



Principles of Geology

NASC 130 – Bentley College – Spring 2008

Section 001

Tuesday 12:45-2:00 p.m. (D period)
Friday 12:45-3:25 p.m. (D and E periods)

Professor: Liane Stevens
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Office Hours: Monday 12:30-2:00 p.m.,
Wednesday 2:00-3:30 p.m., or by appointment

Did you collect rocks or seashells as a child? Fascinated by the rocky outcrops on campus? Would you like to have a better understanding of geology in the news (earthquakes, volcanic eruptions, floods, global warming, etc.)? Are you just looking to fill your science requirement – and maybe nurture your inner geologist in the process? You're in the right place – **WELCOME!**

Course Description: Introduces the basic principles of geology. Topics covered include the origin of Earth; the classification and origin of the minerals and rocks composing Earth; discussion of geologic features and processes such as volcanoes, earthquakes, plate tectonics, and the sculpture of Earth's surface by erosion and deposition; and the concept of geologic time.

Course Goals: As a geologist-in-training, you will be introduced to the beauty and intricacies of geologic processes, rocks and minerals, and Earth's landforms. We will pay particular attention to the unifying aspects of plate tectonic theory, the depth of geologic time, and the interconnectedness of natural processes and human activities. Through this course you will gain practical skills (observation, identification, map-reading, critical thinking) and knowledge (regional geology, resources, environment) that will be useful in the "real" world. You will develop an appreciation, if not passion, for the geosciences... Geology rocks!

Learning Objectives: Please see page 6 of this syllabus.

Required Text:

- Tarbuck, E.J., and Lutgens, F.K., 2005, Earth: An Introduction to Physical Geology, 8th edition: Upper Saddle River, New Jersey, Pearson Prentice Hall, 711 p. with appendices and CD-ROM. ISBN: 0-13-114865-6.

Course Policies:

- 🌐 This course is conducted in accordance with the Bentley Honor Code, the Bentley Beliefs, the Academic Integrity System, and all other college policies (for specific policies and information, see additional handouts, Blackboard, and www.bentley.edu/shandbook/).

- 🌐 **Course Meetings.** This course meets twice a week. Lecture presentations take place during single periods (Tuesday); double periods (Friday) are primarily used as lab periods (see syllabus schedule).
- **Lecture Periods.** Lectures are held in Jennison 112. These periods include presentations, class discussions, and relevant activities. Bring your notebook, textbook, and pencil to class.
 - **Lab Periods.** Labs begin in Jennison 112 then move to Jennison 118. Lab work involves graded assignments and quizzes that are completed during the lab period. Thirteen labs and four lab quizzes are scheduled for this semester. Always bring your lab materials, notebook, textbook, calculator, and pencil to lab.
 - **Technology.** Laptops are fine for course-related activities; wireless access will be blocked if abused. Cell phones and iPods must be silent and put away (out of sight) during lectures and labs. Email/IM, games, surfing, texting, etc., are inappropriate during class time and will have a detrimental effect on your Professionalism grade.
- 🌐 **Assignments.** All assignments are to be completed in accordance to the instructions given and with regard to Academic Integrity policies (see handouts and Blackboard). Reading assignments and Applied Geology assignments are due at the beginning of class, unless otherwise noted. Lab assignments will be completed during class.
- **Reading Assignments.** Readings come primarily from your textbook and serve as the starting point for lecture presentations and class discussions. The *minimum* expectation is that you will skim readings *before* class, giving attention to figures, general concepts, terminology, and chapter summaries. You are responsible for information from the readings as needed in class, for assignments, and on assessments. Reading assignments should be completed by the date for which they are listed on the syllabus.
 - **Lab Preparation.** Lab materials will be posted on Blackboard. Each week you are responsible for accessing and thoroughly reviewing this information prior to class. In addition, lab materials may include specific instructions to be completed in preparation for lab – please arrive prepared!

