




HOUSTON COMMUNITY COLLEGE SOUTHWEST
COURSE OUTLINE FOR CHEM 1411 – GENERAL CHEMISTRY I
Spring, 2012
Class Number 82253


Discipline/Program	Chemistry
Course Level	First Year (Freshman)
Course Title	General Chemistry I
Course Rubric and Number	CHEM 1411
Semester with Course Reference Number (CRN)	Spring, 2012 CRN 82253
Course Location/Times	West Loop Center, 5601 West Loop South Tuesday, Room C220 (lecture) 8:00 – 11:00 AM Thursday, Room 164 (lab) 8:00 – 11:00 AM
Course Semester Credit Hours (SCH) (lecture, lab)	4 (3 lecture, 3 lab)
Total Course Contact Hours	96
Course Length (number of weeks)	16
Type of Instruction	In-person
Instructor contact information (phone number and email address)	Dr. Steven E. Dessens Office Phone: 713-718-6710 E-mail: steven.dessens@hccs.edu Learning Web: http://learning.hccs.edu/faculty/steven.dessens
Office Location and Hours	Room S107 Stafford Scarcella building, 3:00 – 5:00 PM Monday & Wednesday or by arrangement.
Course Description: ACGM or WECM	General principles, problems, fundamental laws, and theories. Course content provides a foundation for work in advanced chemistry and related sciences.
Course Description: HCC Catalog Description	Science and engineering majors study atomic structure, chemical reactions, thermodynamics, electronic configuration, chemical bonding, molecular structure, gases, states of matter, and properties of solutions. Core Curriculum Course. Note: Only one of CHEM 1305, CHEM 1405, and/or CHEM 1411 can be used toward associate degree natural science requirements. Only one of the three will count as Natural Science core; the others may count as electives in the degree plan.
Course Prerequisite(s)	Must be placed into college-level reading (or take GUST 0342 as a co-requisite) and be placed into MATH 0312 (or higher) and be placed into college-level writing (or take ENGL 0310/0349 as a co-requisite).
Academic Discipline Program Learning Outcomes	<ol style="list-style-type: none"> 1. To provide the student a basic and practical understanding of chemistry (formulas, reactions, and calculations) and recognize its relevance in our daily lives. 2. To prepare our students to meet with success in higher level chemistry and other science courses when they transfer to four-year universities. 3. To prepare our students for professional programs requiring a mastery of General Chemistry and Organic Chemistry, such as Nursing, Medicine, Dentistry, and Pharmacy. 4. To enhance class lectures with a meaningful, hands-on laboratory experience involving making measurements, observing reactions, evaluating the results, and drawing conclusions with the involvement of lab group or other class members.
Course Student Learning Outcomes (SLO)	<ol style="list-style-type: none"> 1. Give names and formulas of elements, ions, and ionic and molecular compounds. 2. Categorize, complete, and balance chemical reactions. 3. Do chemistry calculations involving reaction stoichiometry and energy changes. 4. Relate the properties of electromagnetic radiation (frequency, wavelength, and energy) to each other and to the energy changes atoms undergo which accompany electronic transitions. 5. Identify the parts of the periodic table and the trends in periodic properties of atoms.

