

## Fall 2022 | GEOL 0200 | Geodynamics

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**Professor:** Ryan Kerrigan

**Office:** Krebs 227A

**E-mail:** kerrigan@pitt.edu

**Class time:** Monday, Wednesday and Friday, 11:00-11:50 AM

**Lab time:** Monday 2:00-4:50 PM

**Office Hours:** Thursdays 9:00-11:00 AM or by appointment

**Office Phone:** (814) 269-2942

**Class Room:** Krebs 220

**Lab Room:** Krebs B52

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### **Welcome to Geodynamics!**

The Earth operates as a system on long time scales and millennia of scientific investigation has revealed the processes at work. This course is designed to build on topics introduced in introductory geology and strengthen their understanding of the scientific principles that form the basis of our understanding of the Earth. Throughout the semester the course will provide the history, data, and empirical derivation of the principles of earth science as we know them today.

### **Goals**

Upon successful completion of this course, students will be able to:

- Talk intelligently about the fundamental nature of science, the role of science in developing an objective understanding of the natural world, and be able to apply the scientific method to investigate geologic problems.
- Apply a range of intellectual abilities, including critical thinking, logical argument, and appropriate uses of evidence and interpretation to solve geologic problems.
- Apply basic principles from physics, mathematics and chemistry to solve geologic problems.
- Effectively communicate details about Earth's internal structure and the techniques employed to probe Earth's interior.
- A fundamental understanding of geologic materials (atoms, molecules, minerals, rocks)
- Fully understand the plate tectonic paradigm and the data that support it.
- Apply basic methods of geochronology to age date rocks and to use these methods to solve geologic problems
- Understand the importance of geologic materials (minerals, rocks) as a data source for geologic research.

The supporting skills you will acquire in this course include:

- Dimensional analysis as a quantitative problem solving approach.
- An ability to use spreadsheets as a tool to display and analyze scientific data.
- Graphical methods in the geosciences.
- An understanding of basic statistics/data analysis applicable to the geosciences.
- The ability to write cogent, professionally-crafted laboratory reports.
- Scientific research skills.

To accomplish these goals there will be a variety of instructional activities: lecture-discussion sessions, group problem solving, laboratory work, and individual readings and investigations.

### **COURSE RESOURCES**

**Text (required):** Harold Levin (2013 [10<sup>th</sup> edition]), The Earth through Time. ISBN-10: 1118254678  
ISBN-13: 978-1118254677. There is a new addition (the 11<sup>th</sup>), do not get this, it more expensive and my page numbers will not correspond. Get the 10<sup>th</sup> edition! The bookstore has it at ~\$?. Amazon has new

copies at ~\$75 and used copies at ~\$45. Additionally, I have asked the library to have a copy on reserve. It is imperative that you have a version of this book in some manner. You will complete assignments using it and I will refer to its contents in lecture frequently. There is no lab text; I will provide all necessary lab materials.

**Web-material:** Most class materials (schedule, power points, reading guides, etc.) will be posted on Canvas for your convenience.

**Clean-up:** Please don't make a mess, but if you choose to make a mess, please clean up after yourself.

**Safety:** The only cautionary material we will work with is very dilute hydrochloric acid. We will take the necessary precautions when handling the dilute HCl. You should also be careful handling the rocks, minerals, and tools, for their safety, as well as yours. Don't abuse the lab materials; specimens, supplies, tools. Use brain.

**Students Accommodations:** Students with documented disabilities who need course adaptations or accommodations, have emergency medical information to share with me, or require special arrangements for building evacuation, should contact me after class within the first two weeks of class. I'm here to help.

**Academic Integrity:** Although there will be opportunities for group work in this course, all students are responsible for understanding the material and should indicate with whom they collaborated on any assignment. Group work does not mean that one person does all the work and everyone else puts their name on it...this is considered cheating. Students **should not:** claim other's ideas as their own, turn in other's work as their own, copy sources without proper citation (plagiarism), allow others to take their work or ideas, or pass off past projects as original work. If you have questions about academic honesty, see the instructor or refer to the document "Academic Integrity at the University of Pittsburgh at Johnstown." (<http://www.upj.pitt.edu/en/academics/academic-affairs/academic-advising/academic-integrity/>). Anyone found to be in violation of the Pitt-Johnstown standards for academic integrity will fail the course. We will cover scientific ethics in this course, until then use your brain.