As you will refer to materials and handouts throughout the semester, it is expected that you will maintain an organized folder or notebook for your lab materials. Additionally, lab exercises do not exist in a vacuum separate from lectures – you will be expected to apply lecture information and textbook readings to your lab experience! Therefore, you are advised to have your lecture notes and textbook with you in lab.
 - **Applied Geology Assignments.** Applied Geology assignments typically focus on a variety of topics. This semester the assignments will focus on creating and revising an integrated Google Earth resource for the geology of the Bentley College campus. You will work with a partner to complete four assignments over the course of the semester. Assignments will be posted on Blackboard.
- 🌐 **Quizzes and Exams.** Your progress and performance will be evaluated throughout the semester by four lab quizzes, by midterm and final exams, and by unannounced Quick Quizzes.
- **Quick Quizzes.** Quick Quizzes are brief (~5 minutes), unannounced quizzes focused on current course material (readings, concepts, terms, exercises, discussions); they will not include sample identification. Quick Quizzes are not “pop” quizzes – in other words, you should not be surprised when we have a quiz! Prepare for quizzes as you prepare for class – do the assigned readings and review your notes from the previous class. Quizzes will be graded as follows: ✓+ (excellent = 96), ✓✓ (above average = 90), ✓ (sufficient = 82), ✓- (unprepared = 72), 0 (unacceptable). Your lowest quiz grade will be dropped at the end of the semester. Note: Zero (0) grades (quizzes not taken) cannot be dropped. You may expect 6-10 Quick Quizzes during the semester.

- **Lab Quizzes.** Lab quizzes test your practical knowledge of mineral and rock identification. There is one quiz each for minerals, and for igneous, sedimentary, and metamorphic rocks.
- **Midterm & Final Exams.** The midterm exam will focus on concepts covered during the first half of the semester; the final exam will cover concepts from the second half of the semester. Material covered in lab will not be included on exams unless also discussed in lecture. These comprehensive exams will include a variety of questions (multiple choice, fill-in-the-blank, short answer, diagrams). The final exam is not cumulative except for the natural progression of concepts. You must attend the final exam as scheduled by the College (see syllabus schedule) – no exceptions! – make your end-of-semester travel plans accordingly!
- **Study Tips.** Study guides with information on content and format will be available on Blackboard prior to lab quizzes and exams. The lab will be open for scheduled study sessions prior to lab quizzes. Review sessions for exams will be scheduled.

Additional Academic Policies.

- **Academic Integrity.** As in the workplace, I expect you to conduct yourself appropriately and professionally, to complete your work with integrity, and to treat members of our community with courtesy and respect. In the event of any work or behavior that violates the Academic Integrity System, I will notify you of the matter and then prepare an Academic Incident Report. Please familiarize yourself with Bentley's Academic Integrity System. You will receive explicit guidelines on Academic Integrity and your work in this class (see additional handouts and/or Blackboard). Please contact me immediately if you have any questions or concerns.
- **Disability Services.** If you are eligible for and have need of academic adjustments or accommodations because of a disability, you are required to meet with the Coordinator of Disability Services, 781-891-2274, LaCava 166, within the first three weeks of the semester. You are responsible for contacting me one week in advance to schedule accommodations for each quiz, exam, or assignment, as appropriate.

- **Grading Policy.** Your performance in this course is evaluated on the basis of laboratory work and quizzes, Applied Geology assignments, Quick Quizzes, midterm and final exams, and a professionalism grade. You may keep track of your grade throughout the semester by downloading a prepared spreadsheet from Blackboard. No surprises!