	6. Relate the properties of gases with the gas laws and extend the application of these relationships to reaction stoichiometry, gas mixtures, and effusion/diffusion of gases. 7. Depict chemical bonding with dot structures and valence bond theory and determine the molecular shapes (geometry) of molecules based on VSEPR and valence bond theory.
Learning Objectives (Numbering system linked to SLO)	1.1. Given the name, identify the formula and charge of positive and negative ions, and vice-versa. 1.2. Given the name, write the formula of ionic compounds, binary molecular compounds, and acids. Given the formulas of these types of compounds, name them. 2.1. Identify given reactions as combination, decomposition, single displacement, and double displacement. 2.2. Starting with the reactants, complete the reaction by writing the reaction products. 2.3. Given the reactants and products, balance the equation for the reaction. 3.1. Convert amounts in units of mass or volume to moles, and vice-versa. 3.2. Given the amount of one substance in a reaction, calculate the amount of the other substances that react and form. 3.3. Identify the limiting reactant and excess reactant in a reaction where more than one reactant amount is given. 3.4. Determine the amount of the excess reactant that remains as unreacted excess. 3.5. Calculate energy changes associated with chemical reactions using Hess's law, standard enthalpies of formation, or calorimetry. 4.1. Relate frequency, wavelength, and the speed of electromagnetic radiation. 4.2. From the frequency or wavelength of electromagnetic radiation, calculate its energy. 4.3. Relate the energy change in the hydrogen atom to its electronic transitions using the Bohr model. 4.4. Identify and relate the four quantum numbers that can be associated with electrons. 4.5. Write the electronic configurations of atoms and ions, including the box diagram method. 5.1. Identify the common regions of the periodic table. Identify by name selected groups of elements in the periodic table. 5.2. Using the periodic table, identify the trend (increasing or decreasing in value) of selected properties of atoms such as atomic radius, ionization energy, and electron affinity. 5.3. Identify reaction similarities of elements within the same group in the periodic table. 6.1. Relate and calculate the pressure, volume, temperature, or amount of gas using Boyle's law, Charles' law, Gay-Lussac's law, Avogadro's law, the combined gas law, and the ideal gas law. 6.2. Perform stoichiometry calculations which involve gaseous substances. 6.3. Use Dalton's law and Graham's law to perform calculations involving gaseous mixtures and effusion and diffusion of gases. 6.4. Explain the assumptions of the kinetic-molecular theory of gases. 7.1. Draw the Lewis dot structure of molecules containing two or more atoms. 7.2. Based on the dot structure of the molecule, determine its electron domain geometry and molecular geometry based on VSEPR theory. 7.3. Given the dot structure, identify the hybridization of and geometry about each atom. 7.4. Explain the nature of sigma and pi bonding using hybrid atomic orbitals.
SCANS and/or Core Curriculum Competencies	Reading, Writing, Speaking/Listening, Critical Thinking, Computer/Information Literacy

Course Calendar		Course Schedule	
Jan	17	Chapter 1 – Chemistry: The Study of Change	
Jan	19	Lab Safety , Conclude Chapter 1, Begin Chapter 2 – Atoms, Molecules, and Ions	
Jan	24	Conclude Chapter 2, Begin Chapter 3 – Mass Relationships in Chemical Reactions	
Jan	26	EXPERIMENT 1 – Measuring Techniques and Calculations	
Jan	31	Chapter 3	
Feb	2	EXPERIMENT 2 – Separation of a Mixture	
Feb	7	Chapter 4 – Reactions in Aqueous Solution	
Feb	9	EXPERIMENT 5 – Empirical Formula of an Oxide EXPERIMENT 6 – Formula of a Hydrate and Percent Water of Hydration	
Feb	14	EXAM 1 – Chapters 1–3	
Feb	16	EXPERIMENT 8 – Metathesis Reactions in Aqueous Solution: Net Ionic Equations	
Feb	21	Conclude Chapter 4, Begin Chapter 5 – Gases	
Feb	23	EXPERIMENT 13 – Molecular Weight of a Volatile Compound	
Feb	28	Conclude Chapter 5, Begin Chapter 6 – Thermochemistry	
Mar	1	Conclude Chapter 6	
Mar	6	Begin Chapter 7 – Quantum Theory and the Electronic Structure of Atoms	
Mar	8	EXPERIMENT 11 – Heat of Neutralization	
Mar	13	☺ Spring Break – No Classes ☺	
Mar	15	☺ Spring Break – No Classes ☺	
Mar	20	Conclude Chapter 7	
Mar	22	Chapter 8 – Periodic Relationships Among the Elements	
Mar	27	EXAM 2 – Chapters 4–7	
Mar	29	EXPERIMENT 9 – Reactivity of Metals – Activity Series ☞ Last Day for Withdrawals (for grade of W) ☞	
Apr	3	Begin Chapter 9 – Chemical Bonding I: Basic Concepts	
Apr	5	Conclude Chapter 9	
Apr	10	Begin Chapter 10 – Chemical Bonding II: Molecular Geometry and Hybridization of Atomic Orbitals	
Apr	12	EXPERIMENT 4 – Identification of Substances	
Apr	17	Chapter 10	
Apr	19	EXPERIMENT 14 – The VSEPR Theory of Molecular Geometry	

