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CHMY 101.01: Chemistry for the Consumer

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CHEMISTRY 101 'Chemistry for the Consumer'

Instructor: Earle R. Adams: earle.adams@umontana.edu office CP117 first floor of the chemistry building; phone: 243-4196

Office Hours: I am often around the chemistry building or working in the instrument room, you can come by or set up an appointment or email me as well.

Prerequisite: There are none for this class.

Course Purpose: An introductory survey of chemistry principles and concepts and how chemistry relates to our everyday life.

Required/Recommended: Textbook: 'Conceptual Chemistry' by John Suchocki (publisher Addison-Wesley Benjamin Cummings). Any edition will work and there are used copies on campus as well as paperbacks on amazon.com. You will also need a pair of goggles for the lab portion of the class. Handouts will be given during class for labs. *Please bring paper, pen/pencil, and calculator to class.*

Format: The course consists of a two component lecture and laboratory format. In every class there will be group work, in class exercises and discussions in order to solidify student understanding of chemical concepts and principles. There will be weekly quizzes and four cumulative exams to assess student's comprehension of fundamental chemical principles.

Course Policy: Students will be expected to attend every class since class participation is important and integral to the class. A student will be allowed to miss three classes with explained excused absences before 10% of their grade is subtracted and a mandatory meeting with the student takes place.

Grading:

Quizzes	100 points
Homework	100 points
Subtotal	500 points

Regular labs	300 points
Special Project	200 points
Subtotal	500 points

Total **1000 points**

	A 930-1000	A- 900-929
B+ 870-799	B 830-869	B- 800-829
C+ 770-799	C 730-769	C- 700-729

D+ 670-699 D 630-669 D- 600-629
F 0-599

Grade Summary: Keep a record of your grades (exams, quizzes, homework and lab) until the final grade is issued. If there is a grading error, you are responsible for resubmitting the item(s) in dispute.

Learning Outcomes:

- i. Students will attain a level of competency in basic understanding of chemical principles and concepts.
- ii. Strengthening of reasoning skills through inquiry based exercises and laboratory experiences.
- iii. A fundamental understanding of the scientific process by experiencing real 'hands on' research problem based on an environmentally relevant problem in

Lecture: The lecture component of the course will be *MTWR Forestry 106* **Time:** *10:10-11:35*

Laboratory: The laboratory component of the course will be in *CP409 (the fourth floor lab in the Chemistry Building)*. **Time:** *TR 1:30-4:30*.

Safety: This is an official laboratory course and thereby subjected to a lab safety component. Each student will go through a lab safety protocol and will sign a safety agreement which they will abide to over the semester. There will be a pre-lab component to every lab to discuss any safety concerns and specifics for each and every lab over the entire course. There will also be specific lab safety questions and scenarios on course quizzes and exams. While this lab never uses open flames or dangerous materials, ALL students are required to wear proper lab safety glasses and close end shoes for ALL labs. Students who do not abide by these safety rules will not be allowed in the lab.

Make-ups: Students who miss exams for a legitimate emergency or illness may be allowed to be allowed to replace one exam score with the final exam score.

Drops: July 6th is the last day to register by CyberBear. Dropping on or before this date results in "NO RECORD" of taking this course on your transcript. This is also the last day to change your grade option to AUDIT.

Academic Honesty: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://life.umt.edu/vpsa/student_conduct.php.

Other: If you are a student with a disability and wish to discuss reasonable modifications for this course, contact me privately to discuss the specific modifications you wish to request. Please be advised I may request that you provide a letter from Disability Services

for Students verifying your right to reasonable modifications. If you have not yet contacted Disability Services, located in Lommasson Center 154, please do so in order to verify your disability and to coordinate your reasonable modifications. For more information, visit the Disability Services website at <http://www.umt.edu/disability>.

Legal Notice: This course syllabus is not a contract; it is a tentative outline of course policies. Change may be made before, during, or after the semester at my discretion.

Course Schedule (lecture and lab):

Learning Unit:	Assessment Methods
<i>What is Matter:</i> overview of matter and its components from atom to molecule, physical and chemical properties. The <i>particulate: microscopic</i> and <i>macroscopic worlds:</i> What is a scientific model?	Discussion on board and special in class lab unit using paperclip models to distinguish different types of matter. Lab: model building allowing students to develop the concept of atom, molecule, pure substance, and mixtures. Lab: physical properties and inquiry based lab on density via graphing and extrapolating the formula for density.
<i>The Atomic Nucleus:</i> overview of the particles comprising an atom and its relation to matter: Nuclear energy versus conventional energies: coal, wind, oil.	Discussion on board with participation with weekly quiz. Continuation of in class lab and demo with paperclip models and its connectivity to atoms and molecules.
<i>What is Light? How do we use and harness light?</i> Understanding the dual nature of light, its history, its importance in all the biological and physical sciences.	Discussion on board with weekly quiz. Lab: demo with hand spectrometers. Guided inquiry in formulating the concept of light and its nature.
<i>Chemical Bonding and 3D shape of molecules:</i> Nature of the chemical bond and how 3D structure dictates chemical reactivity.	Discussion on board along with worksheets and quizzes. Integrated Lab: in silico computer graphics and simulations of molecules.
<i>Water the Most Important Chemical:</i> A close look at water with all its chemical and physical properties, importance to life, natural resource preservation and its connection to energy. The connection of water as the great ‘ <i>solvent</i> ’ and chemical of life. The connection of a water molecule from the particulate world all the way to macro world and our everyday life. The road to clean water with its scientific, sociological and political implications.	Discussion on board along with in class worksheets. Vignettes and leading discussions in class along with weekly quizzes. Lab: Inquiry based lab exercise looking at the simple proportionality of temperature (C vs F) and boiling points. Designed for students to formulate their own graphs and measuring results from their graphs. Continuation of proportionality and graphing.
<i>Chemistry of Air:</i> What is air and what is air pollution? Growing implications of	Discussion on board along with worksheets and quizzes. Discussion leading into

<p>polluted air in human centers and scientific implications in global warming and climate change.</p>	<p>independent inquiry based research project on indoor air pollution (carbon monoxide and radon).</p>
<p><i>Acids and Bases:</i> What are acids and bases and how do these two generic terms dictate the bulk description of most chemical species.</p>	<p>Discussion on board along with worksheets and quizzes in class. Lab: measuring pH of common consumer goods.</p>
<p><i>Energy:</i> What is energy and how does energy permeate everything in science and why chemical reactions occur all the way to our need for raw energy in our consumer economy.</p>	<p>Discussion on board along with worksheets and quizzes in class. Lab: Measure the calorimetric energy in food products and relate this to our calorimetric output in energy on the human scale.</p>
<p><i>What is a Chemical Reaction?</i> Underlying concept of energy and its role in why chemical reactions occur or not occur. The understanding of a chemical reaction and the making of a product from reactants.</p>	<p>Discussion on board along with worksheets and weekly quizzes. Lab: Perform a chemical reaction, measuring energy produced or used and products formed.</p>
<p>SPECIAL PROJECT: Research project based on real community research projects from the University of Montana. This is an inquiry based project looking at indoor and outdoor air quality in private homes in Missoula County.</p>	<p>Special Project: Will include research question, hypothesis, data gathering, data analysis and conclusion.</p>