**Late Work:** Contact me prior to any absence/missed: due dates, classes/labs, or quizzes/exam. If you can show me that respect and we will find an arrangement to allow you to make-up/hand-in the missed work. Without prior contact, any work not received by the due date will have points deducted, except for a documented exemption. For each day late 10% of the total possible points will be deducted (this includes weekends and holidays). The work will not be accepted for credit after 10 days.

**Outside Resources:** Perhaps there are questions that I cannot answer, or issues you feel you cannot discuss with me, UPJ has outlets these issues. I am new at UPJ so I am learning where this stuff is myself and I would most likely ask the division administrative assistant, Kara Bernard. Steve Stern is the Natural Science Division Chair; he is my boss.

## EVALUATION

### 1. Quizzes and Reading Guides / Participation:

Reading Guides will be posted to Canvas and you will be expected to complete them with the aid of your book. The questions will follow the sequence of the book. I will try not to make these too onerous.

### 2. Laboratory

In the lab you will be given problems to solve. Labs will generally be focused on the lecture topics being discussed that week. Labs are designed such that a student who is current with the class material and focuses should be able to complete the lab in the time allotted. However, some labs will at times be more difficult and require work outside of class time. Lab topics will parallel those covered in concurrent

lectures as closely as possible, but there may not always be a perfect overlap. At times, materials will be made available for use. Out of courtesy to others, please do not remove any materials from the lab. If you ask questions during the lab, I will help you get to the correct answer; I will not let you hand in incorrect material, if you ask tons of questions you should do very well.

**Please always bring a pencil to lab;** you will make mistakes, erasers erase mistakes.

### **3. Term Project and Presentation:**

Students will be asked to complete a semester-long research project that will culminate in the presentation of the independent investigation on a topic of their choosing. A separate sheet will be distributed discussing expectations, timelines, formats, and potential topics.

### **4. Exams**

There will be three unit exams during the semester (including the final). The tentative dates of these exams are shown on the Course Schedule found below. The exams are generally 60% multiple choice and 40% of short answer/drawings/labeling/calculations/etc.

Exams will emphasize material presented in lecture; however, you will also be tested on material contained in the readings. Exams will not just test your factual knowledge of the material; you will also be expected to *apply* your knowledge and understanding of the course material. In this regard, it is of prime importance to understand geologic concepts, more so than facts. Some memorization will be necessary, but I consider this of secondary importance. Exams are closed-book. If you know you will be missing an exam, see me and we may be able to arrange to have you take the exam early.

#### **ASSESSMENT**

- 20% Reading Guide Quizzes [lowest quiz will be dropped]
- 20% Weekly Labs (11 labs) [lowest lab will be dropped]
- 15% Term Project
- 45% Exams (3 – 15% each)
- Standard grade cut-off apply (100-96.6 =A+, 96.6-93.3=A, 93.3-90=A-, etc)

