PSC 104
EARTH SCIENCE
Spring 2020

Class Time and Location: Lecture: MW 9:30 – 10:45 AM, **Lab**: **M** 2:00 – 4:00 PM
Instructor: Gaumani Gyanwali – Ph. D.: OSU-Stillwater; MS, BS: Tribhuvan University
Office Location: S 244
Office Hours: Posted on office door
Contact Information: Office: (479)-394-7622, Ext. 1339
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Prerequisite: A grade of "C" or better in Elementary Algebra.

Resources:

Textbook: The Good Earth: Introduction to Earth Science by David McConnell and David Steer, third edition: McGraw Hill, 2015 ISBN 978-0-07-352410-8.

Required Materials:

1. Lab Safety Goggles **2.** Earth Science Lab Manual: Gaumani Gyanwali 2017 (Revised: December 2018)

Course Description: This introductory course will explore on various aspects of Earth structure and properties mainly, focusing on the scientific explanation and understanding. The course will be covered in a way to help students in concept building and problem solving, but emphasis will be given to real-life experience and application of scientific process and progress. Topics covered will include plate tectonics, earthquake, volcanoes, rocks and minerals, weathering, oceans and coastlines, atmosphere, and weather and climate.

Program Outcomes: The purpose of the Associates of Arts Program is to provide the student with the knowledge and critical thinking skills that will enable them to analyze problems, arrive at intelligent conclusions, and make reasoned choices in his or her professional and personal life.

- Students will demonstrate an understanding of geological principles.
- Students will apply technological and research skills to identify, locate, and process information.

Rationale: Structure and properties of the Earth, as well as natural processes and events have always been very influential in determining the society's community and the economic, environmental, and social development. Understanding the basic science behind these processes not only helps remove misconceptions but also to take right decisions in right time. Creating interest in these processes and properties will help build better and safer communities to some extent.

Course Objectives: Upon successful completion of PSC 104, the student should be able to do the following:

1. Recognize the influence of the concepts of Earth Science on their daily lives and preparedness from natural disasters. (Components: apply, analyze, validate, appraise)

2. Explain the philosophy of science: scientific conclusions are based on experimental evidence.
3. Perform a scientific calculation and experimental procedures, and draw proper conclusions. (Components: collaboration, data collection, calculation and formulation, proper grammar and format, documentation, logical argument, research skills)
4. Demonstrate a basic understanding of scientific techniques, structure of the Earth, earthquake and volcanoes, rocks, weathering and soil formation, ocean currents, atmosphere, weather-related hazards, and climate system based on established scientific theories. (Components: differentiate, apply, validate, comprehend, classify, illustrate, and hypothesize)
5. Collect data of earth and weather related information and present it in proper format. (Components: data collection, proper communication, proper grammar, research skills, reliable resources, collaboration, presentation skills)
5. Apply the knowledge gained in above mentioned subject areas in relation to overall safety of the society and protection of the environment. (Components: apply, analyze, validate, appraise)

Topical/Unit Outline:

I. Introduction to Earth Science
- A. Earth Science and Earth System
- B. The Scope of Earth Science
- C. Doing Science
- D. Science and Society

II. Plate Tectonics
- A. Continental Drift
- B. Evidence from the Seafloor
- C. Plate Tectonics
- D. Plate Boundaries

III. Earthquake
- A. Evidence of Earthquakes
- B. Faults, Earthquake, and Plate Tectonics
- C. Seismic waves and Earthquake Detection
- D. Measurement of Earthquake
- E. Earthquake Hazards

IV. Volcanoes and Mountains
- A. Magma: Sources and Composition.
- B. The Mount St. Helens Eruption
- C. Products of Volcanic Eruption
- D. Volcanoes and Volcanic Landforms
- E. Mountains

V. Rocks and Minerals
- A. Elements and Atoms: Basic Building Blocks
- B. Minerals
- C. Igneous Rocks

D. Sedimentary Rocks
E. Metamorphic Rocks
F. The Rock Cycle

VI. Weathering and Soils
A. Physical Weathering
B. Chemical Weathering
C. Biological Weathering and Decay
D. Weathering Rates
E. Soil Erosion and Conservation

