PSC 114
PHYSICAL SCIENCE
Spring 2020

Class Time and Location: **Lecture**: TR 4:30 – 5:45 PM, **Lab**: R 6:00 – 8:00 PM, Room: **S235 (Respective high school lab for Zoom classes)**
Instructor: Gaumani Gyanwali – Ph. D.: OSU-Stillwater; MS, BS: Tribhuvan University
Office Location: S244 (Mena Campus)
Office Hours: Posted on the office door
Contact Information: Office: (479)-394-7622, Ext. 1339
Cell: (479)-234-8727 Email: gyanwali@uarichmountain.edu

Prerequisite: A grade of "C" or better in Elementary Algebra.

Resources:
Textbook: Physical Science, Tenth Edition by Bill W Tillery: McGraw Hill, 2014 ISBN 978-0-07-351389-8.
Laboratory Manual: Physical Science Lab Manual, Gaumani Gyanwali, 2016, UA Rich Mountain (Revised: December 2019)

Required Materials:
1. Lab Safety Goggles **2.** Calculator capable of roots and exponents **3.** 2½ inch binder divided into three sections – In-class, Assignments, Exams.

Course Description: This is a general education course designed to meet the need of a laboratory science course for education and other non-science majors. This introductory level course includes the study of selected materials from the fields of chemistry, physics, and astronomy. This course requires at least one paper using a documentation format and multiple lab reports.

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 one-step mathematical calculations and applications.
- Students will demonstrate an understanding of physical and chemical principles.
- Students will apply technological and research skills to identify, locate, and process information.

Rationale: In this technological age it is imperative that people have a basic understanding of the technologies they are using in their daily lives. By using a conceptually based hands-on approach, students will quiet their fears of science and gain knowledge and appreciation for this omnipresent discipline.

Course Objectives: Upon successful completion of PSC 114, the student should be able to-

1. Recognize the influence of physical science on their daily lives. (Components: apply, validate, and differentiate).
2. Explain the philosophy of science: scientific conclusions are based on experimental evidence. (Components: analyze, evaluate, and interpret data)
3. Perform a scientific experiment, draw proper conclusions, and prepare a formal lab report (Components: collaboration, data collection, calculation and formulation, proper grammar and format, documentation, logical argument, research skills)
4. Demonstrate a basic understanding of measurements, mechanics, sound, heat, electricity, atomic structure, chemical bonding, mole concept, and astronomy by explaining the scientific principles used in everyday items.
5. Develop problem-solving skills for simple mathematical calculations of practical application. (Components: analyze mathematical relationships, calculate, comprehend, and differentiate)

Topical/Unit Outline:

<u>I. Scientific Method, Measurement and Error</u>
A. Syteme Internationale
B. Conversion Factors
C. Scientific Notation
D. Precision and Accuracy
E. Percentage Error

<u>II. Force and Motion</u>
A. Motion: Speed, Velocity, Acceleration
B. Forces: Horizontal and Vertical Motion
C. Newton's Three Laws of Motion
D. Motion Due to Gravity
E. Weightlessness

<u>III. Work and Energy</u>
A. Work and Power
B. Energy (Potential and Kinetic)
C. Energy conservation and transfer
D. Energy Sources
E. Renewable energies

<u>IV. Heat and Temperature</u>
A. Temperature/Heat
B. Specific Heat Capacity
C. Heat Transfer
D. Change of Phase
E. Laws of Thermodynamics
F. Heat engines

<u>V. Wave Motion/Sound</u>
A. Waves
B. Reflection and Refraction
C. Interference

D. Doppler Effect

VI. Electricity/Magnetism
A. Static Electricity
B. Circuits
C. Ohm's Law
D. Magnets/Electromagnets
E. Electromagnetic Induction
F. Motors/Generators/Transformers

VII. Atomic Structure
A. Structure of an atom
B. Atomic Spectra
C. Electron Configuration
D. Ions and emission of light

VIII. Periodic Table of Elements
A. Groups and Periods
B. Periodic Properties
C. Chemical Bonding: ionic and covalent compounds
D. Naming binary compounds

