PS.121 §101– Physical Science for Teachers: Chemistry

Fall 2018 **(CRN 3623)**

Class meets:	Tuesdays & Thursdays @ 9:00 pm – 10:50 in Sci.179
Instructor:	Dr. Curt Foltz Sci.159 email: foltzc@marshall.edu phone: (304) 696-2519
Office Hours:	MTWRF 12:30 – 2pm & __W_F 9:30 – 10:30
Web-site:	www.science.marshall.edu/foltzc/p121_181.htm
Required Text:	Physical Science for Teachers: Chemistry Workbook (Pearson Custom Text)

Catalog Description: PS121 is part of a 3 course sequence of Physical Science for K-9 Education majors. Includes 2-hr, 1 credit lab. *(3 hours)*

Verbose Description: PS121 is a survey of introductory chemistry, particularly focused on content related to the Next Generation Science Standards (NGSS). It is designed to provide the chemistry background (atomic structure, properties of matter, phase changes, chemical reactions, heating & cooling) required for K-9 Education majors, as well as provide practice in the applied engineering principles included in these new standards. This course will model the type of inquiry-based, interactive learning environment expected of teachers by the NGSS. Lectures will be brief and interspersed with lab activities and investigations designed to foster higher-order learning and enhance critical thinking skills.

Course Components:

Homework	Investigations	Quizzes	Exams
(14) 10%	(30) 10%	(6) 20%	(3) 60%

Letter Grades: 100% > A > 90% > B > 80% > C > 70% > D > 60% > F > 0%

Homework: on-line homework will be graded at *http://www.masteringchemistry.com*
Students must purchase an access code; this section's course ID is MC121FOLTZ18 .

Investigations: About half the class will be devoted to hands-on, laboratory-style investigations; design or testing problems; and lecture tutorials. Some of these will be "open-ended" problems. The exact design and procedure of the investigation will be up to you. This is in keeping with both the letter and spirit of the NGSS, so you will have a chance in this course to practice what you will teach.

Journals: All your experimental work on the investigations will be recorded in your science journal, as well as your conclusions on the results. In addition you will be asked periodically to reflect on the assignments and comment on your learning process. Journals will be usually remain in the classroom. Your journal entries are the evidence (artifact) that you have done the investigations.

Quizzes: 2 Quizzes will be given during each Unit, as practice for the Exams.

Exams: Three (3) Unit Exams, each covering about the same amount of material, will be conducted throughout the semester. Questions about the investigations **WILL** be included on the exams. The Final Exam, during Finals week, **WILL** be cumulative.

A Note on Homework: Please do the homework. Allow enough time on the homework so that you can think about your responses and pay close attention to the questions. It is not intended to be mere busy work, but instead is an important part of the learning process. Students who do the homework for themselves (not copying off of someone else or looking up the answers online) do much better in the class. I can't "make you do" the homework. I can't make sure that you always do it for yourself. But I can guarantee that you will severely lower your chances of getting a good grade, or even passing, if you don't do the homework. *So, please do the homework.*

University Policies: By enrolling in this course, you agree to the University Policies listed below. The full text of each policy is at http://www.marshall.edu/academic-affairs/policies.

Academic Dishonesty/ Excused Absence Policy / Computing Services Acceptable Use/ Dead Week/ Inclement Weather/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities/ Affirmative Action/ Sexual Harassment

Attendance Policy: Regular attendance is crucial to your success, as many of the class activities are interactive. Being on time for class and attending all class meetings is expected. Period. Excessive absences – whether excused or unexcused – will affect your ability to earn a passing grade.

Excused Absences - Students who miss interactive activities with an excused absence will be provided with an alternative assignment that attempts to connect with the activities in the missed class session.

Unexcused Absences -

- ☐ If you miss two classes, expect an email notification from your instructor.
- ☐ If you miss a third class, you will face:
  - Automatic one letter grade deduction in the course.
  - Mandatory meeting with instructor. At the instructor's discretion, you may develop an "improvement plan" which might provide you opportunity to earn back the letter grade deduction. Keep in mind this option is at the instructor's discretion.
- ☐ If you miss a fourth class, the previous automatic letter grade deduction becomes permanent (adhering to an improvement plan will not earn this back).
- ☐ Subsequent missed classes will result in *additional* letter grade deductions.

Other Course Policies:

- ☐ Any work handed in late will suffer a 20% penalty per **calendar** day. This does not apply for any day for which there is an excused absence.
- ☐ Makeup work will **NOT** be allowed except for *documented* emergencies.
- ☐ If you miss a class, contact your instructor as soon as feasible. If you wait too long to arrange a makeup, even for an excused absence, you may be denied to opportunity to obtain credit for it.
- ☐ ***Let your instructor know ahead of time if you expect to be absent from a class.***
- ☐ Cell phone use is not permitted in the classroom. Please turn cell phones to OFF or vibrate.
- ☐ Except for calculators, *all other electronic devices* (laptops, tablets) *must be turned off in class.*
- ☐ Any act of academic dishonesty of any kind will result in a final grade of **F** for the class.
- ☐ The instructor reserves the right to allow an exception(s) to any course policy without incurring any obligation to allow an exception to that policy in any other particular situation.

Course Schedule: (*Approximate and Tentative!*) Plan for an Exam after each unit ends.

Weeks	Unit	Topics
1-4	1	Physical & Chemical Properties; Heat & Energy; Change of State
5-8	2	Molecules & Atoms; Elements & Compounds; Chemical Formulas & Names
9-12	3	Bonds & Reactions; Balancing Equations; Oxidation/Reduction; Acids & Bases
13-14	4	Hydrocarbons; Organic Molecules; Biochemistry

Learning Outcomes: *Practice on* Homeworks & Investigations *Assessment on* Exams

☐ Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

☐ Develop a model to describe that matter is made of particles too small to be seen.
Develop models to describe the atomic composition of simple molecules and extended structures.

☐ Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

☐ Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

☐ Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

☐ Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

☐ Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

☐ Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

☐ Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

☐ Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

☐ Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

☐ Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

☐ Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

☐ Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

☐ Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

☐ Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

☐ Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

☐ Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.