VII. Oceans and Coastlines
A. Our Changing Oceans
B. Ocean Basins
C. Ocean Waters
D. Oceanic Circulation
E. Tides
F. Wave Action and Coastal Processes

VIII. The Atmosphere
A. Structure and Process of Atmosphere
B. Solar Radiation and the Atmosphere
C. The Role of Water in the Atmosphere
D. Air Pressure, Condensation, and Precipitation
E. Clouds and Frontal System
F. Winds

IX. Weather Systems
A. Science of Weather
B. Air Masses
C. Midlatitude Cyclones and Frontal Systems
D. Severe Weather: Thunderstorms and Tornadoes
E. Hurricanes
F. Earth's Climate System

Tentative Schedule of Lecture

Week	Chapter or Topics	Date
1	Syllabus and Introduction to Earth Science Introduction to Earth Science	1/13 M 1/15 W
2	Plate Tectonics	1/20 M, 1/22 W
3	Plate Tectonics/Earthquake	1/27 M, 1/29 W
4	Earthquake Review	2/3 M 2/5 W
5	**Test 1** Volcanoes and Mountain	**2/10 M** 2/12 W
6	*Winter break – no class* Volcanoes and Mountain	*2/17 M* 2/19 W

7	Rocks and Minerals	2/24 M, 2/26 W
8	Rocks and Minerals Review	3/2 M 3/4 W
9	**Test 2** Weathering and Soils	**3/9 M** 3/11 W
10	Weathering and Soils Oceans and Coastlines	3/16 M 3/18 W
11	*Spring Break - no classes*	*3/23 – 3/27*
12	Oceans and Coastlines Review	3/30 M 4/1 W
13	**Test 3** The Atmosphere	**4/6 M** 4/8 W
14	The Atmosphere Weather System and Earth's Climate	4/13 M 4/15 W
15	Weather System and Earth's Climate Review	4/20 M 4/22 W
16	**Test 4** Presentations - (50% Final Exam)	**4/27 M** 4/29 W
17	**Final Exam – (50%)**	**5/6 W**

Tentative Schedule for Lab: Earth Science

Date	**Experiments**	**Expt. #/ Page # Lab Manual**
1/13	Syllabus/Safety	Sign the safety agreement
1/20	Insolation Pattern - first data collection Isostasy Experiment Practice	Expt. 11 Page 95 Expt. 4 Page 33
1/27	1. Density of Rocks and Water	Expt. 1 Page 5
2/3	2. Salinity and Density	Expt. 2 Page 15
2/10	3. Latent Heat and Differential Heating…	Expt. 3 Page 25
2/17	*Winter Break – no lab*	
2/24	4. Magma Viscosity and Isostasy…	Expt. 4 Page 33
3/2	5. Minerals and Rocks Part I	Expt. 5 Page 43
3/9	6. Minerals and Rocks Part II	Expt. 6 Page 53
3/16	7. Mineral Crystallization	Expt. 7 Page 61
3/23	*Spring Break - no lab*	
3/30	8. Albedo Effect	Expt. 8 Page 69
4/6	9. Psychrometer Experiment	Expt. 9 Page 75
4/13	10. Coriolis Effect	Expt. 10 Page 85
4/20	11. Insolation Pattern	Expt. 11 Page 95
4/27	Make-up	One missed lab

Course Conduct: The class will be taught using a combination of lecture using *Powerpoint* presentation, solving in-class questions, demonstrations, group interaction and discussions, and performing laboratory experiments. Students are strongly encouraged to discuss concepts and examples as opportunities are presented during instructor presentation. It is the student's responsibility to inform the instructor when a concept is confusing or otherwise

unclear. Students must answer all the in-class questions before leaving the classroom and discuss with the instructor about any confusing concept right away.

