

## Geos 101 – The Dynamic Earth

**Lectures:** Mon., Wed., Fri. – 10:30 AM – 11:30 AM – NSCI 201B

**Labs:** Tues., 9:45 AM – 12:45 PM, 6:00 – 9:00 PM, 2:00 – 5:00 PM (Honors);  
Wed., 11:45 – 2:45 PM, 6:00 – 9:00 PM; Thurs., 9:45 AM – 12:45 PM, 5:20 –  
8:20 PM – NSCI 230

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**Office Hours:** Monday & Friday 9:00-10:30 a.m., or by appointment

### **Required text:**

Smith, G. A. and Pun, A., 2006. **How Does Earth Work?** Pearson Prentice Hall, New Jersey, 639 p.

### **Other required materials:**

Geos 101: The Dynamic Earth Laboratory Manual

### **Introduction:**

The Earth is a dynamic planet that is constantly changing. Physical geology is concerned with understanding the processes that operate at or beneath the surface of the Earth, and the materials on which those processes operate. An understanding of these processes and materials is essential for finding and utilizing Earth's resources, for occupying our planet in an environmentally responsible manner, and for responding to natural changes at the Earth's surface. The goals of this course are to understand and identify common minerals and rocks, to understand the structure and composition of the Earth, to understand basic processes on and within the Earth and how these relate to resources (including water!), and to view the Earth as a dynamic system.

### **Attendance:**

A university classroom is an adult environment and, therefore, attendance at lectures is entirely up to you. However, it is unlikely that you will perform well in this class without attending lectures. It is strongly recommended that you attend all labs and class sessions.

### **Grades:**

Your final grade for this course will be determined as follows:

- Mid-term examination #1 – 15%
- Mid-term examination #2 – 15%
- Laboratory exercises – 40%
- Final examination – 30%

The two mid-term examinations will encompass the first and second thirds of the course respectively. The final examination will be cumulative, encompassing material from the entire semester, although the emphasis will rest heavily on the final third.

**The final examination will be given only on the day and time scheduled by the university.**

### **Labs:**

A fundamental goal of this class is to give you the tools to interpret the geologic features that you encounter on a daily basis. Reading topographic maps, interpreting aerial photos, and identifying rocks and minerals are practical skills that will be of use to you whether you decide to become a geologist or not. It is in the lab that you will have the opportunity to apply your geological knowledge and practice these new skills.

A pre-lab is found at the start of each lab exercise in your lab manual. Your lab manual will be handed out to you at the start of your first lab. The pre-lab is designed to introduce some basic concepts and to get you thinking about the material that will be covered in the next week's lab. Pre-labs are to be handed in on Mondays in class. Labs are to be handed in to your TA in your lab session.

Completion of lab assignments is essential for understanding course material. The labs are designed so that you can complete them within the three hour lab period. However, labs will require that you commit yourself for most, or all, of the 3 hours. Do not schedule other activities during any portion of the lab period. If you have a conflict, you can make it up by attending another lab section. Please notify your TA the week before if this will be necessary.

You will be allowed to drop one lab mark from your final grade if, and only if, you have completed all of the laboratory assignments for the semester.

### **Field Trips:**

The first lab of the semester is a local field trip. This trip will give you a chance to examine rocks and minerals in their natural environment and will provide you with an appreciation for the types of rocks and geologic structures in and around Fairbanks. The third lab also has a field trip component to it. Be sure to wear appropriate clothing – e.g. sturdy shoes or boots, a warm jacket and raincoat (just in case!). The field trips will “go” regardless of weather. Attendance on the field trips is mandatory and a “missed” field trip lab cannot be made up in later weeks.

### **Questions:**

There is no such thing as a foolish question. If you don't understand what I'm saying, please stop me and ask for clarification. Chances are someone else in class isn't understanding either! If you're not comfortable asking questions in class, please ask after the lecture or send an e-mail or drop by my office so we can clear up any confusion. That's what I'm here for!

