



**HOUSTON COMMUNITY COLLEGE SOUTHWEST**  
**COURSE SYLLABUS FOR CHEM 1411 – GENERAL CHEMISTRY I**  
**Fall 2016**  
**Class Number 15113**


<b>Discipline/Program</b>	Chemistry
<b>Course Level</b>	First Year (Freshman)
<b>Course Title</b>	General Chemistry I
<b>Course Rubric and Number</b>	CHEM 1411
<b>Semester with Course Reference Number (CRN)</b>	Fall 2016 CRN 15113
<b>Course Location/Times</b>	Stafford Scarcella Center, 10141 Cash Road Monday Room W121 (lecture) 2:00 – 5:00 PM Wednesday Room S109 (lab) 2:00 – 5:00 PM
<b>Course Semester Credit Hours (SCH) (lecture, lab)</b>	4 (3 lecture, 3 lab)
<b>Total Course Contact Hours</b>	96
<b>Course Length (number of weeks)</b>	16
<b>Type of Instruction</b>	In-person
<b>Instructor contact information (phone number and email address)</b>	Dr. Steven E. Dessens Office Phone: 713-718-6710 E-mail: <a href="mailto:steven.dessens@hccs.edu">steven.dessens@hccs.edu</a> Learning Web: <a href="http://learning.hccs.edu/faculty/steven.dessens">http://learning.hccs.edu/faculty/steven.dessens</a>
<b>Office Location and Hours</b>	Room S107 Stafford Scarcella building, Tuesday 1:00-4:00 PM.
<b>Course Description: ACGM or WECM</b>	General principles, problems, fundamental laws, and theories. Course content provides a foundation for work in advanced chemistry and related sciences.
<b>Course Description: HCC Catalog Description</b>	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.
<b>Course Prerequisite(s)</b>	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).
<b>Academic Discipline Program Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. Demonstrate a basic mastery of chemistry by writing formulas and equations for chemical reactions, performing chemical calculations, and recognizing the application of chemistry in our daily lives.</li> <li>2. Demonstrate a mastery of introductory and intermediate level chemistry to promote success in higher level chemistry and other science programs at four-year universities.</li> <li>3. Demonstrate a mastery of General and Organic Chemistry in preparation for professional programs such as Medicine, Dentistry, and Pharmacy.</li> <li>4. Conduct laboratory experiments by making measurements, performing chemical reactions, and analyzing the results in a group or individual setting.</li> </ol>
<b>Course Student Learning Outcomes (SLO)</b>	<ol style="list-style-type: none"> <li>1. Give names and formulas of elements, ions, and ionic and molecular compounds.</li> <li>2. Categorize, complete, and balance chemical reactions.</li> <li>3. Do chemistry calculations involving reaction stoichiometry and energy changes.</li> <li>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.</li> <li>5. Identify the parts of the periodic table and the trends in periodic properties of atoms.</li> <li>6. Relate the properties of gases with the gas laws and extend the application of these</li> </ol>

	<p>relationships to reaction stoichiometry, gas mixtures, and effusion/diffusion of gases.</p> <p>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.</p>
<b>Learning Objectives (Numbering system linked to SLO)</b>	<p>1.1. Given the name, identify the formula and charge of positive and negative ions, and vice-versa.</p> <p>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.</p> <p>2.1. Identify given reactions as combination, decomposition, single displacement, and double displacement.</p> <p>2.2. Starting with the reactants, complete the reaction by writing the reaction products.</p> <p>2.3. Given the reactants and products, balance the equation for the reaction.</p> <p>3.1. Convert amounts in units of mass or volume to moles, and vice-versa.</p> <p>3.2. Given the amount of one substance in a reaction, calculate the amount of the other substances that react and form.</p> <p>3.3. Identify the limiting reactant and excess reactant in a reaction where more than one reactant amount is given.</p> <p>3.4. Determine the amount of the excess reactant that remains as unreacted excess.</p> <p>3.5. Calculate energy changes associated with chemical reactions using Hess's law, standard enthalpies of formation, or calorimetry.</p> <p>4.1. Relate frequency, wavelength, and the speed of electromagnetic radiation.</p> <p>4.2. From the frequency or wavelength of electromagnetic radiation, calculate its energy.</p> <p>4.3. Relate the energy change in the hydrogen atom to its electronic transitions using the Bohr model.</p> <p>4.4. Identify and relate the four quantum numbers that can be associated with electrons.</p> <p>4.5. Write the electronic configurations of atoms and ions, including the box diagram method.</p> <p>5.1. Identify the common regions of the periodic table. Identify by name selected groups of elements in the periodic table.</p> <p>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.</p> <p>5.3. Identify reaction similarities of elements within the same group in the periodic table.</p> <p>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.</p> <p>6.2. Perform stoichiometry calculations which involve gaseous substances.</p> <p>6.3. Use Dalton's law and Graham's law to perform calculations involving gaseous mixtures and effusion and diffusion of gases.</p> <p>6.4. Explain the assumptions of the kinetic-molecular theory of gases.</p> <p>7.1. Draw the Lewis dot structure of molecules containing two or more atoms.</p> <p>7.2. Based on the dot structure of the molecule, determine its electron domain geometry and molecular geometry based on VSEPR theory.</p> <p>7.3. Given the dot structure, identify the hybridization of and geometry about each atom.</p> <p>7.4. Explain the nature of sigma and pi bonding using hybrid atomic orbitals.</p>
<b>SCANS and/or Core Curriculum Competencies</b>	Critical Thinking, Communication Skills, Empirical & Quantitative Reasoning, and Teamwork

