SYLLABUS: GEOLOGY 101, Physical Geology

COURSE/SEMESTER: GEO 101, Physical Geology, Spring 2018

PROFESSOR: Dr. Donald Minkel, Distinguished Professor of Geology

PHONE & VOICEMAIL: 743-2325 (I prefer e-mail! I don't use ANGEL or BLACKBOARD!)

E-MAIL & Web page: minkeld@sunyacc.edu www.drminkel.altervista.org

LECTURE: M W 11:15-12:35 or T R 9:00-10:20 in NSTEM (ADK) 113

LAB: M 2:15-5:15 or T 10:30-1:30 or W 2:15-5:15 in NSTEM (ADK) 113

COURSE DESCRIPTION: The course is an introduction to physical geology with emphasis on plate tectonics.

COURSE OBJECTIVES: To explore the nature of geological and geophysical observations.

To show how geologists apply understanding of physical and chemical processes acting upon and within the Earth to account for the observations.

To see how geological processes caused and continue to cause colossal, sometimes gradual, sometimes catastrophic changes in the Earth's surface and interior. (Earthquakes, volcanoes, climate change)

To appreciate that humans came to be because of the particular physical and chemical conditions present on Earth. Thus, our future is bound to the Earth's geologic future.


LAB BOOK: Exercises in Physical Geology, 12th Edition, by Hamblin and Howard Required!

LAB MATERIALS: lab notebook, clipboard or small notebook for field trips, cheap magnifying glass or hand lens, erasers, pencils, pens, ruler (one that has centimeters and millimeters). For the second half of the semester 30 8 1/2 x 11" clear plastic overhead transparencies, 4 permanent markers to write on the overheads-get 4 different colors. Go on-line to get these cheaply and share boxes of 100. Do a search on "8.5 x 11 transparency" on ebay. The transparencies and sharpies are REQUIRED for lab.

COURSE STRUCTURE: The course has three major sections:

I - Understanding the Earth System: Composition, structure, and intro. to plate tectonics
II - The Skin of the Earth: surface processes
III- The Body of the Earth: internal processes, external effects

Student Learning Objectives

Per SUNY Gen Ed Assessment

1. Students will demonstrate an understanding of the methods scientists use to explore natural phenomena, including observation, hypothesis development, measurement and data collection, experimentation, evaluation of evidence and employment of mathematical analysis.

2. Students will apply scientific data, concepts and models.

Additional Objectives may be determined by the instructor.

Course-specific Objectives

1. Recall key facts and theories about physical geology such as plate tectonics.
2. Demonstrate the ability to work safely and effectively in a physical geology laboratory.
3. Communicate in writing an understanding of concepts related to physical geology.
4. Apply laboratory skills to identify samples of rocks and minerals.
5. Analyze and interpret data derived from observation at field sites.
6. Evaluate the scientific validity of Earth-system information delivered by mass media sources.
7. Apply knowledge gained in physical geology to assess personal risk from geologic hazards.
# Semester Lab, Lecture, and Exam Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>First day of the week</th>
<th>Textbook Chapter(s)</th>
<th>Lab and lab book chapters</th>
<th>Lecture or Lab Exam content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M 1/22</td>
<td>Preface, Prelude, 1, 2</td>
<td>Videos: Down to Earth and Birth of a Theory</td>
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<tr>
<td>2</td>
<td>M 1/29</td>
<td>2, 3</td>
<td>Ch. 2</td>
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<tr>
<td>3</td>
<td>M 2/5</td>
<td>3, Interlude A &amp; C, 4</td>
<td>Ch. 3</td>
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<tr>
<td>4</td>
<td>M 2/12</td>
<td>5, Interlude B</td>
<td>Ch. 4</td>
<td></td>
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<tr>
<td>5</td>
<td>M 2/19</td>
<td>6, 7</td>
<td>Ch. 5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>M 2/26</td>
<td>7, review Lec. Exam 1, W 2/28 or Th 3/1</td>
<td>Ch. 7</td>
<td>Textbook: Preface, Prelude, chapters 1-7, Interludes A, B &amp; C</td>
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<tr>
<td>7</td>
<td>M 3/5</td>
<td>Interlude E, 10, 9</td>
<td>Lab exam 1 in lab: M or T or W</td>
<td>Rock &amp; mineral identification - lab book exercises 2,3,4,5</td>
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<tr>
<td></td>
<td>M 3/12</td>
<td>spring</td>
<td>break</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>M 3/19</td>
<td>9, 6 (weathering), 13</td>
<td>9, 10 Text: Interlude F</td>
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<tr>
<td>9</td>
<td>M 3/26</td>
<td>14, 16</td>
<td>12, 13 Text chp. 18</td>
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<tr>
<td>10</td>
<td>M 4/2</td>
<td>16, 17</td>
<td>16, text Ch. 9</td>
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<tr>
<td>11</td>
<td>M 4/9</td>
<td>18, review Lec. Exam 2, W 4/11 or Th 4/12</td>
<td>18 - 22</td>
<td>Textbook: 6, 9-11,13,14,16-18, Interludes B, E, &amp; F</td>
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<tr>
<td>12</td>
<td>M 4/16</td>
<td>19</td>
<td>Lab Exam 2 in lab: M or T or W</td>
<td>Review sheet, parts of Lab book exercises 7,9,10,12,13,16,18-22</td>
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<tr>
<td>13</td>
<td>M 4/23</td>
<td>19, 8, Interlude D</td>
<td>Local Field Trip I</td>
<td></td>
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<tr>
<td>14</td>
<td>M 4/30</td>
<td>8, Interlude D, 2 again!</td>
<td>Local Field Trip II</td>
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<tr>
<td>Finals Week</td>
<td>M 5/7</td>
<td>11:15-12:35</td>
<td>Final exam review</td>
<td>Study hard and plan ahead. Its comprehensive!</td>
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<tr>
<td></td>
<td>M W lecture W 5/9 1-3</td>
<td>Final Exam</td>
<td></td>
<td>text chapters 2, 8, 9, 19, and Interlude D :50%, all other text chapters except 12: 50%</td>
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</tbody>
</table>
**Essentials of Geology, 5th ed. - contents**

