	173-176 points
3.8: 96.59 - 94.60	189-192 points	3.3: 86.59 - 84.60	169-172 points
3.7: 94.59 - 92.60	185-188 points	3.2: 84.59 - 82.60	165-168 points
3.6: 92.59 - 90.60	181-184 points	3.1: 82.59 - 80.60	161-164 points
		3.0: 80.59 - 79.60	159-160 points

Considered "C"s		Considered "D"s	
2.9: 79.59 - 78.60	157-158 points	1.9: 69.59 - 68.60	137-138 points
2.8: 78.59 - 77.60	155-156 points	1.8: 68.59 - 67.60	135-136 points
2.7: 77.59 - 76.60	153-154 points	1.7: 67.59 - 66.60	133-134 points
2.6: 76.59 - 75.60	151-152 points	1.6: 66.59 - 65.60	131-132 points

2.5:	75.59 - 74.60	149-150 points	1.5:	65.59 - 64.60	129-130 points
2.4:	74.59 - 73.60	147-148 points	1.4:	64.59 - 63.60	127-128 points
2.3:	73.59 - 72.60	145-146 points	1.3:	63.59 - 62.60	125-126 points
2.2:	72.59 - 71.60	143-144 points	1.2:	62.59 - 61.60	123-124 points
2.1:	71.59 - 70.60	141-142 points	1.1:	61.59 - 60.60	121-122 points
2.0:	70.59 - 69.60	139-140 points	1.0:	60.59 - 59.60	119-120 points
			0.5:	30.00 - 59.59	60-118 points
			0.0:	<30	<60 points

14. BIBLIOGRAPHY:

Abruscato, J. (1995). *Teaching children science: A discovery approach.* Boston: Allyn and Bacon.

American Association for the Advancement of Science (AAAS) (1993). *Project 2061: Benchmarks for science literacy.* New York: Oxford University Press.

American Institute of Physics (1990). *Operation physics (Michigan).* Kalamazoo, MI: Center for Science Education, Western Michigan University.

Barba, R. H. (1998). *Science in the multicultural classroom (2nd Ed.)* Boston: Allyn and Bacon.

Bosak, S. V. (2000). *Science is…: A source book of fascinating facts, projects and activities.* (2nd ed.). Ontario: The Communication Project.

Cohen, H., et al. (1990). *Teaching science as a decision making process.* Dubuque, IA: Kendall Hunt.

Krajcik, J., Czerniak C., & Berger, C. (1999). *Teaching children science: A project-based approach.* Boston: McGraw Hill.

Lorbeer, G (1992). *Science activities for elementary children (9th ed.), Vol. I, II.* Dubuque, IA: W. C. Brown.

Martin, D. J. (1997). *Elementary science methods: A constructivist approach.* Detroit, MI: Delmar Publishers.

Martin, Jr., R. E., Sexton, C., Wagner, K, & Gerlovich, J. (1994). *Teaching science for all children.* Boston: Allyn and Bacon.

Michigan Department of Education. (1995). *New directions science units*. Lansing, MI: Author.

Michigan Department of Education. (1995). *Science education guidebook: Curriculum frameworks, tools, and resources.* Lansing, MI: Author.

Michigan Department of Education. (2007). *Science grade level content expectations* (v.1.09). Lansing, MI: Author.

National Research Council (NRC) (1996). *National science standards.* Washington DC: National Academy Press.

Peters, J. M., & Stout, D.L. (2011) *Science in Elementary Education: Methods, Concepts and Inquiries (11th ed.)* Upper Saddle River, NJ: Pearson Education

Rutherford, J. & Algrehn, A. (1990). *Science for all Americans.* Washington DC: American Association for the Advancement of Science (AAAS).

Stepans, J. (1996). *Targeting students' science misconceptions*. Riverview, FL: Idea Factory.

Tolman, M. N. & Hardy, G. R. (1995). *Discovering elementary science.* Boston: Allyn and Bacon.

RECOMMENDED JOURNALS AND PERIODICALS:

Dragonfly
Great Exploration in Math and Science (GEMS)
Activities that Integrate Math and Science (AIMS)
Project 2061 (AAAS Report)
Science and Children - NSTA
Science Scope - NSTA
The Science Teacher - NSTA
CESI Science - Council for Elementary Science International publication
Ranger Rick
WonderScience - American Chemical Society
Science World - Scholastic

SCS 2060 TENTATIVE TIMELINE
Winter 2018

SciS = Great Source Education Group. (2006). *ScienceSaurus: A student handbook.* Wilmington,
Moodle = Downloadable activities available at https://moodle.oakland.edu
Demo. = Demonstration

