

Medical Geology is the science surrounding the relationships among geological factors and health in humans, animals, and plants. This class focuses on the relationships between geology and human health. Specific topics include: (a) understanding the pathways and exposure (food, water, air), (b) an introduction to the techniques and tools used in medical geology, and (c) specific examples of health effects caused by exposures to Earth materials.

**Prereqs:** GEOL 220 *or* GEOL 301; and CHEM 121

**Instructor:** Dr. Brenda J. Buck,  
Office phone: 702-895-1694; email: [buckb@unlv.nevada.edu](mailto:buckb@unlv.nevada.edu)  
**Office:** 4131 SEB  
**Class Lecture:** M/W 11:30-12:45 pm, GRA 129  
**Office Hours:** M/W 12:45-1:45 pm or by appointment (recommended).

**Required Text:**

Assigned readings, from library or other sources

**Other Required Class Items – bring these to class EVERY time:**

1. Paper for notes and sometimes quizzes
2. Blue or Black pen
3. Red pen

**Learning Outcomes:** Upon completion of this course, successful students will be able to demonstrate a comprehensive understanding of several important relationships between our natural environment and human health.

**About the Instructor:**

I am an elected Fellow in the Geological Society of America and the Soil Science Society of America, and have won the highest award in soil mineralogy/chemistry from the Soil Science Society of America. I have a B.S. degree in Geology from the University of Notre Dame, a M.S. degree in Geology from New Mexico State University, and a Ph.D. in Soils from New Mexico State University. My research specialty is in Medical Geology: Understanding how Earth materials affect human health, I focus on the effects of exposure to mineral dust. I am also an expert in arid soils, and have performed research on topics surrounding paleoclimate, landscape evolution, flood hazards, Earth analogues to Mars, arsenic, asbestos, depleted uranium, and other topics. If you want to learn more:

<http://geoscience.unlv.edu/brendajbuck.htm>

**Academic Dishonesty:**

ACADEMIC HONESTY, PLAGIARISM AND ETHICS POLICY: It is my belief that academic honesty is the cornerstone of the educational community. There will be severe consequences for academic dishonesty or plagiarism. Please refer to the college catalog: Administrative Policy VIII.E, and <http://studentconduct.unlv.edu/misconduct/policy.html>. As a member of this class each student agrees to the following statements of student behavior:

- **I agree that, unless approved by the instructor, I will not share answers to homework assignments, quizzes, exams, or any other course material with fellow classmates.**
- **I agree that I, and only I, will be the one completing and submitting class materials (homework, quizzes, exams, written projects, etc.) in my name.**
- **I agree that I will not directly copy or plagiarize material from books, publications, the internet, other students' work, or any other source. I am familiar with, and I agree not to violate, copyright laws. If small amounts of material from other sources are used as part of**

**any class assignment, I agree to clearly indicate such and properly cite the source according to APA standards.**

- **I agree that I will not buy papers or course work and submit them as my own.**
- **I acknowledge that failure to comply with any of the above statements may result in failure of an assignment, removal from the course, failure of the course, and discipline action deemed appropriate by the instructor and or policies and procedures set forth by college.**

A student may be dropped from this course for any behavior that is disrupting the learning environment of the other students. Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated. No form of academic dishonesty is acceptable. Academic dishonesty includes any act that violates the academic process of the university.

***These acts include (but are not limited to) cheating on an examination, stealing or sharing examination & quiz questions among fellow students, substituting one person for another at an examination, violating the procedures of an examination, falsifying data, destroying or tampering with or stealing a computer program or file, and plagiarizing (using as one's own the ideas or writing of another). Students who cheat will be expelled from the course, receive a grade of "F", and may receive additional disciplinary action as outlined in the University and community college System of Nevada document, Rules and Disciplinary Procedures for Members of the University Community.***

Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution.

An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the *Student Academic Misconduct Policy* (approved December 9, 2005) located at: <http://studentconduct.unlv.edu/misconduct/policy.html>.

**Disability Resource Center (DRC)** – The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

**UNLV Writing Center** – One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>

**Transparency in Learning and Teaching**—The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further

information:<https://www.unlv.edu/provost/teachingandlearning> <https://www.unlv.edu/provost/transparency>

**Copyright** – The University requires all members of the University Community to familiarize themselves **with** and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

**Religious Holidays Policy**—Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor **within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses**, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

**Incomplete Grades** - The grade of I – Incomplete – can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

**Tutoring and Coaching**—The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call [702-895-3177](tel:702-895-3177). The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.

