



INDIANA UNIVERSITY

Fall 2016

CHEM-C 105 Principals of Chemistry I

CHEM-C125 Experimental Chemistry Laboratory I

Whiteland Community High School

Credits	C105: 3 cr C125: 2 cr	College of Arts and Sciences Education CASE	Natural & Mathematical Sciences N&M
Instructor	Kate Smola	Office	B207
Email	ksmola@cpcsc.k12.in.us	Office Hours	Mon & Fri GI; 7:15-7:30
Meeting Times	Daily	Meeting Location	B207
Prerequisite(s)	One year of high school chemistry	Lab fees	Included in book rental
Course Descriptions	C105: Basic principles including stoichiometry, thermochemistry, atomic and molecular structure, gases, solutions, and selected topics in descriptive chemistry. C125: Introduction to laboratory experimentation with emphasis on the collection and use of experimental data, some properties of solutions, stoichiometry, thermochemistry, and synthesis. Credit given for only one of C105 or C117.		
Core Transfer Library Course	Yes, part of CTL Name: Chemistry 1 & 2 w/lab (2 course sequence), General		
Textbook Title & Author	Chemistry 8 th edition, by Zumdahl, Steven S. and Susan A Zumdahl. Publisher: Brooks Cole, 2012 Cracking the AP Chemistry Exam , 2016 Edition Mead Graph Composition Book , Square Deal, Black Marble, 7.5 x 9.75 Inches		
Learning Objectives	<ul style="list-style-type: none">• Understand and be able to classify different types of matter and different types of properties of matter.• Know and understand the structure of atoms and molecules, and be able to describe the bonding and structure in chemical compounds.• Be able to name compounds and write down formulae associated with these compounds.• Understand the concept of the <i>mole</i>, and be able to solve problems involving stoichiometry both for pure substances and for solutions.• Understand the chemistry and be able to write down different types of chemical equations for precipitation, acid-base, and redox reactions.• Know the kinetic molecular theory, and be able to solve problems using the ideal gas equation.		

	<ul style="list-style-type: none"> Know the electronic configuration of atoms and ions, and be able to correlate trends in selected chemical properties with properties associated with the atomic structure. 	
Important Deadlines	Registration ends: Friday, August 26, 2016 Drop: Friday, August 26, 2016 (Self-drop online) Automatic Withdrawal (for any reason): Friday, October 21, 2016 Late Withdrawal (must be passing and must petition IU for approval): one week before IU final exam	
How IU Grade will be Calculated	C105 Principles of Chemistry I (3 credits) 75% Exams and Quizzes 10% Homework 15% Final Exam (provided by IU)	C125 Experimental Chemistry Lab I (2 credits) Lab write-ups
	IU grades are not weighed by IU. There will be 10-12 lab experiments of varying lengths and complexity. Students enrolled in C105 will take their final exam at the end of the school year in May. Student's IU-ACP grade will only reflect those topics covered in the C105 course syllabus.	
How High School Grade will be Calculated	AP Chemistry 70% Exams and Quizzes 20% Lab write-ups (at least one formal/project) 10% Homework AP Chemistry is a 1.0 weight on a 4.0 point scale. At the end of this course, students are encouraged to take the AP Chemistry Exam which will determine whether the material has been mastered well enough to be granted college credit. Quizzes and exams are patterned after the AP Chemistry Exam. Final semester grades are determined by considering each nine-week grade as 40% and the final exam grade as 20%.	
IU Grading Scale	Suggested	
	A+: 98-100%	C+: 77-79.9%
	A: 93-97.9%	C: 73-76.9%
	A-: 90-92.9%	C-: 70-72.9%
	B+: 87-89.9%	D+: 67-69.9%
	B: 83-86.9%	D: 63-66.9%
	B-: 80-82.9%	D-: 60-62.9%
High School Grading Scale	Whiteland Community High School	
	A: 93-100%	C: 73-76%
	A-: 90-92%	C-: 70-72%
	B+: 87-89%	D+: 67-69%
	B: 83-86%	D: 63-66%
	B-: 80-82%	D-: 60-62%
	C+: 77-79%	F: 59% & below