	<p>Apr 24 EXAM 3 – Chapters 8–10</p> <p>Apr 26 Begin Chapter 11 – Intermolecular Forces and Liquids and Solids</p> <p>May 1 Conclude Chapter 11</p> <p>May 3 Review for Final</p> <p>May 8 Finals Week – No Class</p> <p>May 10 FINAL EXAM – Chapters 1–11, 8:00 – 10:00 AM</p> 
Instructional Methods	Standard class lectures using the whiteboard with occasional use of PowerPoints.
Student Assignments	Outside of laboratory reports, special assignments are normally not required. I will recommend practice problems but these are not graded. Practice problems, such as those at the end of the chapters, are highly beneficial to learning chemistry. The McMurry organic textbook has “in text” problems within the chapters with answers provided at the end of the textbook. Answers to the end of chapter problems are in the study guide. Online problems can be found on my Learning Web site. It is helpful to have a spiral leaf notebook just for working chemistry problems. That will keep your work more organized and you (or I) can more easily review your work.
Student Assessment(s)	<p>The overall score is based on the following:</p> <ul style="list-style-type: none"> • Three regular exams 55% • Laboratory 20% • Final Exam 25% <p>Overall Score = 0.55(Average of three regular exams) + 0.20(Laboratory grade) + 0.25(Final Exam)</p>
Instructor's Requirements	<p><u>Laboratory Policy</u></p> <p>Lab safety will be reviewed before the first lab. Each student will then sign a statement affirming his or her commitment to following safe procedures in the laboratory, and turn the form in to the instructor. Be especially aware of the need for adequate eye protection and proper dress in the laboratory.</p> <ul style="list-style-type: none"> • <i>Safety glasses or goggles must be worn at all times during the laboratory period.</i> • <i>No food or drinks are allowed in the lab.</i> • <i>Open-toed shoes and/or shorts should not be worn in the lab.</i> • <i>Admission to the lab may be denied for violation of any of these rules.</i> <p>Normally, experiments will be performed in groups of two to three students. Students should arrive at the lab <i>on time</i> with their lab manual. After you have finished the experiment, show me your results for me to examine briefly, and I will initial (“<i>S.D.</i>”) your lab report before you leave. <i>Laboratory reports are due on the next lab day.</i> Each report must be done <i>individually</i>, but of course you can work with your lab partners on it. Each report will be graded on a 10-point basis. Come to lab <i>prepared</i>. Read through the experiment beforehand and do the pre-lab questions at the end of the lab report. You will be much better organized when doing the experiments, and your laboratory experience will be much more rewarding!</p> <p><u>Exams and Make-up Policy</u></p> <p>Examinations will consist of three non-cumulative regular exams plus a comprehensive final. Make-up exams will not normally be given, so make every effort to take the exams on their scheduled dates. In the event that you <i>must</i> miss a regular exam, I will count the grade</p>