Final Grade:

Laboratory Assignments & Quizzes	30
Applied Geology Assignments	15
Quick Quizzes	15
Midterm Exam	15
Final Exam	15
Professionalism	10
Total	100%

- **Professionalism.** The “professionalism” grade reflects your conduct as a course participant, including timeliness (attendance, tardiness, completion of assignments), involvement (participation in discussions and exercises vs. disruptive or inconsiderate behavior), overall effort, and any unexcused absences (see attendance policies).
- **Extra Credit.** There will be no extra credit projects available. Your grade is based on the expectation that you have done the work required of you throughout the semester.
- **Success!** Your academic achievement naturally depends on your level of involvement in this course – you will do well if you complete readings and assignments, attend lectures, participate in activities and discussions, and ask questions. *I do not assign your grade – you earn it!*

🌐 **Attendance & Make-Up Policies.** This course meets twice a week. Your presence is required. There are no allowances for skipping class. For each unexcused absence (see below), you will lose 10% of your professionalism grade; this is equivalent to losing one point from your overall course grade. More than four unexcused absences results in *automatic failure* of the course.

- **Excused Absences.** An absence is excused when your reason for absence is *unavoidable* (serious illness or emergency) and when you contact me regarding your absence *prior* to the next scheduled course meeting. I may require written verification of your reason for absence. Late work and make-up work must be completed within one week of your absence, unless other arrangements are *previously* agreed upon. There are no penalties for excused absences, unless missed work is not completed on time.
- **Unexcused Absences.** An absence is unexcused when your reason for absence is deemed unacceptable, or when you fail to contact me regarding your absence *prior* to the next scheduled course meeting. There are no lab/quiz/other make-ups for unexcused absences. All late assignments will automatically lose 10% of the total grade each day that they are late. Note that work submitted by email or via a classmate on the day of your unexcused absence will be considered one day late. No assignment will be accepted more than one week past the date due.

🌐 **Resources.**

- **Availability & Communication.** Do not hesitate to ask for help! I am always happy to assist you, but it is your responsibility to seek help when you need it. I guarantee my availability during office hours, but *please feel free to drop by at any time*. When I am on campus and not in class, you will find me either in my office or in the geology lab. A hanging pocket outside my office door is for correspondence, graded assignments, and extra handouts.
- Professor Anna Tary is the geology laboratory coordinator. I may refer you to Anna when I am not available. She can assist you with your questions or with making up labs (*activity periods only*), but you must make an appointment with her first! You'll find Anna in Jennison 117; you can reach her at x2236 or at atary@bentley.edu. Her hours are generally 10:00-5:00, Monday through Friday. Anna does us a great service by making herself available to you when I cannot be on campus. Treat her with consideration and respect.
- **Blackboard.** Most course documents will be made available on the course Blackboard site (NASC130.001.SP08.Stevens.Principles of Geology). Also be aware that I will communicate with the class via email and/or Blackboard announcements as necessary. Please log in as soon as possible and have a look around. Let me know if you encounter any bugs, or if there is anything else you'd like to see posted.
- **PowerPoint Presentations.** PowerPoint lecture presentations will be helpful for taking notes or studying, but please be aware that not all lecture material presented is contained in these documents. There is no substitute for taking good notes!
- **Bulletin Board.** "The Spin" is the Geosciences Bulletin Board located outside of the Geology Lab (JEN118). Take some time to catch up on the news, win contests (and perhaps the occasional bonus point), and even prepare for the occasional extra credit quiz question!
- **Course Schedule.** This syllabus contains a detailed course schedule. You are responsible for keeping up with the schedule and completing assignments on time. Readings and assignments are noted on the day by which they should be completed. I reserve the right to make changes in this schedule as necessary, and will notify you accordingly.

- 🌐 *Course Designations & Requirements.* Please note that course designations in the Natural & Applied Sciences Department have recently changed; for example, this course was previously known as GEO230. Course requirements, however, remain unchanged. You are required to complete a 4-credit lab science course (formerly 200-level AST, BIO, CHM, GEO, PHY), now the **100-level NASC** – or Natural & Appled Sciences Core – courses. You are also required to complete a 300-level math/science elective. This elective, previously satisfied by 300-level NS courses, is now satisfied by **300-level NASE** – or Natural & Appled Sciences Elective – courses.
- 🌐 *Earth, Environment, & Global Sustainability (EEGS).* This course (NAS130) is one of the courses in the EEGS Liberal Studies Major (LSM). If you are interested in green business, green building, global climate change, or other issues of environmental concern, consider the EEGS LSM! Additionally, the NAS Department offers relevant minors in EEGS or in the more general Natural & Applied Sciences. Please feel free to speak with me about your interests – I will point you in the right direction! Note: Current sophomores must declare the LSM by April 11, 2008.