Jan 03	**Lecture 1** PS1.A: Structure and Properties of Matter: *How do particles combine to form the variety of matter one observes?* *By the end of grade 8.* All substances are made from some 100 different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. Pure substances are made from a single type of atom or molecule; each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. In a liquid, the molecules are constantly in contact with each other; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and vibrate in position but do not change relative locations. Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (Boundary: Predictions here are qualitative, not quantitative.) **Activities:** Just the Ticket (Moodle), Cereal Models (Moodle) **Read:** SciS: 001-016 (21 pages)
Jan 10	**Lecture 2** **PS1A: Structure & Properties of Matter** **Activities:** **Properties of Matter:** Creating Atoms and Ions (Moodle); **Solids:** Take a Powder (Bosak, p. 169) **Liquids:** How many drops (of water) fit on a penny? (Demo.), How Water and Other Liquids Stick Together (P&S, p. 457-458), Can you float a paperclip? (Demo.) **Read:** SciS 055-068, 249-254; **Resource:** States of Matter: Basics: http://phet.colorado.edu/en/simulation/states-of-matter-basics **HW: Real World Questions # 1 (due next week)**
Jan 17	**Lecture 3** PS1.B: Chemical Reactions: How do substances combine or change (react) to make new substances? How does one characterize and explain these reactions and make predictions about them? *By the end of grade 8.* Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. The total number of each type of atom is conserved, and thus the mass does not change. Some chemical reactions release energy, others store energy. **Activities:** Chemical Change (Moodle), Colour Clues (Bosak, p. 168), Rain, Rain Go Away (Bosak, p. 363) **Read:** SciS 255-265; 266-273 **Due**: RWQ #1 **HW**: Real World Question # 2 Activity Critique (due in two weeks)
Jan 24	**Lecture 4** PS2.A: Forces and Motion: How can one predict an object's continued motion, changes in motion, or stability? *By the end of grade 8.* For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first but in the opposite direction (Newton's third law). The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. Forces on an object can also change its shape or orientation. All positions of objects and the

	direction of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared PS3.C Relationship Between Energy and Forces: How are forces related to energy? *By the end of grade 8.* When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. For example, when energy is transferred to an Earth-object system as an object is raised, the gravitational field energy of the system increases. This energy is released as the object falls; the mechanism of this release is the gravitational force. Likewise, two magnetic and electrically charged objects interacting at a distance exert forces on each other that can transfer energy between the interacting objects. **Activities:** **Force and Motion:** Balloon Rocket Engineering Design (P&S, p. 512); Drop it! (Bosak, p. 145); Ball Drop (Moodle); Free Falling (Moodle); Superbounce (Moodle) **Read:** SciS 274-298 **Due**: RWQ # 2 **HW:** Activity Critique (due next week), RWQ #3
Jan 31	**Lecture 5** PS2.B: Types of Interactions: What underlying forces explain the variety of interactions observed? *By the end of grade 8*. Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass—for example, Earth and the sun. Long-range gravitational interactions govern the evolution and maintenance of large-scale systems in space, such as galaxies or the solar system, and determine the patterns of motion within those structures. Forces that act at a distance (gravitational, electric, and magnetic) can be explained by force fields that extend through space and can be mapped by their effect on a test object (a ball, a charged object, or a magnet, respectively). PS3.A: Definitions of Energy: What is energy? *By the end of grade 8*. Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. A system of objects may also contain stored (potential) energy, depending on their relative positions. For example, energy is stored—in gravitational interaction with Earth—when an object is raised, and energy is released when the object falls or is lowered. Energy is also stored in the electric fields between charged particles and the magnetic fields between magnets, and it changes when these objects are moved relative to one another. Stored energy is decreased in some chemical reactions and increased in others. The term "heat" as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and energy transfers by convection, conduction, and radiation (particularly infrared and light). In science, heat is used only for this second meaning; it refers to energy transferred when two objects or systems are at different temperatures. Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. **Activities:** **Electricity:** How to Make a Bulb Light (P&S, p. 276), Series Circuits (P&S. p. 281-282), Parallel Circuits (P&S, p. 282), Electromagnets (P&S, p. 294), Static Electricity (P&S, p. 298) **Magnetism:** Objects Magnets Can Pull (P&S, p. 258), The Power of Magnets (P&S, p. 260), How to Make Magnets (P&S, p. 262), Long-Lasting Magnets (P&S, p. 263), Magnetic Fields (P&S, p. 265), Does Magnetism Go Through Objects? (P&S, p. 266), Make Your Own Compass (P&S, p. 268) **Read:** SciS 314-321 **Due**: RWQ #3, Activity Critique **HW**: RWQ # 4
Feb 7	**Lecture 6** PS4.A: Wave Properties: What are the characteristic properties and behaviors of waves? *By the end of grade 8.* A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. A sound wave needs a medium through which it is transmitted. Geologists use seismic waves and their reflection at interfaces between layers to probe structures deep in the planet. PS4.B: Electromagnetic Radiation: What is light? How can one explain the varied effects that involve light? What other forms of electromagnetic radiation are there? *By the end of grade 8.* When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. Lenses and prisms are applications of this effect.