## Course Calendar

### Weekly Schedule

Aug	22	Chapter 1 – Introduction: Matter and Measurement
Aug	24	Conclude Chapter 1, Review Lab Safety
Aug	29	Chapter 2 – Atoms, Molecules, and Ions
Aug	31	<b>EXPERIMENT 1 – Measuring Techniques and Calculations</b>
Sept	5	☞ Labor Day Holiday - No Classes ☛
Sept	7	<b>EXPERIMENT 2 – Separation of a Mixture</b>
Sept	12	Chapter 3 - Chemical Reactions and Reaction Stoichiometry
Sept	14	Conclude Chapter 3
Sept	19	Chapter 4 – Reactions in Aqueous Solution
Sept	21	<b>EXPERIMENT 5 - Empirical Formula of an Oxide</b>
Sept	26	Chapter 5 – Thermochemistry
Sept	28	<b>EXPERIMENT 8 – Reactions in Aqueous Solution: Single and Double Displacement Reactions</b>
Oct	3	<b><u>EXAM 1 – Chapters 1-4</u></b>
Oct	5	<b>EXPERIMENT 11 - Heat of Acid-Base Neutralization</b>
Oct	10	Chapter 6 – Electronic Structure of Atoms
Oct	12	Chapter 7 - Periodic Properties of the Elements
Oct	17	Conclude Chapter 7 Begin Chapter 8 - Basic Concepts of Chemical Bonding
Oct	19	Conclude Chapter 8 <b>Begin EXPERIMENT 14 - The VSEPR Theory of Molecular Geometry</b>
Oct	24	<b><u>EXAM 2 – Chapters 5-8</u></b>
Oct	26	Begin Chapter 9 – Molecular Geometry and Bonding Theories
Oct	28	☞ Last Day for Withdrawals (for grade of W) ☛
Oct	31	Conclude Chapter 9
Nov	2	Complete <b>EXPERIMENT 14</b>
Nov	7	Chapter 10 – Gases
Nov	9	Conclude Chapter 10
Nov	14	Chapter 11 – Liquids and Intermolecular Forces
Nov	16	<b>EXPERIMENT 13 - Ideal Gas Law: Determination of the Molar Mass of a Volatile Compound</b>
Nov	21	<b><u>EXAM 3 – Chapters 9-11</u></b>
Nov	23	<b>EXPERIMENT 6 - Formula of a Hydrate and Percentage of Water of Hydration</b>
Nov	28	Conclude Chapter 11, Chapter 12 – Solids and Modern Materials
Nov	30	Conclude Chapter 12, Review for Final