**UNLV Writing Center** – One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>

**Rebelmail** – By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always [@unlv.nevada.edu](mailto:@unlv.nevada.edu). **Emailing within WebCampus is acceptable.**

**Final Examinations** – The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.

**Student Responsibilities:** Students are responsible for: all text, and web-based materials, participation in web-based discussions and other assignments; completion of all assignments on schedule and in proper format; attainment of a satisfactory level of achievement for the course.

**WebCampus Email:** Use of webcampus email is strictly limited to course-only issues. Using class email for other purposes will result in expulsion from the course.

**Religious Holidays Policy** – Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor no later than the end of the first two weeks of classes, **January 31, 2018**, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

**Student Responsibilities:** Students are responsible for: text material, participation in class discussions, completion of all projects on schedule and in proper format; attainment of a satisfactory level of achievement for the course.

**Makeups & Extra Credit:** None allowed without prior authorization.

**Assessment:** Assessment of these course objectives will be based on exams, quizzes, homework, as described below.

Expectations for Graduate students are higher than for undergraduates. Graduate students are expected to take a leadership role in the class, especially in class discussions. Graduate students have a different type of Paper Critique to complete for most papers (see syllabus and ask to be sure which method is assigned for which papers). Graduate students as a team will also develop and plan one class discussion/homework/grading. In addition, the exams for graduate students are different and will be graded differently than those for undergraduates.

Participation: In-Class discussion, Assignments	10%
Quizzes/Paper Critiques/Paper Reviews	40%
Research Project/Geosymposium	20%
Mid-term Exam	10%
Final Exam	20%

#### **The Final Exam is comprehensive.**

**A = 100-94%; A- = 93-90%; B+ = 89-87%; B = 86-84; B- = 83-80%; C+ = 79-77%;  
C = 76-74%; C- = 73-70%; D+ = 69-67%; D = 66-64%; D- = 63-60%; F = 59-0%**

What do the grades mean?

“A” = exceptional performance and demonstration of expertise. Strong evidence of original thinking, ability to analyze and synthesize, superior grasp of subject matter.

“B” = above average but not exceptional, demonstrating proficiency but not expertise. Some evidence of ability to critically analyze, good grasp of subject matter.

“C” = average, just meets expectations; student has attained basic competency in the course material. Understands subject matter.

“D” = does not meet expectations. Some evidence of familiarity with the subject matter and some evidence that critical and analytic skills have been developed.

“F” = the student has not demonstrated a basic level of competency in the course material. Little evidence of even superficial understanding of subject matter, weakness in critical and analytical skills, limited use or ability to use terminology.

To earn an “A” in this class, you should demonstrate *exceptional knowledge* of the course material. An “A” typically requires that you should: (1) Thoroughly read and demonstrate understanding of all of the assigned readings, (2) attend class every day and arrive on time, (3) know all of the terminology and be able to discuss all of the concepts we discuss in lecture, and (4) perform well on exams. Most importantly, students who are naturally curious and ask questions are more likely to perform well. To earn an “A” in this course, graduate students will be expected to demonstrate expertise at and above the level of the textbook, and show a proficient understanding of the selected readings from the primary literature. Undergraduates will be expected to demonstrate proficiency at the level of the textbook and lectures, and a working knowledge of the literature discussed in class.

**Quizzes.** Each student must bring paper for daily quizzes. Each class day where a reading has been assigned, but before it is discussed in class, the class will start with a quiz over that material. Approximately 5-7 minutes will be allotted at the start of each class period to answer several short, written questions. No make-up quizzes will be allowed, but the 2 lowest grades will be discarded prior to averaging the quizzes at the end of the semester.

### **Graduate Students: Paper Critique Assignments**

Read assigned papers and answer the following questions before class. Bring your written answers to class and turn in.

Answering the following questions is a good method to learn how to critically examine the papers and learn from them.

- A. Where did the study take place?
- B. Why was this study conducted? (what hypothesis was tested?)
- C. What exactly was measured? (what methods were used in the analyses?)  
Are the methods of data collection sound? Could/did they affect the results?
- D. What were the results of their measurements? (note this question is not asking how they interpreted their data, but just what are the data – summarize the main results)
- E. How did the authors interpret the data?  
Do you disagree with any of their interpretations? If so, why?  
Are there weaknesses to their interpretations?  
Could the results be interpreted differently?
- F. What were the conclusions?
- G. What, if any, assumptions were made? Are they valid? Could/did that affect the conclusions?
- H. What is the significance of the results of this study? Why is it important?

### **Undergraduates: Paper Review Assignments**

1. **Vocabulary** – list and define all pertinent vocabulary words in the required reading.
2. **Figures & Tables** – in your own words, describe what each of the figures and tables in the text are explaining/showing.
3. **Exam questions** – write what you think would be the 3 best exam questions over this reading. Answer those questions.