	A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media (prisms). However, because light can travel through space, it cannot be a matter wave, like sound or water waves. **Activities:** **Light:** Me & My Shadow (P&S, p. 183), Shadows in the Sun (P&S, p. 183-184), Making Money (P&S 184), Mirror Reflections (P&S, 185), I Can See Myself (P&S, p. 186-187), The Real You (P&S, p. 187-188), Light Relay Races (P&S 188-189), Mirror Balance (P&S, p. 189-190), Some Everyday Magnifiers (P&S, p. 192), How Big Can It Get? (P&S, p. 193), The Colors of the Sun (P&S, p. 200), Diffraction Glasses (Demo.) **Sound Energy:** Focus Inquiry: Hand pipe (Demo.), Good Vibrations (P&S, p. 233), Sound Travels (P&S, p. 238), Vibrations of Metal Objects (P&S, p. 240), A String Telephone (P&S, p.241), Underwater Sounds (P&S, p. 242), Sound Tubes (Demo.), How is sound produced by a tuning fork? (Demo.) **Read: Energy:** SciS 299-321; HW" RWQ # 4, Online Session #1 Due: RWQ #4
Feb 14	**Field Trip – Dinosaur Hill Nature Preserve,** $5.00 per student **Due: Online Session #1** **HW: Complete Online Quiz # 1 (due next week)**
Feb 21	**No Class**
Feb 28	**<u>Lecture 7</u>** ESS1.A: The universe and its stars: What is the universe, and what goes on in stars? *By the end of grade 8.* Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. The universe began with a period of extreme and rapid expansion known as the Big Bang. Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. ESS1.B: Earth & the Solary System: What are the predictable patterns caused by Earth's movement in the solar system? *By the end of grade 8.* The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. This model of the solar system can explain tides, eclipses of the sun and the moon, and the motion of the planets in the sky relative to the stars. Earth's spin axis is fixed in direction over the short term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. **Activities:** The Way the Earth R otates (P&S, p. 489-490), Direct Sun (P&S, p. 491-492), Why the Earth Has Seasons (P&S, p. 492-493) Moon Phases (P&S 497-498), Eclipses of the Sun and Moon (P&S, p. 499-500) **Read:** SciS 323-328 HW: RWQ # 5
Mar 07	**<u>Lecture 8</u>** ESS1.C: The History of Planet Earth: How do people reconstruct and date events in Earth's planetary history? *By the end of grade 8.* The geological time scale interpreted from rock strata provides a way to organize Earth's history. Major historical events include the formation of mountain chains and ocean basins, the evolution and extinction of particular living organisms, volcanic eruptions, periods of massive glaciation, and development of watersheds and rivers through glaciation and water erosion. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. **Activities:** Freezing Water and Rocks (P&S, p. 434), Soil Erosion (P&S, p. 435-436), Glaciers (P&S, p. 438), Cross-Section Anayses (Demo.), **Read:** SciS 175-200;

	Due: RWQ #5 HW: RWQ #6
Mar 14	**<u>Lecture 9</u>** ESS2.C: The Roles of Water in Earth's Surface Processes: How do the properties and movements of water shape Earth's surface and affect its systems? *By the end of grade 8.* Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation as well as downhill flows on land. The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. Global movements of water and its changes in form are propelled by sunlight and gravity. Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. ESS2.D: Weather and Climate: What regulates weather and climate? *By the end of grade 8.* Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. Because these patterns are so complex, weather can be predicted only probabilistically. The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. Greenhouse gases in the atmosphere absorb and retain the energy radiated from land and ocean surfaces, thereby regulating Earth's average surface temperature and keeping it habitable. **Activities:** Heating Soil & Water (P&S, p. 476), **Read:** SciS 201-207, 212-230 Due: RWQ # 7 **Demonstration Lessons** **Due: RWQ #6,** **HW: RWQ # 7, Online Session #2**
Mar 21	**NO CLASS** **Due: Online Session #2** **HW: Complete Online Quiz #2**
Mar 28	**Demonstration Lessons for Groups 1-5** Due: RWQ # 7
Apr 4	**<u>No Class</u>**
Apr 11	**Final Exam Review** **Demonstration Lessons for Groups 6-9** **Due: Presentation Content Work for groups 6-9** **HW: Scholarly Reports due 2 days prior to Final Exam.**
Apr 18	**Study Day**
Apr 25	**Final Exam 7:00-10:00 PM**

SCS 2060 Peterson: Presentation Sign-up Sheet

TOPIC	Presentation Date	Names
PS1: Matter and its Interactions Includes Structure and Properties of Matter, Chemical Reactions and Nuclear Processes		
PS2: Motion & Stability: Forces & Interactions Includes Forces and Motion, Types of Interactions and Stability and Instability in Physical Systems.		
PS3: Energy Includes What is Energy, Conservation of Energy, Energy Transfer, Relationship of Energy with Force and Energy in Chemical Processes and Everyday Life		
PS4: Waves and their Applications in Technologies for Information Transfer Includes Wave Properties, Electromagnetic Radiation and Information Technologies and Instrumentation		
ESS1: Earth's Place in the Universe Includes The Universe and Stars, Earth and the Solar System and the History of Planet Earth.		
ESS2: Earth's Systems Includes Earth Materials and Systems, Plate Tectonics and Large-Scale Interactions, Role of Water in Earth's Surface Processes, Weather & Climate and Biogeology		
ESS3: Earth and Human Activity Includes Natural Resources, Natural Hazards, Human Impact on Earth Systems and Global Climate Change.		