IX. Chemical Reactions
A. Molecular formula and weights
B. Chemical equations
C Balancing chemical equations
D. Types of chemical reactions
E. Mole concept

X. Astronomy (The Solar System)
A. Planets, moons, and other bodies
B. Small bodies of the solar system
C. Origin of the solar system
D. Ideas about the solar system

Tentative Schedule for Lecture: Physical Science

Week	Topics/Activities by Book Chapter	Date/Day
1	Discuss syllabus; Survey Measurement	1/14 T 1/16 R
2	Measurement Force and Motion	1/21 T 1/23 R
3	Force and Motion Work and Energy	1/28 T 1/30 R
4	Work and Energy Review	2/4 T 2/6 R
5	**Test 1** Heat and Temperature	**2/11 T** 2/13 R
6	Heat and Temperature Wave motion/ Sound	2/18 T 2/20 R

7	Wave motion/ Sound Electricity and Magnetism	2/25 T 2/27 R
8	Electricity and Magnetism Review	3/3 T 3/5 R
9	**Test 2** Atomic Structure	**3/10 T** 3/12 R
10	Atomic Structure Periodic Table of Elements	3/17 T 3/19 R
11	*Spring Break (no classes)*	*3/23 -3/27*
12	Periodic Table of Elements Review	3/31 T 4/2 R
13	**Test 3** Chemical Reactions	**4/7 T** 4/9 R
14	Chemical Reactions Astronomy	4/14 T 4/16 R
15	Astronomy Review	4/21 T 4/23 R
16	**Test 4** (Receive Final Exam) Excursion*	4/28 T 4/30 R
17	**Final Exam Due**	**5/5 T**

*Review class if no excursion.

Tentative Schedule for Lab:

Date	Experiments	Page/Miscellaneous info
1/16	Syllabus/Safety	Sign the safety agreement
1/23	1. Measurement	5
1/30	2. Back and Forth Motion	19
2/6	3. Value of Acceleration due to Gravity	35
2/13	4. Specific Heat of Metals	43
2/20	5. Heating and Cooling Rates	53
2/27	6. Sound Frequency and Speed	63
3/5	Make-up (need one week's notice)	One missed lab
3/12	7. Caloric Values of Food	73
3/19	8. Spectrometric Identification of Salt Solutions	83
3/26	*Spring Break – no lab*	
4/2	9. Composition of a Metal Oxide	93
4/9	10 Types of Chemical Reactions	101
4/16	11. Composition of a Penny	111
4/23	Make-up *(need a week's notice)*	

Course Conduct: The class will be taught using a combination of lecture using *Powerpoint* presentation in-class as well as through Zoom video at the same time, 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 provided 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) to check the concepts in homework assignments, and exam reviews but it is not the responsibility of SSS 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 online assignments and fully comprehending them. Expect a minimum of 12 hours of work per week in this course.

UA Rich Mountain Credit Hour Calculator: For every course credit hour, you should expect to spend at least three clock hours per week of concentrated attention on the course-related work. This is 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 assignments/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. Please see credit hour calculator attached to end of syllabus.

Course Requirements/Evaluation (Grading):

Your grade for this course comes from the following:

Four quarterly tests @100 each	= 300 (lowest one dropped when taken all four)
One Final Exam @ 100	= 100
11 Lab reports @ 20 each	= 200 (lowest one dropped after submitting all)
10 Online Assignments @ 20 each	= 200
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 based on 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 all three campuses. UA Rich Mountain assists students with quality tutors available in the Student Support Services (SSS).

tutor.com provides 5 hours of free tutoring online for each UA Rich Mountain student per semester. Johnson Learning Commons has contract with this online site where personal tutors are available 24/7. Create an account and get help personally from home or anywhere if internet access is available. Follow the link to log in www.tutor.com/uarichmountain

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, the student is expected to arrange 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. If the student is present in lab but fails to submit the lab report, no point will be awarded for that lab.

Assignment Due Dates: Assignments are online and students must complete before the due time. You will be penalized for the late works depending on the number of days and full point. 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 required for a make-up exam. 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 114			
Course Title	Physical 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