You are encouraged to solve problems forming a study group and actively taking part in discussion. You may seek assistance from Student Support Services (SSS) or Learning Enrichment Advising Center (LEAC) to check the concepts in homework assignments, quizzes, and exam reviews but it is not the responsibility of SSS or LEAC to teach the entire lesson to complete your homework, neither can you directly ask for the answer. In case of extreme difficulty, you must inform me no later than two weeks after the classes started. You cannot pass the course without completing the homework. Expect a minimum of 12 hours of work per week in this class

UARM Credit Hour Calculator: For every course credit hour, you should expect to spend at least three clock hours per week of concentrated attention on course-related work, including but not limited to time attending class, as well as out-of-class time spent completing homework, seeking help from instructor or tutors, preparing for upcoming quizzes/tests/exam, reviewing material, problem solving, and organizing your notebook. For a four hour course, a typical student should expect to spend at least twelve hours per week dedicated to this course. This includes the time spent in class. Please see credit hour calculator attached to end of syllabus.

Course Requirements / Evaluation (Grading):

I. Tests: Four tests will be given each covering approximately the same quantity of material.

II. Final Exam: A final exam will consist of two parts: i) Presentation (50%) - this will be group presentation (two students in a group) and each individual in the group will be evaluated separately even though they work together to make that presentation. Guidance will be provided earlier to collect data and about the content of presentation. Each member of the group must present their part in the class and should actively take part in the question-answer session after the presentation. Rest of the class and the instructor can ask questions related to the presentation. ii) Comprehensive final (50%) – this will be given during the finals week and worth 50 points, a straightforward 50-question standard Scantron test.

III. Lab Report: Each student may complete as many as 11 laboratory activities. Each activity will require a laboratory report. One lowest lab will be dropped and total of ten completed experiments/lab activities will carry 200 points.

IV. Assignments and Quizzes: 9 assignments and 9 quizzes will be given during the whole semester and need to complete within the due dates.

V. In-class work sheets: In-class work sheets will be provided for each chapter, total of 9 work sheets. You should complete these sheets during the lecture time and have the right information recorded for future use. You should read the textbook and make any corrections in the work sheets. At the end of semester, these will be collected and will be graded for completion, accuracy of answers, and good maintenance. 20 points are possible from these work sheets.

Four tests @100 each = 300 (lowest one dropped when taken all four)
One Final Exam @ 100 = 100 (Written report = 50, Presentation = 50)
11 Lab reports @ 20 each = 200 (lowest one dropped after submitting all eleven)
9 Quizzes @ 10 each = 90

9 Assignments @ 10 each = 90
9 In-class work sheets = 20
Total points possible = 800

The final grade for the course will be determined by dividing the student's total number of points earned by the number of possible points. Grades are assigned on the basis of the following percentage scale, after rounding the calculated percentage to the nearest whole number:

90 -100 **A**
80 - 89 **B**
70 - 79 **C**
60 - 69 **D**
< 60 **F**

Class Procedures/Student Requirements:

On-Campus Resources: Your student portal will be populated with the lecture slides for each upcoming chapter. If you wish to bring the printed lecture slides to class and write notes on them, you will need to print the lecture slides of the chapter. I will not bring the printed copies to class just because it is too much waste of paper. Computer labs with printers are available in several places on campus including the Johnson Learning Commons. UA Rich Mountain offers students assistance with quality tutors available in the Student Support Services and Learning Enrichment and Advising Center (LEAC) in the Johnson Learning Commons.

Attendance Policy: Regular attendance and punctuality are expected. It is the responsibility of the student to initiate arrangements for all missed activities. If an absence is a planned absence the student is expected to make arrangements for making up work prior to the absence. More than three absences will be considered excessive and, along with work not made up, may adversely affect the grade for the course. Under no circumstances will the student receive credit for the course if more than a fourth of the classes are missed (13 classes). In case of extended illness, or other circumstances, the student must contact the instructor if a WP is desired. If the instructor is not notified a failing grade will be assigned for the course. Laboratory work is scheduled for a specific time and day. However, if it can be done safely (guidelines provided in class), students may do the missed laboratory works at another time if course schedule conflicts dictate. Each student is expected to participate in the required laboratory time in order to receive credit for the laboratory activity. There will be no designation of excused or unexcused absences in the lab. If a student is not in lab they will be counted as absent no matter what the reason may be. Also, if the student is present in lab but fails to submit the lab report, it is counted as absent and no point will be awarded for that lab.