### Tentative Lecture Schedule:

Date	Lecture/Lab Topic	Reading
September 1 (F)	Introduction	Chpt. 1 – p. 2-15
<b>September 4 (M)</b>	<b>Labor Day – no classes</b>	
September 6 (W)	An overview of planet Earth	Chpt. 9
September 8 (F)	Mineralogy: the basics	Chpt. 2 – p. 29-36
Week of Sept. 4-8	<b>Lab #1 – <i>The 3 major rock types</i> – Field Trip</b>	Chpt. 3
September 11 (M)	Mineralogy: structures	Chpt. 2 – p. 36-44
September 13 (W)	Mineralogy: identification	Chpt. 2 – p. 24-29
September 15 (F)	Geologic time and relative sequence of events	Chpt. 7 – p. 166-179
Week of Sept. 11-15	<b>Lab #2 – <i>Mineral properties and identification</i></b>	
September 18 (M)	Radiometric dating and absolute ages	Chpt. 7 – p. 180-195
September 20 (W)	Weathering	Chpt. 5 – p. 102-111
September 22 (F)	From sediment to sedimentary rocks	Chpt. 5 – p. 111-120
Week of Sept. 18-22	<b>Lab #3 – <i>Mineral compositions, colors, ages</i></b>	
September 25 (M)	Sedimentary environments	Chpt. 5 – p. 120-131
September 27 (W)	Soils and palaeosols	Chpt. 14
<b>September 29 (F)</b>	<b>Mid-term Exam #1</b>	
Week of Sept. 25-29	<b>Lab #4 – <i>Sedimentary rocks and processes</i></b>	
October 2 (M)	Magma and intrusive rocks	Chpt. 4 – p. 82-93
October 4 (W)	Volcanoes, lava and extrusive rocks	Chpt. 4 – p. 73-82; 93-100
October 6 (F)	Igneous rocks	Chpt. 4 – p. 66-73
Week of Oct. 2-6	<b>Lab #5 – <i>Igneous rocks and processes</i></b>	
October 9 (M)	Metamorphic processes	Chpt. 6 – p. 134-152; 158-165
October 11 (W)	Foliation: telling metamorphic rocks apart	Chpt. 6 – p. 152-157
October 13 (F)	Folds and ductile deformation	Chpt. 11 – p. 270-274; 280-290

Week of Oct. 9-13	<b>Lab#6</b> – <i>Metamorphic rocks and processes</i>	
October 16 (M)	Maps	
October 18 (W)	Faults, fractures and brittle deformation	Chpt. 11 – p. 274-279
October 20 (F)	Earthquakes: distribution and magnitude of hazard	Chpt. 11 – p. 291-305
Week of Oct. 16-20	<b>Lab #7</b> – <i>Understanding topographic maps</i>	
October 23 (M)	Geologic maps and structures	Chpt. 11 – p. 275
October 25 (W)	Earth's magnetic field	Chpt. 10
October 27 (F)	Seismology and structure of Earth's interior	Chpt. 8
Week of Oct. 23-27	<b>Lab #8</b> – <i>Geologic maps and geologic structures</i>	
October 30 (M)	Paleomagnetism and continental drift	Chpt. 12 – p. 308-310.
November 1 (W)	Tectonics: plates and plate boundaries	Chpt. 12 – p. 311-341
November 3 (F)	Tectonics: crustal dynamics	Chpt. 12 – p. 342-348
Week of Oct. 30-Nov. 3	<b>Lab #9</b> – <i>Earthquakes and seismic waves</i>	
November 6 (M)	Tectonics: building mountains	Chpt. 13
<b>November 8 (W)</b>	<b>Mid-term Exam #2</b>	
November 10 (F)	Mass wasting	Chpt. 15
Week of Nov. 6-10	<b>Lab #10</b> – <i>Earth magnetism and faults in Alaska</i>	
November 13 (M)	Rivers and deltas I	Chpt. 16
November 15 (W)	Rivers and deltas II	Chpt. 16
November 17 (F)	Groundwater: fundamentals	Chpt. 17 – p. 482-504
Week of Nov. 13-17	<b>Lab #11</b> – <i>Air photos and remote sensing</i>	
November 20 (M)	Groundwater: chemistry and karst	Chpt. 17 – p. 504-515
November 22 (W)	Wind and deserts	Chpt. 20
<b>November 24 (F)</b>	<b>Thanksgiving – no classes</b>	
Week of Nov. 20-24	<b>Thanksgiving – no labs this week</b>	

November 27 (M)	Oceans and ocean processes	Chpt. 19
November 29 (W)	Glaciers	Chpt. 18 – p. 516-528
December 1 (F)	Glaciers: erosion and deposition	Chpt. 18 – p. 528-548
Week of Nov. 27-Dec. 1	<b>Lab #12</b> – <i>Groundwater hydrology</i>	
December 4 (M)	Ice Ages and Permafrost	Chpt. 18 – p. 548-563
December 6 (W)	Global change	
December 8 (F)	Global change – a geological perspective	
Week of Dec. 4-8	<b>Lab #13</b> – <i>Glacial geology</i>	
December 11 (M)	Mineral and energy resources in Alaska	
<b>December 14 (R)</b>	<b>Final Exam</b>	<b>10:15 a.m. - 12:15 p.m. in NSCI 201B</b>