Schedule of Assignments	Semester 1:		
	Timeline	Title and Topics	Lab(s) involved:
	1 ½ week + summer HW	Unit 1: Chemical Foundations: Mole, nomenclature (& alkanes), balancing, stoichiometry: limiting reactants and percent yield, empirical and molecular formulas, mass spectrometry, isotopes	Decomposition of Sodium Chlorate Target Stoich Lab (Flinn)
	2 weeks	(mini) Unit 2: Reactions Beer's Law, net ionic equations, solution composition, conductivity, molarity	Properties of Cu Lab (BSU101) Spec20/Beer's Law Inquiry Lab (CB) Target Lab: Soln making of CuSO ₄ ·5H ₂ O
	4 weeks	Unit 3: Thermochemistry and Thermodynamics First law of thermodynamics (heat/work), enthalpy, calorimetry, Hess's law, standard enthalpies of formation, bond energy (distance/internuclear separation), entropy, Gibb's free energy, "3 Golden Ideas" linked	Enthalpy of a Reaction via Calorimetry Parts I and II Hand Warmer Inquiry Lab (CB) Labette : Guppy Activity (JD)
	2 weeks	Fall Break: Gases NMSI Unit ideal gas law, ideal versus real gas law, kinetic molecular theory, mole fraction, Dalton's law of partial pressures, Graham's law of diffusion, temperature and root mean square velocity,	Podcasts & WB lessons Gas Law Target Lab (Becker, Flinn)
	3 weeks	Unit 4: Chemical Kinetics Reaction rates, rate law, including rate constant and reactant orders, differential versus integrated rate law, half-life, reaction mechanisms, including molecularity (elementary steps), collision theory, including effective collisions and activation energy, reaction coordinates, Arrhenius equation, catalysis, Maxwell-Boltz for temperature	Micro-Mole Lab Crystal Violet Rate Inquiry Lab (CB) Kinetics of Bleach & candle (JB)
	3 weeks	Unit 5: Intro to General Equilibrium and Solubility Equilibrium Characteristics of equilibrium, K, the equilibrium constant: K_p , K_c , Le Chatelier's principle, equilibrium quotient, Equilibrium(K_{sp}), selective precipitation, and qualitative analysis	Exploring Eq: It works both ways (Flinn) Le Chatelier's Inquiry Lab (CB) or (C)
	3 weeks	Unit 6: Electrochemistry oxidation states, balancing redox reactions, voltaic/galvanic cells, equilibrium constant (Nernst equation) electrolysis, conductivity/dissociation, Coulomb's Law	Conductivity Review Lab Aluminum Air Battery Lab (U of L) H ₂ O ₂ titration lab (Flinn/CB)
	2 weeks	Finals Week Winter HW Assignment: Intro to Acid-Base Properties (1 st yr material)	
Semester 2:			
Timeline	Topic	Lab(s) involved:	
4 weeks	Unit 7: Acid/Base/Buffer Equilibrium Relative strengths of acids and bases, pH, pOH, [H ₃ O ⁺], and [OH ⁻], K_w , K_a , K_b , Percent dissociation, including the effect of concentration, Polyprotic acids, including stepwise dissociation, Hydrolysis: acid-base characteristics of salts, Molecular structure and acid-base properties, Anhydrides: oxides that affect pH, Lewis acid-base model, Common ion effect, Buffers: K_w , K_a , K_b , Titration curves	Titration-titration Lab: vinegar acid How weak is your acid lab? (NMSI) Acids,Bases,Buffers Lab (U of L)	
4 weeks	Unit 8: Atomic Structure, Periodicity, Bonding Electromagnetic radiation and the relationships among wavelength, frequency, speed, and energy, the hydrogen spectrum and Bohr's model, quantum mechanical model of electron position and electron spin, PES & spectroscopy (UV-vis & IR) linking the quantum mechanical model, periodic trends and electron configuration, bond length, bond strength, bond multiplicity, electronegativity, polarity of bonds and molecules, polarizability, electron configuration of ions, ionic radius, Lewis structures and resonance (organic arrow formalism), VSEPR model, hybridization of orbitals (sp, sp ² , sp ³ only), sigma and pi bonds	Chromatography (Flinn) & paper V-SEPR Models (Flinn/BSU) Molecular Sim modeling (PhET)	
3 weeks	Unit 9/10/11: IMFs, Gases, and Solutions Comparison of the condensed states of matter, liquids, and solids, IMFs, characteristics	Isolating the Components of a Three Mixture (BSU)	