🌐 *A Message from your Geology Professor.*

I was lucky to discover early that I have two loves: 1) Geology, and 2) Teaching Geology. Teaching Geology is, in essence, my only job here at Bentley, and you can expect me to devote myself to it.

You, a Bentley student, came to this campus to study a business-related field, but also, I hope, because Bentley prides itself on, “uniting the rigor, relevance, creativity, and intellectual dynamics of business and the liberal arts.”¹ I hope you are excited by this opportunity for a brief departure from the business world!

This is a fast-paced, four-credit, lab science course. I will work to engage you with new concepts. I will offer my assistance and encouragement. I will demand your focus, effort, and integrity, and I will give you the same in return. I will do my best to provide you with the best geological education and experience that I can.

What do I expect from you? I recognize that science may not be “your thing.” You might even have signed up for geology thinking it is “rocks for jocks,” and easier than other sciences. It’s not! Regardless, while you are in my course, you are a geologist-in-training. You are *capable, intelligent* college students, and I have high expectations for you: hard work, intellectual curiosity, humor, respect.

By April you will have sufficient knowledge to engage in intelligent conversation about current events (floods, mine collapses, volcanic eruptions, climate change, etc.), and the ability to see outdoor landscapes with new and powerful perspective.

So, please... Give me your time, patience, and attention. Ask questions! Seek help! Enjoy yourself! The reality is that you will get out of this course what you put into it. Let’s have a great semester together!

¹ Bentley Mission Statement, Retrieved August 21, 2007 from <http://www.bentley.edu/about/statement.cfm>

- 🌐 *Student Learning Objectives.* The student will demonstrate proficiency in these categories at the end of the semester:

Knowledge:

- Describe the origin of Earth and relate formation processes to Earth's current structure.
- Define and understand the chemistry of basic mineral structures; relate the arrangement of the SiO tetrahedron to the physical properties of silicate minerals.
- Label a plate tectonic cross-section with reference to Earth's layers, mantle processes, tectonic forces, igneous processes and volcanic landforms, metamorphic processes, and deformation; describe evidence for plate tectonic theory; comprehend the unifying aspects of plate tectonic theory.
- Know the mantle processes related to the production of magma; relate magma production processes to the tectonic setting of igneous rocks, volcanic processes, and volcanic landforms.
- Relate sediment characteristics to the processes of the sedimentary cycle and to sedimentary environment.
- Describe the evolution of stream characteristics along a longitudinal profile and through time.
- Label a hydro-geologic cross-section and classify water sources according to FDA standards for bottled water; assess bottled water labels for geologic meaning.
- Know the principles used to determine relative geologic age; use these principles to interpret geologic cross sections.
- Know and comprehend the variables of the radiometric age equation and their significance in the determination of absolute geologic age.
- Apply principles of relative and absolute geologic time to comprehension of the depth of geologic time.
- Apply understanding of geologic materials and processes to the interpretation of regional geologic history and the geology of the Bentley campus.
- Relate tectonic forces to deformation processes and strain (faults and folds); categorize faults and folds by geometry and geologic significance; relate deformation to orogenic characteristics.
- Describe the earthquake cycle; compare and contrast earthquake magnitude and intensity; describe seismic waves; analyze seismic waves for information on epicenter; describe the use of seismic waves in the study of Earth's interior.

Skills:

- Master and apply the skills required to accurately observe and identify geologic materials (rocks and minerals).
- Interpretation of geologic and topographic map data; relate topography to geologic characteristics and landforms.
- Development of skills applicable to laboratory exercises: critical thinking, quantitative analysis, effective collaboration, and problem-solving capabilities.
- Application of geologic knowledge and use of appropriate equipment in the development and completion of original investigative research.