	made on the final exam as the grade for the missed exam (for one missed exam only), and calculate the final course grade accordingly. If you do not miss any of the regular exams, I will replace your lowest exam score with your final exam score if the final exam grade is higher. This is intended to provide you a "second chance" if you do not do well on a particular exam. Remember that the final exam will be <i>comprehensive</i> (meaning that it will cover <i>all</i> of the material from the whole semester, not just the last part). Please note that all students are required to take the final (no student can be exempted).
Program/Discipline Requirements	At the program level, the Chemistry Discipline strives to accomplish the Program Learning Outcomes, Student Learning Outcomes, and Learning Objectives as described above. We desire that you receive a challenging and rewarding experience in your chemistry classes at HCC which will prepare you well for future chemistry and related science courses that you may take in the future.
HCC Grading Scale	<p>A = 100 – 90;4 points per semester hour B = 89 – 80:3 points per semester hour C = 79 – 70:2 points per semester hour D = 69 – 60:1 point per semester hour 59 and below = F.....0 points per semester hour IP (In Progress)0 points per semester hour W(Withdrawn).....0 points per semester hour I (Incomplete).....0 points per semester hour AUD (Audit)0 points per semester hour</p> <p>IP (In Progress) is given only in certain developmental courses. The student must re-enroll to receive credit. COM (Completed) is given in non-credit and continuing education courses. To compute grade point average (GPA), divide the total grade points by the total number of semester hours attempted. The grades "IP," "COM" and "I" do not affect GPA.</p>
Instructor Grading Criteria	See the above descriptions of the lab, exams, quizzes, and final. The course grade is based on these four criteria according to the Assessment section above.
Instructional Materials	<p><u>Textbook</u></p> <div data-bbox="529 1098 662 1268" data-label="Image"> </div> <p><u>Chemistry, Tenth Edition, Volume I</u>, by Raymond Chang. McGraw-Hill 2 ISBN-13 978-0-07-736562-2 Softcover Custom Edition available at HCC bookstores</p> <p>Description of hardcover version: http://catalogs.mhhe.com/mhhe/viewProductDetails.do?isbn=00772743</p> <div data-bbox="529 1310 662 1459" data-label="Image"> </div> <p>The full hardcover edition for CHEM 1411 & 1412 is also available (ISBN-13 978-0-07-351109-2)</p> <p><u>Laboratory Manual</u></p> <p>Last Year's:</p> <div data-bbox="529 1665 662 1814" data-label="Image"> </div> <p><u>General Chemistry 1411 & 1412 Laboratory Manual, Third Edition</u> by Gholam Phalavan. Blue Door Publishing: 2010. <u>HCC Southwest College Edition</u> ISBN-13: 978-1-59984-186-1</p>

	<p>This Year's:</p> <div data-bbox="532 157 646 338">  </div> <p><u>Laboratory Manual for CHEM 1411 – General Chemistry I</u> by Gholam Pahlavan, et. al. Blue Door Publishing: 2010. New <i>HCC System-Wide Edition</i> ISBN-13: 978-1-59984-380-3</p> <p><u>Optional Study Guide and Solutions Manual</u></p> <p><u>Student Study Guide to accompany Chemistry 10th Edition, by Raymond Chang</u> McGraw-Hill ISBN 978-0-07-322676-7</p>
<p>HCC Policy Statement: ADA Academic Honesty Student attendance 3-peaters Withdrawal deadline</p>	<p>Access Student Services Policies on their Web site: http://hccs.edu/student-rights</p> <p><u>Disability Support Services (DSS)</u> “Any student with a documented disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) who needs to arrange reasonable accommodations must contact the Disability Services Office at the respective college at the beginning of each semester. Faculty are authorized to provide only the accommodations requested by the Disability Support Services Office.”</p> <p>If you have any special needs or disabilities which may affect your ability to succeed in college classes or participate in any college programs or activities, please contact the DSS office for assistance. At Southwest College, contact Dr. Becky Hauri, 713-718-7909. Contact numbers for the other HCC colleges are found in the Annual Schedule of Classes, and more information is posted at the HCC web site at Disability Services.</p> <p><u>Academic Honesty</u> “Students are responsible for conducting themselves with honor and integrity in fulfilling course requirements. Disciplinary proceedings may be initiated by the college system against a student accused of scholastic dishonesty. Penalties can include a grade of "0" or "F" on the particular assignment, failure in the course, academic probation, or even dismissal from the college. Scholastic dishonesty includes, but is not limited to, cheating on a test, plagiarism, and collusion.” In this class, the penalty for willful cheating on exams is a grade of F in the course. This is the standard policy of the Physical Sciences department at Southwest College.</p> <p><u>Attendance Policy</u> The HCCS attendance policy is stated as follows: “Students are expected to attend classes regularly. Students are responsible for materials covered during their absences, and it is the student's responsibility to consult with instructors for make-up assignments. Class attendance is checked daily by instructors. <i>Although it is the responsibility of the student to drop a course for non-attendance, the instructor has full authority to drop a student for excessive absences. A student may be dropped from a course for excessive absences after the student has accumulated absences in excess of 12.5% of the hours of instruction (including lecture and laboratory time).</i>”</p> <p>Note that 12.5% is approximately <u>4</u> classes or labs for a 4 semester hour course, such as this one, which meets two times per week in a normal 16 week semester. If circumstances</p>