		of liquids in relation to intermolecular forces (bp, surface tension, cap action, vp), Coulomb's Law, bonding and types of component parts in crystalline solids, phase change as an equilibrium between two phases, heating-cooling curve, miscible, homogeneous/heterogeneous, energetics of solution formation	Molar Volume of a Gas (Flinn) Solid Bonding Lab (Flinn)
4 weeks		AP Chemistry Review: AP Exam on Mon, May 2nd Review Study Plans "5 steps to 5" and Princeton review	Qualitative Analysis of Unknown M (Flinn) Reactions Lab (Flinn)
3 weeks		Unit 12: Additional IU-ACP info: (not tested on the AP Exam) 12.1 Combustion analysis 12.2 Organic functional groups 12.3 Lewis acids and bases 12.4 Quantum numbers, blackbody radiation 12.5 Magnetic properties of atoms 12.6 Exceptions to the Octet 12.7 Formal Charge 12.8 Unit cells 12.9 Phase Diagrams	Esterification (BSU) Synthesis of Aspirin (BSU)
		Finals week	
Classroom Policies & Information	<p>IU CHEM 105/125 and CHEM 106/126 are taught concurrently with Advanced Placement Chemistry. All students are expected to take the AP Chemistry exam upon completion of the course. This course will mirror the college experience wherever possible, requiring students to put forth a significant amount of academic effort outside of class in order to be successful. We will cover material at a fast pace, and you will be expected to keep up with the lab work and homework assignments.</p> <p>Successful students take responsibility for their own learning, and have the time necessary to devote to the course. Questions, study groups, and extra help sessions are encouraged.</p> <p>Check Google Classroom for information, assignments, study aids, power points, etc.</p> <p>Students may use scientific calculators on exams, except in the multiple choice sections. Calculators may not have wifi capability.</p>		
Attendance Policy	<p>All class attendance policies follow WCHS's attendance policy: "It is the student's responsibility to make arrangements with his/her teachers on the day of his/her return to school to make up missed assignments. Teachers are required to give students a minimum of the number of days that they were absent to make up the work that was missed. However, assignments, including tests, which were assigned prior to the absence and were due on or before the day the student returns, will be due on the date the student returns to school. If a review day is part of the absence, teachers will allow for the day and the review materials. Students who fail to complete make work will receive an F."</p>		
Late Work Policy	<p>Late homework is accepted 1 day late, with a 20% loss of points. No work is taken two days past the due date.</p>		
Make-up/Re-take Exam Policy	<p>Most exams and quizzes are <u>not</u> eligible for retakes. Tests and quizzes missed due to absence will be made up according to the WCHS attendance policy above.</p>		
Dual Credit-High School Credit Policy Statement	<p>The rigor of this course will be periodically reviewed by Indiana University faculty in an effort to maintain the high quality of education that each student receives. Due to the unique format of this course, students must decide during the IU enrollment period whether they wish to receive dual credit (high school and IU credit) or only high school credit. Students who choose to take the course only for high school credit and receive a passing grade may not register at a later date or repeat the course (while in high school) for college credit.</p>		
IU Academic	<p>The rights and responsibilities of Indiana University students are explained in the <i>Indiana University Code of Student Rights, Responsibilities, and Conduct</i>, http://www.indiana.edu/~code/. The Code</p>		

Misconduct Statement	<p>describes the types of misconduct for which students may be penalized, including cheating, fabrication, plagiarism and interference with other students' work, as well as actions which endanger the University and the University community and possession of firearms. The Code also indicates the procedures to be followed in these cases. All students are required to adhere to the responsibilities outlined in the <i>Code</i></p> <p>The definition and clarification related to academic misconduct is here: http://www.indiana.edu/~code/code/responsibilities/academic/index.shtml</p> <p>Examples of Plagiarism: http://www.indiana.edu/~wts/pamphlets/plagiarism.pdf</p> <p>Per IU policy, ACP instructors are required to investigate and then report all incidents of academic misconduct to the Dean of Students.</p> <p><i>Adopted by the Board of Trustees, effective August 1, 2009</i></p>
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