**Prelude: And Just What Is Geology?**

1. The Earth in Context
2. The Way the Earth Works: Plate Tectonics
3. Patterns in Nature: Minerals

**Interlude A: Rock Groups**

4. Up from the Inferno: Magma and Igneous Rocks
5. The Wrath of Vulcan: Volcanic Eruptions

**Interlude B: A Surface Veneer: Sediments and Soils**

6. Pages of Earth’s Past: Sedimentary Rocks
7. Metamorphism: A Process of Change

**Interlude C: The Rock Cycle**

8. A Violent Pulse: Earthquakes

**Interlude D: The Earth’s Interior Revisited: Insights from Geophysics**

9. Crags, Cracks, and Crumples: Crustal Deformation and Mountain Building

**Interlude E: Memories of Past Life: Fossils and Evolution**

10. Deep Time: How Old is Old?
11. A Biography of Earth
12. Riches in Rock: Energy and Mineral Resources

**Interlude F: An Introduction to Landscapes and the Hydrologic Cycle**

13. Unsafe Ground: Landslides and Other Mass Movements
14. Streams and Floods: The Geology of Running Water
15. Restless Realm: Oceans and Coasts
16. A Hidden Reserve: Groundwater
17. Dry Regions: The Geology of Deserts
18. Amazing Ice: Glaciers and Ice Ages
19. Global Change in the Earth System

PREFACE

Exercise

1 MINERALS AND CRYSTAL GROWTH 6
2 MINERAL IDENTIFICATION 10
3 IGNEOUS ROCKS 24
4 SEDIMENTARY ROCKS 41
5 METAMORPHIC ROCKS 57
6 GEOLOGIC TIME-RELATIVE DATING 68
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8 LANDFORMS OF THE UNITED STATES 92
9 STREAM EROSION AND DEPOSITION 97
10 MASS MOVEMENT 112
11 GROUNDWATER 116
12 VALLEY GLACIATION 125
13 CONTINENTAL GLACIATION 134
14 SHORELINE PROCESSES 142
15 EOLIAN PROCESSES 155
16 STRUCTURAL GEOLOGY 162
17 SEISMOLOGY 190
18 PLATE TECTONICS 196
19 DIVERGENT PLATE BOUNDARIES 206
20 TRANSFORM PLATE BOUNDARIES 219
21 CONVERGENT BOUNDARIES 228
22 PLUMES AND HOTSPOTS 238
23 PLANETARY GEOLOGY 247

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Under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, a post-secondary student with a disability who is in need of academic accommodations or auxiliary aids is required to notify the College of the nature of the disability and to provide appropriate documentation which supports the request for reasonable accommodations or auxiliary aids.

Individuals who would like to self-identify with a disability (and have not already) or think they may have a disability and want to request accommodations should contact the Accessibility Services Office located in Warren Hall or call (518) 743-2282 (voice and relay) for an appointment.