Perspective:

- Appreciation for the beauty and intricacies of geologic materials, processes, and landforms.
- Appreciation of the interconnectedness of natural processes and human activities.



NASC 130-001 – Principles of Geology – Course Schedule



DATE	TOPIC	READING ASSIGNMENT
Tu Jan. 22	Course Introduction; Earth's Origin	Course Packet; T: Chapter 1
F Jan. 25	Earth's Layers & Materials Lab 1: Scientific Observation & Mineral Properties	T: Chapter 3 (p. 88-93); Bb: Lab 1
Tu Jan. 29	Rock-Forming Minerals	T: Chapter 3 (p. 78-88, 93-103)
F Feb. 1	Rock-Forming Minerals, <i>cont.</i> Lab 2: Mineral Identification	Bb: Lab 2
Tu Feb. 5	Plate Tectonics: Mechanisms	T: Chapter 2
F Feb. 8	Plate Tectonics: Evidence Lab 3: Plate Tectonics	T: Chapter 2; Bb: Lab 3
Tu Feb. 12	Melting & Igneous Rocks	T: Chapter 4 (p. 110-112, 124-133)
F Feb. 15	Lab Quiz 1: Mineral ID Lab 4: Igneous Rock Identification	T: Chapter 4 (p. 112-124); Bb: Lab 4
Tu Feb. 19	~~~ Monday Schedule – No Class! ~~~	
F Feb. 22	Lab 5: Topographic Maps	Bb: Lab 5
Tu Feb. 26	Magma & Volcanoes	T: Chapter 5 (p. 138-158, 168-175)
F Feb. 29	Sedimentation Lab 6: Sediments	T: Chapter 6 (p. 184-196); T: Chapter 7 (p. 212-214, 228-238); Bb: Lab 6
Tu Mar. 4	Midterm Exam; TBA	
F Mar. 7	Lab Quiz 2: Igneous Rock ID Lab 7: Sedimentary Rock Identification	T: Chapter 7 (p. 214-228); Bb: Lab 7
Tu Mar. 11	~~~ Spring Break – No Class! ~~~	
F Mar. 14	~~~ Spring Break – No Class! ~~~	
Tu Mar. 18	Streams	T: Chapter 16 (p. 468-488)
F Mar. 21	Hydrogeology Lab 8: Water Resources	T: Chapter 17; Bb: Lab 8
Tu Mar. 25	Metamorphism	T: Chapter 8
F Mar. 28	Lab Quiz 3: Sedimentary Rock ID Lab 9: Metamorphic Rock Identification	Bb: Lab 9
Tu Apr. 1	Geologic Time	T: Chapter 9
F Apr. 4	Lab Quiz 4: Metamorphic Rock ID Lab 10: Geologic Time	Bb: Lab 10
Tu Apr. 8	Campus Geology	T: Chapter 13 (p. 399-410); T: Chapter 14 (p. 428-431)
F Apr. 11	Introduction to Field Methods Lab 11: Bentley Geology	Bb: Lab 11
Tu Apr. 15	Deformation: Faults & Folds	T: Chapter 10
F Apr. 18	Deformation: Faults & Folds, <i>cont.</i> Lab 12: Interpreting Geologic Maps	Bb: Lab 12
Tu Apr. 22	Orogenesis: Making Mountains	T: Chapter 14
F Apr. 25	Earthquakes & Seismicity Lab 13: Earthquakes	T: Chapter 11 (p. 328-343); Bb: Lab 13
Tu Apr. 29	Seismicity & Earth's Interior; Course Conclusion	T: Chapter 12
TBA	Review Sessions for Final Exam	
Final Exam	Wednesday, May 7, 1:00-3:00 p.m. You must attend this exam period as designated.	

- Readings and assignments are to be completed by the beginning of class on the day noted. Quizzes will take place at the beginning of class on the day noted.
- Reading Assignments: T: Reading in textbook. Bb: Reading from Blackboard Lab Manual (see Blackboard).