## Research Project and Geosymposium Presentation

Choose 1 topic on medical geology and receive approval from the instructor for that topic. Written outline of **Topic DUE FEB 5; must include both written outline plus meeting with instructor to discuss your plan**. Project can be accomplished either individually or in groups. Groups require prior approval from instructor and group work requires significantly larger project.

Research the topic, identify why it is important to people, determine what the the most up-to-date knowledge is on that subject. Information might include what geologic processes are involved in producing the Earth material that is beneficial or harmful to human health, where this material occurs, what chemistry or mineralogy characteristics are important in its affect on health, what populations are affected, what are the routes of human exposure, what levels are harmful (if applicable), and what scientific tools are utilized in the study of this topic. Prepare a poster to present at the Geosymposium on this topic. More information provided in class.

**Graduate Students ONLY** – *As a group*, find one or more good films, review papers, or other class activities suitable for this class that are not otherwise already scheduled, devise homework questions and grading, and perform discussion facilitation for class. Meet with me prior to doing this to obtain approval on the topic.

### Semester Schedule

Wed Jan 17	Syllabus; Watch in class: Silent Spring video (56 min). Do HW questions Before next class, read EPA top toxic threats
Mon Jan 22	Discuss Silent Spring video/ <b>HW questions due</b> . Discuss EPA top toxic threats
Wed Jan 24	Homo Toxicus Film (watch at home before class – 88 min). <b>HW Due/Discuss</b>
Mon Jan 29	<b>Quiz</b> . Discuss Bundschuh et al 2017. <b>Paper Review DUE (Grads too)</b>
Wed Jan 31	<b>Quiz</b> . Discuss Plumlee et al. 2006, <b>pages 1-19</b> (stop at heading of “Physical and chemical characteristics of the earth material”) Complete a Paper Review for just these pages alone; Quiz also will be over only this section. <b>Paper Review DUE (Grads too)</b>
Mon Feb 5	<b>Quiz</b> . Discuss Plumlee et al. 2006, <b>pages 19-26</b> (stop at heading of “Immune system mechanisms”). Complete a Paper Review for just these pages alone; Quiz also will be over only this section. <b>Paper Review DUE (Grads too) TOPICS DUE FOR RESEARCH PROJECT</b>
Wed Feb 7	<b>Quiz</b> . Discuss Plumlee et al. 2006. <b>P. 26-36</b> . Stop at heading of “asbestos”. Complete a Paper Review for just these pages alone. Quiz also will be over only this section. <b>Paper Review DUE (Grads too)</b>
Mon Feb 12	<b>Quiz</b> . Discuss Plumlee et al., 2006 <b>p. 36-end of paper</b> (Asbestos and heavy metal uptake sections). Complete a Paper Review for just these pages alone. Quiz also will be over only this section. <b>Paper Review DUE (Grads too)</b>
Wed Feb 14	In class: Asbestos Film 1 & 2. Discuss.
Mon Feb. 19	No class Presidents Day
Wed Feb 21	<b>Quiz</b> . Discuss Harper, 2008. <b>Paper Review/Critique DUE</b>
Mon Feb 26	<b>Quiz</b> . Discuss Buck et al., 2013. <b>Paper Review/Critique DUE Abstracts DUE FOR Geosymposium</b>
Wed Feb 28	Watch George Knapp Videos at home. Answer <b>HW questions – Turn in/discuss</b> .
Mon March 5	<b>Quiz</b> . Discuss Pfau, 2017. <b>Paper Review/Critique DUE</b>
Wed March 7	<b>Quiz</b> . Discuss Wolfe et al., 2017. <b>Paper Review/Critique DUE</b>
Mon March 12	<b>Quiz</b> . Discuss Morman and Plumlee 2014. <b>Paper Review/Critique DUE</b>
Wed March 14	Arsenic Video/HW/WHO arsenic summary
Mon March 19	TBD
Wed March 21	<b>Midterm Exam</b>

\*\*\*\*\*March 26 & 28 Spring Break\*\*\*\*\*

Mon April 2	Review Geosymposium Presentations** If possible
Wed April 4	Review Geosymposium Presentations** If possible
Mon April 9	Tar Creek Film & HW
Wed April 11	Idaho Heavy Metals Film & HW
Mon April 16	TBD
Wed April 18	TBD
Friday April 20	Geosymposium Presentations
Mon April 23	Flint Michigan/Lead readings
Wed April 25	Lead
Mon April 30	<b>Graduate Student's Class Project</b>
Wed May 2	Review/Discuss Final exam

Final Exam: Wed May 9 10:10 AM