	<p>significantly prevent you from attending classes, please inform me. I realize that sometimes outside circumstances can interfere with school, and I will try to be as accommodating as possible, but please be aware of the attendance policy.</p> <p><u>Policy Regarding Multiple Repeats of a Course</u></p> <p>“NOTICE: Students who repeat a course three or more times may soon face significant tuition/fee increases at HCC and other Texas public colleges and universities. If you are considering course withdrawal because you are not earning passing grades, confer with your instructor/counselor as early as possible about your study habits, reading and writing homework, test-taking skills, attendance, course participation, and opportunities for tutoring or other assistance that might be available.”</p> <p><u>Last Day for Administrative and Student Withdrawals</u></p> <p>For 16-week Spring '12 classes, this date is <u>March 29</u>. I urge any student who is contemplating withdrawing from the class to see me first! You may be doing better than you think. Either way, I want to be accessible and supportive. I do not believe in "weed out" classes, and I consider you to be much more than just a name or number! Note my office hours above; if you need assistance, I'm here to help.</p> <p>☞ <u>Policy Regarding Withdrawals</u> ☞</p> <p>Students desiring to withdraw from a class must do so by the above withdrawal date by filling out a withdrawal form at the registrar's office. <i>After this date, instructors can no longer enter a grade of "W" for the course for any reason.</i></p>
Distance Education and/or Continuing Education Policies	<p>Access DE Policies on their Web site: http://de.hccs.edu/Distance_Ed/DE_Home/faculty_resources/PDFs/DE_Syllabus.pdf</p> <p>Access CE Policies on their Web site: http://hccs.edu/CE-student-guidelines</p>
Test Bank	<p>Extra practice problems by chapter, sample exams, and sample finals may be found at the following web sites: http://learning.hccs.edu/faculty/steven.dessens http://swc2.hccs.edu/pahlavan</p>
Scoring Rubrics	<p>Regular exams and the final will consist of multiple-choice and show-work questions. These are graded in the standard manner. The regular exams will include extra questions for extra credit, for a total possible score of about 105 to 110 points.</p> <p>The lab reports are graded on the basis of completeness, neatness, and the correctness of the calculations tied to the experimental result. The pre- and post-lab questions are also checked. Each report is graded on a 20 point basis.</p>
Sample Assignments	N/A
Sample Instructional Methods/Activities	<p>See the PowerPoints at my Learning Web site for an overview of the content of each chapter: http://learning.hccs.edu/faculty/steven.dessens</p>

Important Dates

January 17	Tuesday	Classes Begin
January 18	Wednesday	Last Day for Drop/Add/Swap
February 20	Monday	Offices Closed – Presidents Day Holiday
March 29	Thursday	Last Day for Administrative/ Student Withdrawals with a grade of “W” 4:30 PM After the withdrawal date no W can be given, you <u>must</u> receive a regular grade (A-F) in the course.
May 6	Sunday	Instruction Ends
May 10	Thursday	Final Exam (No deviation from the printed schedule is permitted.)
May 18	Friday	Grades Available to Students

Other Information

Free chemistry tutoring is available. A tutoring schedule will be posted in the classroom and lab and will also be placed on my web site at http://learning.hccs.edu/faculty/steven.dessens/chemistry_resources/tutoring-schedules.