## Schedule of Events

\*Chapters listed indicates a Reading Guide Quiz on that date

<b>Week</b>	<b>Monday (Lec)</b>	<b>Monday (Lab)</b>	<b>Wednesday (Lec)</b>	<b>Friday (Lec)</b>
<b>1</b>	<u>August 29, 2022</u> Introduction to Historical Geology	<u>August 29, 2022</u> Maps, Rates & Time	<u>August 31, 2022</u> Early Theories Chapt 1 (1-12)	<u>September 2, 2022</u> Early Theories Chapt 2 (13-28)
<b>2</b>	<u>September 5, 2022</u> <b>NO CLASS LABOR DAY</b>	<u>September 5, 2022</u> <b>NO LAB LABOR DAY</b>	<u>September 7, 2022</u> Geologic Time <b>Chapt 3 (29-48)</b>	<u>September 9, 2022</u> Geologic Time
<b>3</b>	<u>September 12, 2022</u> Geologic Time	<u>September 12, 2022</u> Dating	<u>September 14, 2022</u> Minerals and Rocks <b>Chapt 4 (49-80)</b>	<u>September 16, 2022</u> Minerals and Rocks
<b>4</b>	<u>September 19, 2022</u> Sedimentary Record <b>Chapt. 5 (81-168)</b>	<u>September 19, 2022</u> Minerals and Rocks	<u>September 21, 2022</u> Sedimentary Record <b>Research Topics Due</b>	<u>September 23, 2022</u> Fossils <b>Chapt 6 (125-168)</b>
<b>5</b>	<u>September 26, 2022</u> Plate Tectonics <b>Chapt 7 (169-214)</b>	<u>September 26, 2022</u> Sedimentary Environments and Structures	<u>September 28, 2022</u> Plate Tectonics	<u>September 30, 2022</u> <b>EXAM I</b>
<b>6</b>	<u>October 3, 2022</u> Early Earth <b>Chapt 8 (215-250)</b>	<u>October 3, 2022</u> Facies Correlation	<u>October 5, 2022</u> Early Earth	<u>October 7, 2022</u> Early Earth
<b>7</b>	<u>October 10, 2022</u> The Proterozoic <b>Chapt 9 (251-274)</b>	<u>October 10, 2022</u> Evolution	<u>October 12, 2022</u> The Proterozoic	<u>October 14, 2022</u> <b>NO CLASS</b>
<b>8</b>	<u>October 17, 2022</u> Early Paleozoic Events <b>Chapt 10 (275-302)</b>	<u>October 17, 2022</u> Paleontology I: Learning fossil taxa	<u>October 19, 2022</u> Early Paleozoic Events <b>Ciations Due</b>	<u>October 21, 2022</u> Late Paleozoic Events <b>Chapt 11 (303-334)</b>

<b>Schedule of Events</b>				
<b>*Chapters listed indicates a Reading Guide Quiz on that date</b>				
<b>Week</b>	<b>Monday (Lec)</b>	<b>Monday (Lab)</b>	<b>Wednesday (Lec)</b>	<b>Friday (Lec)</b>
<b>9</b>	<u>October 24, 2022</u> Late Paleozoic Events	<u>October 24, 2022</u> Paleontology II: Unknown Fossils	<u>October 26, 2022</u> Life in the Paleozoic <b>Chapt 12 (335-384)</b>	<u>October 28, 2022</u> Life in the Paleozoic
<b>10</b>	<u>October 31, 2022</u> <b>EXAM II</b>	<u>October 31, 2022</u> Paleontology III: Fossil Quiz	<u>November 2, 2022</u> Mesozoic Events <b>Chapt 13 (385-416)</b>	<u>November 4, 2022</u> Mesozoic Events
<b>11</b>	<u>November 7, 2022</u> Mesozoic Events	<u>November 7, 2022</u> Geologic Maps I: Cross Sections	<u>November 9, 2022</u> Life in the Mesozoic <b>Chapt 14 (385-416)</b>	<u>November 11, 2022</u> Life in the Mesozoic
<b>12</b>	<u>November 14, 2022</u> Life in the Mesozoic	<u>November 14, 2022</u> Geologic Maps II: Basic Structures	<u>November 16, 2022</u> Cenozoic Events <b>Chapt 15 (469-504)</b>	<u>November 18, 2022</u> Cenozoic Events <b>Outline Due</b>
<b>13</b>	<u>November 21, 2022</u> <b>NO CLASS</b>	<u>November 21, 2022</u> <b>NO LAB</b>	<u>November 23, 2022</u> <b>NO CLASS</b>	<u>November 25, 2022</u> <b>NO CLASS</b>
<b>14</b>	<u>November 28, 2022</u> Cenozoic Events	<u>November 28, 2022</u> Geologic Maps III: More Geologic Maps!	<u>November 30, 2022</u> Life in the Cenozoic <b>Chapt 16 (505-542)</b>	<u>December 2, 2022</u> Life in the Cenozoic
<b>15</b>	<u>December 5, 2022</u> Life in the Cenozoic	<u>December 5, 2022</u> <b>TERM PROJECT PRESENTATIONS</b>	<u>December 7, 2022</u> Human Origins <b>Chapt 17 (543-567)</b>	<u>December 9, 2022</u> Human Origins
<b>16</b>	<b>Friday</b> <u>December 16th</u> 10:30 AM - 12:30 PM <b>FINAL EXAM</b>			

\*This schedule will be fluid at times to adjust for the pace, comprehension of the class, and the eventually corona outbreak...