

Spring 2014  
**Foundations of Inorganic and Physical Chemistry**  
**CHEMISTRY 220B**

3 Credit Hours – meeting in BSC304E: MWF 9.30am-10.20am

**Instructor:** Professor Sarah A. Winget

**Office:** BSC 301E; 404.471.5379

**Email:** [swinget@agnesscott.edu](mailto:swinget@agnesscott.edu)

**Office Hrs:** Wed 10.30-11.30am, Wed 1-2pm

**Learning Assistant:** Nnenna Dieke

**Science Learning Center Hours:** TBD

**Email:** [ndieke@agnesscott.edu](mailto:ndieke@agnesscott.edu)

**Course Description:** This foundation course focuses on introductory aspects of inorganic and physical chemistry. Topics may include fundamental chemical reactions, nuclear structure and radioactivity, molecular shapes, trends as seen in the periodic table, equilibrium, gas laws, molecular collision theory, the laws of thermodynamics, phases, reaction rates and reaction mechanisms. To illustrate the role of chemistry in fundamental physical and chemical behaviors, examples are chosen from a variety of areas including environmental, medical, and forensic applications

**Prerequisite:** CHE-150; CHE-150L (minimum grade of C- in each)

**Corequisite:** CHE-220L

**Overall Course Goals:** 1.) To obtain an introduction to the fields of Inorganic Chemistry and Physical Chemistry. 2.) To obtain foundational knowledge and skills from the fields of Inorganic Chemistry and Physical Chemistry.

**Course Goals for Part 1 – Introduction to Physical Chemistry:** 1). To gain an increased ability to think logically and critically and to solve complex problems. 2). To improve your ability to think through the reasoning behind the many chemical phenomena you may come across in your life. 3). To be able to apply the knowledge and skills learned to real world problems.

**Course Goals for Part 2 – Introduction to Inorganic Chemistry:** 1). To gain an increased ability to identify and predict different types of chemical reactions that occur in the world. 2). To improve your ability to predict behavior and properties of elements. 3). To be able to discuss the structure and reactivity of inorganic molecules.

**Relevance to the departmental and college curriculum:** After completing this course and its associated lab, you may proceed to the following chemistry courses CHE270 (inorganic chemistry I), and/or CHE260 (physical chemistry I), and/or CHE365 (physical chemistry laboratory). CHE220 and its associated lab can be used to satisfy the natural science distributional if you placed out of CHE150+L. CHE220 and its associated lab are also required for the following majors and programs of study: Chemistry, Biochemistry and Molecular Biology, dual-degree engineering, dual-degree nursing, and any pre-health tracks. CHE220 and its associated lab may also count as one of the two chemistry courses beyond CHE150 that are required for the biology major.

**Required Course Materials:**

1. **Textbook:** Burdge, J. and J. Overby. *Chemistry: Atoms First, First Edition*. New York, NY:McGraw Hill, 2012. (Note: This book may be purchased as a hard copy or as an e-book).
2. **McGraw Hill's online Homework:** *Connect Plus/LearnSmart*. (Note: If you purchase the textbook in the ASC bookstore, the online materials as well as e-book are included).

**Moodle:** Moodle (courses2.agnesscott.com) is a web-based course management system that will be used in this course as well as the lab (Chem 220L). The syllabus, grades, in-class powerpoints, quiz keys, study guides, etc. will be posted for your access. *Note:* Email correspondence using Moodle is directed to Agnes Scott accounts.

**Science Learning Center (SLC):** The Resource Center for Math and Science (RCMS) has a Science Learning Center (SLC) in BSC304W and operating hours will be posted widely throughout the science building and on *Moodle*. During these hours student learning assistants will be available. Please see the RCMS Moodle webpage for more details: <http://rcms.agnesscott.edu/>.

**Course Requirements:**

4 Exams (20% each)	80%	Quiz Average (with 2 lowest grades dropped)	5%
Workshop attendance	5%	On-Line Homework Assignments	5%
Class Attendance	5%		

Absolute Grading Scale

A	93-100	B-	80-82	D+	67-69
A-	90-92	C+	77-79	D	63-66
B+	87-89	C	73-76	D-	60-62
B	83-86	C-	70-72	F	0-59

*Note: If you have completed all exams and online assignments and your score is higher on exam 2 than on exam 1, the exam 2 score may also count for the exam 1 score. If you score higher on exam 4 than on exam 3, the exam 4 score may also count for the exam 3 score.*

*Note: Student grades will not be curved*

**Exams:** Three exams will be given during the semester, and a fourth exam will be given during final exam week. Exams will be taken in the classroom and will be closed-book and with no notes. Please remember to bring your calculators to exams and quizzes.

**Make-up Exams:** Attendance for quizzes and exams are **mandatory**. *There will be no makeup quizzes or exams.* If you know you are going to miss a quiz or exam due to (i) matters relating to death of an immediate family member, or (ii) observance of religious holidays or (iii) participation in events or activities sponsored by the college, please notify the instructor as soon as possible; you will be allowed to take the quiz or exam *early*. If you suddenly find you *miss a quiz*, it will count as one of the two quiz scores that will automatically be dropped. If you need to *miss an exam* because you have become seriously ill or injured or you experience an emergency, you should notify the office of the Dean of Students (x6391) of your situation as soon as possible and ask them to notify me of your circumstances. I will then work with the Dean's office to discover the best course of action for your personal circumstances.