Assignment Due Dates: Students are expected to submit the assignments and other works on or before the assigned due dates. You will be penalized for the late works depending on the number of days and full point and importance of the works assigned. Lab reports will be due the next week of the lab period.

Make-up Work Policy**:** Make up work should be competed promptly after the absence. A maximum of one week will be the guideline. Make-up exams are given only in instances of the most unavoidable, serious circumstances. Prior notice of absence from an exam is expected. Upon return after an absence the student is expected to be prepared for the days' class activities. It will be the student's responsibility to obtain the assignment for that day. Missed labs must be made up during assigned make-up days. If not made up, no grades will be assigned for that lab. There are two make-up days available during the semester. See the lab schedule for available make-up days.

Cell Phone Policy**:** Turn off your cell phone prior to class. If you work for an emergency service such as a fire department, put it on vibrate. It is a sign of disrespect as well as a disruption if non-emergency calls are taken during class. If you chose to take a call anyway, leave the room and take your supplies with you. You are expected not to return that session.

Extra Credit Opportunity: Optimum student involvement in the course as well as course-related activities is highly recommended and rewarded with extra credit. The value of extra credit points varies with the nature of the activity and the application of that activity in the real life as well as relation of the activity with the course. Points that can be received are unlimited. Simple idea is: the more you are involved in real life science experiences, the more you understand and enjoy it, and you get good grades!!! Some examples of activities (but not limited to) that earn extra credit points include:

a) Being an active member of the Science Club coordinated by the instructor
b) Organize activities within the Science Club or participate actively in the activities organized by the Club
c) Taking leadership in group study sessions and manage study sessions with peers
d) Organize or be involved in science and technology awareness activities and helping society to improve utilizing science knowledge
e) Actively participating in science-related meetings and conferences on/off campus
f) Any other science related activities and duties beyond the demand of the course deemed worthy of extra credit by the instructor.

Academic Dishonesty: It is expected that each student shall do his/her own work on class works, quizzes, exams, and lab reports. Cheating, copying other's answers, writing other's statement without citing their reference are all considered plagiarism and are penalized from allowing no point in that particular unit up to dismissal from the whole course, depending on the severity of the offense.

Disability Policy: It is the policy of UA Rich Mountain to accommodate students with disabilities, pursuant to state and federal law. Any student with a disability who needs accommodations should contact the Vice-Chancellor for Student Affairs Office, 394-7622, ext. 1400.

Arkansas Clean Air Act: In compliance with the Arkansas Clean Air Act, UA Rich Mountain is a smoke and tobacco free facility. Students and guests are to refrain from the use of all tobacco products while on campus.

Student Misconduct: Students committing misconduct are subject to disciplinary sanction(s) and/or restrictions. Misconduct or prohibited behavior includes, but is not limited to

endangerment, harassment, disruption, sexual misconduct, illegal drugs and/or alcohol, fire or safety issues, gambling, property violations, computer violations or other violations as listed in the UA Rich Mountain catalog.

UA Rich Mountain Mission: University of Arkansas Rich Mountain exists to provide all residents of the Ouachita Mountain Region with exemplary educational and enrichment opportunities to improve the quality of life and standard of living.

Credit Hour Requirement Calculator				
Course Information				
Department, Course Number	PSC 104			
Course Title	Earth Science			
Credit Hours	4			
Mode of Delivery	Traditional			
Weeks in Part of Term	15			
Level of Reading Material	Advanced/Scientific/Technical (2)			2
Reading Level of Students	Average Student (2)			2
Average Pages per Hour	10			
		Enter either week or term, not both		
Contact Hours		**Hours/Week**	**Hours/Term**	**Total Hours**
Lecture/Recitation			45	45
Lab Contact Hours			24	24
	Pages Asg'd	**Hours/Week**	**Hours/Term**	
Syllabus Items				
Reading	360			36
Assignment		1		15
Online Quiz		1		15
Researching Lab questions		2		30
Reviewing for exams			10	10
				0
				0
				0
				0
				0
Total Hours				175
Required Hours				150
Difference				Ok + 25