* * * * *
GRADING:

Quizzes (first five minutes of every class, PLEASE BE ON TIME!) 15%
Remember the 2% deduction for missed labs or field trips!

Exam I (Text: Preface, Prelude, chapters 1-7, Interludes A, B & C) 15%

Exam II (Textbook: 6, 9-11, 13-18, but not 12, Interludes B, E, & F) 15%

Lab Exam I (Rock & mineral identification - lab book exercises 2, 3, 4, & 5, in lab) 15%

Lab Exam II (Review sheet, parts of Lab book exercises 7, 9, 10, 12, 13, 16, 18-22, in lab) 15%

Final Exam (Text: 2, 8, 9, 19, Interlude D: 50%, all other text chapters except 12: 50%) 25%

Exam times: see the semester schedule 100%

QUIZZES: I will ask you one question about the reading assignment out of the textbook every time the lecture meets right at the start of the class. I will tell you which chapter to study during the previous class. If I forget just check the reading assignment in the schedule on the previous page. Each quiz will be graded as follows:

- 2 points - correct answer
- 1 point - incorrect answer
- 0 points - late for class and missed the quiz for no good reason
- 0 points - missed class for no good reason
- 0 points - left class early without speaking to Dr. Minkel before class as to reason

Quiz grade not counted - late for class or missed class for a good reason.

When a quiz grade is not counted it means your grade is calculated as if that quiz hadn't happened. For example, if you had 35 out of 41 quizzes correct and missed 3 quizzes all for good reasons your quiz percentage for the semester would be \((35\times 2 + 6\times 1)/(41\times 2)\), or 92.7%. If on the other hand your reasons aren't good, it would be \((35\times 2 + 6\times 1)/(44\times 2)\), or 86.4%.

Obviously, frequent missing of class and/or coming to class unprepared will result in a severe grade penalty!! Please be sure to write down and hand in the date of and good reason for a missed quiz. I am flexible about these but unless I get something written from you I will assume the reason wasn't good. The upshot of all this is: Come to class prepared, having read and studied the relevant text chapter. This, more than anything else, will help you to do well in this class.

LAB AND FIELD TRIP ATTENDANCE: REQUIRED!

Each unexcused lab or field trip absence reduces your semester quiz percentage by 2%. For example, the 86.4% calculated in the example above would go down to 82.4% if you missed a lab and a field trip without an excuse. Signed, dated, written excuses must be provided to avoid the penalty.
Electronic distractions/interruptions in class/lab (cell phones etc.)

Please disable and put away any electronic noise/distraction making devices such as cellphones, tablets, music players, laptops, and headphones at the beginning of class or lab before the quiz. These need to be on the floor or inside a book bag or purse, NOT in your pocket or on your lap or on the table tops. If you must to use one of these during class please provide me a signed accommodation form from the Accessibility Services Office documenting the need and the specific technology you will use.

Audio or video recording for any reason in class or lab is expressly forbidden. The exception is for people with signed accommodation forms from the Accessibility Services Office for audio recording that have provided a copy to me.

If you interrupt class or lab with any of these devices I will confiscate the device for 24 hours and use it profusely. I have friends in Montana and Europe so be ready for some hefty bills!

Don’t bring any of these devices to exams or the Cellphone Alligator will eat them!

I repeat: Don’t bring any of these devices to exams.

Disruptive students: Dr. Minkel reserves the right to require disruptive students to leave class or lab. We need to maintain an environment where all of us can learn as much as possible. Disruptive behavior is anything that, in Dr. Minkel's judgement, substantially detracts from this kind of environment.
Dr. Minkel’s Schedule - Spring 2018

ALL GEOLOGY CLASSES, LABS, and EXAMS MEET IN ADK113, ASTRONOMY MEETS IN WILTON 212 AND ALSO USES 209 (PC lab)
OFFICE HOURS ARE AS SHOWN OR BY APPOINTMENT
PHONE & VOICEMAIL: 743-2325 (I prefer e-mail, and don't use ANGEL or BLACKBOARD!)
E-MAIL: minkeld@sunyacc.edu
Web Page: www.drminkel.altervista.org

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<thead>
<tr>
<th>MWF</th>
<th>M</th>
<th>TU</th>
<th>W</th>
<th>TH</th>
<th>F</th>
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<td>8:00-8:55</td>
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<td>9:00-10:00</td>
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<td>Geo 101 lecture</td>
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<td>Office ADK113</td>
<td>Geo 101 lab</td>
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<td>Faculty &amp; Division Meetings</td>
<td>10:30-1:30</td>
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<td>Geo 101 lab</td>
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<td>Ast 113 Lec/lab</td>
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