**Quizzes:** There will be short (10-15 min) quiz given in class on most Fridays (except exam days). The quizzes are intended to give you a regular check on your comprehension of the material rather than to cause stress, so the lowest two quiz scores will automatically be dropped. There will therefore be no make-up quizzes as you may miss two quizzes for any reason and receive no penalty.

**Attendance in Class:** Attendance is highly recommended for all scheduled class times. Because unforeseen events do arise, you will be allowed to miss up to three class periods without penalty to your attendance grade. You will lose 5 percentage points from your class attendance grade for each missed class. If you are more than 10 mins late to class, you will be marked as absent from that class period. Please remember to sign in to class to receive full attendance credit.

**Attendance in workshops:** It is highly advisable that some of your out-of-class study time be spent attending workshops facilitated by our course LA, so you are required as part of this class to attend a one hour workshop every week that is given by our LA. Please sign in to the workshop to receive full credit. If for some reason you cannot attend a workshop on a given week you may work in the SLC for an hour that week (with a learning assistant present). You should ask the learning assistant to sign the sign-in book to say that you worked on chemistry for an hour and that you interacted with her somewhat. You will lose 10 percentage pts from your workshop attendance grade for each missed workshop hour.

**Homework Assignments:** Homework problems will be assigned through Connect Plus/LearnSmart, and problems will be due on most Fridays at the start of class. You will be given an unlimited number of attempts to answer each homework question correctly. I strongly encourage you to work on your homework assignments at the Science Learning Center (SLC) in BSC304W, and to work on problems with your classmates. No late homeworks will be accepted.

**Workload Statement:** This is a 3-credit class that meets “3 hours” per week. To succeed in this course, you should also expect to study 5-6 hours per week outside of class (this does not include the hours you spend specifically on the associated CHE220L lab course).

**Appointments:** Appointments may be made with Dr Winget via e-mail at [swinget@agnesscott.edu](mailto:swinget@agnesscott.edu)

**Academic Honesty:** The Agnes Scott College honor code embodies an ideal of character, conduct, and citizenship, and is an important part of the College’s mission and core identity. This applies especially to academic honesty and integrity. Passing off someone else’s work as your own represents intellectual fraud and theft, and violates the core values of our academic community. To be honorable, you should understand not only what counts as academic dishonesty, but also how to avoid engaging in these practices. Please note that in this course you are sometimes encouraged to work with others, but the work completed is your own. In particular, the copying of another student’s homework assignment answers (or copying from any other source, for that matter) is an Honor Code violation.

The examinations and quizzes are not proctored, although the faculty member will often be close by during an exam to answer any questions. You are expected not to seek aid from anyone (or anything) during these examinations and should not give aid to anyone else taking a quiz or examination. Please pledge ALL your quizzes and exams with “I pledge that I have neither given nor received any unauthorized aid on this assignment. (signed)\_\_\_\_\_”

**Students with disabilities:** Agnes Scott College seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in this class, please contact Kelly Deasy in the Office of Academic Advising (X6150) to complete the registration process. Once registered, please contact me via e-mail ([swinget@agnesscott.edu](mailto:swinget@agnesscott.edu)) to make an appointment so that we can discuss in person the specific accommodations needed for this course.

**Key dates not on our class schedule:**

Friday, Jan 24

Tuesday, Feb 4

Thursday, Mar 27

Wednesday-Thursday, Apr 30-May 1

Thursday-Tuesday, May 1-6

Friday-Wednesday, May 2-7

Last day to add a Spring course (form required)

Last day to drop without a “W” grade

Last day to drop with a “W” Grade/Opt for Pass/Fail

Reading Days

Senior Finals

Finals

**Prior Chemistry Knowledge:**

The following chapters from Atoms First by Burge and Overby (1<sup>st</sup> ed) are assumed to have been covered in CHE150 (or somewhere within CHE101 and CHE102):

Chapters from Burge/Overby	Topics
1.4-1.6	Scientific measurements, significant figures, unit conversions
2.1-2.6	The atom, atomic number, isotopes, average atomic mass, moles, molar mass
3.1-3.4	Energy units, electromagnetic radiation, a brief intro to quantum theory, line spectra, electronic transitions in H atoms
3.9-3.10	Pauli exclusion principle, Aufbau principle, Hund's rule, electron configurations of atoms
4.4-4.6	Metals vs non-metals. Trends in atomic radius, ionization energy and ionic radius. Comparing ionic radius and atomic radius. Electron configurations of ions.
5.2-5.10	Ionic compounds (bonding, formulas, naming) and molecular/covalent compounds (formulas, empirical formulas, naming). Polyatomic ions.
6.1-6.6	Lewis structures, electronegativity, dipole moment, partial charges, formal charges, resonance, exceptions to the octet rule
7.1-7.6	VSEPR theory, bond angles, polarity, valence bond theory, hybridization of atomic orbitals, a brief introduction to molecular orbital theory.
8.1-8.4	Writing and balancing chemical equations, determining empirical formula and molecular formula from % composition of a sample, stoichiometry calculations, limiting reactants, % yield
9.1-9.6	Strong electrolytes vs weak electrolytes, solubility guidelines for predicting precipitation reactions, Ionic equations, net ionic equations, acid-base reactions, and a brief introduction to redox reactions.
10.1-10.3	Introduction to thermodynamics, first law of thermodynamics, work and heat, enthalpy, enthalpy changes and thermochemistry calculations
10.5, 10.7	Hess's Law, Bond enthalpies
12.1	Intermolecular forces
14.1-14.2	Rates of reactions, collision theory of chemical reactions
15.1-15.3	Concept of equilibrium, calculating equilibrium constants, magnitude of equilibrium constants, heterogeneous equilibria