In addition to “face to face” tutoring, HCC also offers online tutoring from AskOnline. It is also free and is available for chemistry and many other subjects. The login page is at <http://www.hccs.askonline.net>.

There are also many interesting chemistry resources on the Internet which can be found by using keyword searches. But your best immediate source of information is your *textbook* - make thorough use of it!

The publisher of your textbook has an extensive online site called **ARIS** (Assessment, Review, and Instruction System) at <http://mharis.com>. Access to the full features requires an account and password. A simplified ARIS page for the ninth edition of Chang is at <http://highered.mcgraw-hill.com/classware/selfstudy.do?isbn=0072980605> and does not require you to log in.

The student companion site for the tenth edition of the Chang textbook is at http://highered.mcgraw-hill.com/sites/0023654666/student_view0/ and also does not require a login.

Evaluation for Greater Learning Student Survey System (EGLS3)

“At Houston Community College, professors believe that thoughtful student feedback is necessary to improve teaching and learning. During a designated time, you will be asked to answer a short online survey of research-based questions related to instruction. The anonymous results of the survey will be made available to your professors and division chairs for continual improvement of instruction. Look for the survey as part of the Houston Community College Student System online near the end of the term.” <http://www.hccs.edu/EGLS3>

New Meningitis Vaccination Requirement

Texas Senate Bill 1107 passed in May 2011, requires that new HCC students and former HCC students returning after an absence of at least one fall or spring semester who are under the age of 30 are required to present a physician-signed certificate showing they have been vaccinated against bacterial meningitis. The immunization must be administered at least 10 calendar days before the start date of your classes and must have been received within the last five years.

<http://www.hccs.edu/hccs/future-students/applying/new-meningitis-vaccination-requirement>

General Suggestions

Chemistry is a vast field, ranging from the study of simple inorganic salts to enormously complex molecules such as enzymes and nucleic acids in living organisms. In this course, the major topics we will be covering are chemical formulas, reactions and stoichiometry, chemical thermodynamics, electron configuration, chemical bonding, gas laws, and structures of solids.

Following are some general suggestions:



Learning chemistry takes time. A reasonable guide is to plan for two hours of study for each hour of lecture. Heavy work and/or class loads are not compatible with learning chemistry!



Attend class regularly (!) and take generous notes during class. Ask questions.



When beginning a new chapter, I recommend that you read through it quickly the first time, just to give yourself a good feel for what it is about. I you are really on the job you will have done this before the class lecture on the chapter! You will understand what's going on in class much better if you do this.



Next, start tackling the end of chapter problems or other available problem sets. Often, working problems facilitates understanding much better than just reading and rereading the chapter itself. Chemistry is a "hands on" course - working problems is essential. However, do not spend an inordinate amount of time on a single problem - skip it for the time being and go on to another. Try working some of the sample exercises. They are worked out in the chapter and are very helpful.



You should have a good, scientific calculator that has scientific notation ("EE" or "EXP" key), log, ln, x^2 , $\sqrt{}$, etc. Business calculators usually do not have all of these features. As noted above, the use of programmable calculators is not allowed when taking exams.



Review basic math operations such as properties of logarithms, if you are rusty.



Study groups can be very helpful. Keep the group small though, no more than three or four people.



Finally, keep a positive outlook! Chemistry can be hard, but with a good approach, you will succeed in mastering it!

I hope you find chemistry to be an interesting and rewarding subject which will not only be useful in your academic major, but will give you a better insight into the many scientific challenges we are facing today. I look forward to working with you during this semester.

A handwritten signature in black ink, appearing to read "Steve Dessens".



Steve Dessens
January, 2012