	<p>Dec 5 Finals Week, No Class</p> <p><b>Dec 7 FINAL EXAM - Chapters 1-12, 2:00 - 4:00 PM</b></p> 
<b>Instructional Methods</b>	Standard class lectures using the whiteboard with occasional use of PowerPoints.
<b>Student Assignments</b>	Outside of laboratory reports and chapter quizzes, 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 Zumdahl textbook has example problems within the chapters and answers to the odd-numbered end of chapter problems are provided at the end of the textbook. 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.
<b>Student Assessment(s)</b>	<p>The overall score is based on the following:</p> <ul style="list-style-type: none"> <li>• Three regular exams 60%</li> <li>• Laboratory 20%</li> <li>• Final Exam 20%</li> </ul> <p>Overall Score = 0.60(Average of three regular exams) + 0.20(Laboratory grade) + 0.20(Final Exam)</p>
<b>Instructor's Requirements</b>	<p><b><u>Laboratory Policy</u></b></p> <p><b>Lab safety</b> 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 <b><i>eye protection</i></b> and <b><i>proper dress</i></b> in the laboratory.</p> <ul style="list-style-type: none"> <li>• <b><i>Safety glasses or goggles must be worn at all times during the laboratory period.</i></b></li> <li>• <b><i>No food or drinks are allowed in the lab.</i></b></li> <li>• <b><i>Open-toed shoes and/or shorts should not be worn in the lab.</i></b></li> <li>• <b><i>Admission to the lab may be denied for violation of any of these rules.</i></b></li> </ul> <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 <b>initial</b> ("SD") 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><b><u>Exams and Make-up Policy</u></b></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 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).</p>
<b>Program/Discipline Requirements</b>	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.
<b>HCC Grading Scale</b>	<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>
<b>Instructor Grading Criteria</b>	The course grade is based on the criteria according to the Assessment section above.
<b>Instructional Materials</b>	<p><b><u>Textbook</u></b></p> <div data-bbox="532 1173 662 1346" data-label="Image"> </div> <p><b><u>Chemistry, The Central Science, 13th Ed., Volume I</u></b>  by Brown, LeMay, Bursten, Murphy, Woodward, and Stoltzfus  Pearson Education, Inc, 2015.  ISBN-13 978-1-32344-453-5 (Includes MasteringChemistry Passcode)  Softcover Custom Edition available at HCC bookstores</p> <p><b><u>Laboratory Manual</u></b></p> <div data-bbox="532 1438 662 1610" data-label="Image"> </div> <p><b><u>Laboratory Manual for CHEM 1411 – General Chemistry I, 2<sup>nd</sup> Ed.</u></b>  by HCC Chemistry Faculty. Blue Door Publishing: 2016.  <b>HCC System-Wide Edition</b>  ISBN-13: 978-1-68135-346-3</p> <p><b><u>Optional Study Guide and Solutions Manuals</u></b></p> <div data-bbox="532 1711 662 1883" data-label="Image"> </div> <p><b><u>Study Guide for Chemistry: The Central Science 13th Edition</u></b>  by Theodore E. Brown and James C. Hill  ISBN-13: 978-0-32194-928-8</p> <p><b><u>Solutions to Red Exercises for Chemistry: The Central Science 13th Edition</u></b>  by Theodore E. Brown and Roxy Wilson  ISBN-13: 978-0-32194-926-4</p>

<p><b>HCC Policy Statement:</b>  <b>ADA</b>  <b>Academic Honesty</b>  <b>Student attendance</b>  <b>3-peaters</b>  <b>Withdrawal deadline</b></p>	<p>Access Student Services Policies on their Web site:  <a href="http://www.hccs.edu/district/about-us/procedures/student-rights-policies--procedures/">http://www.hccs.edu/district/about-us/procedures/student-rights-policies--procedures/</a></p> <p><b><u>Disability Support Services (DSS)</u></b>          “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.”          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:  <a href="http://www.hccs.edu/district/students/disability-services/">http://www.hccs.edu/district/students/disability-services/</a></p> <p><b><u>Academic Honesty</u></b>          “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.” <b>Use of cell phones are not allowed during exams. Students are not permitted to leave the room during their exam.</b></p> <p><b><u>Attendance Policy</u></b>          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>If circumstances 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><b><u>Policy Regarding Multiple Repeats of a Course</u></b>          “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><b><u>Last Day for Administrative and Student Withdrawals</u></b>          For 16-week Fall 2016 classes, this date is <u>October 28</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 we 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>
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	<p><b>🔑 Policy Regarding Withdrawals 🔑</b></p> <p>Students desiring to withdraw from a class must do so by the above withdrawal date by filling out a <b>withdrawal form</b> 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>
<b>Distance Education and/or Continuing Education Policies</b>	<p>Access DE Policies on their Web site:  <a href="http://de.hccs.edu/student-services/">http://de.hccs.edu/student-services/</a></p> <p>Access CE information on their Web site:  <a href="http://www.hccs.edu/continuing-education/">http://www.hccs.edu/continuing-education/</a></p>
<b>Test Bank</b>	<p>Extra practice problems by chapter, sample exams, and sample finals may be found at the following web sites:  <a href="http://learning.hccs.edu/faculty/steven.dessens">http://learning.hccs.edu/faculty/steven.dessens</a>  <a href="http://swc2.hccs.edu/pahlavan">http://swc2.hccs.edu/pahlavan</a></p>
<b>Scoring Rubrics</b>	<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 some extra questions for extra credit.</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 10 point basis.</p>
<b>Sample Assignments</b>	N/A
<b>Sample Instructional Methods/Activities</b>	<p>See the Powerpoints on the instructors Learning Web site for an overview of the content of each chapter:  <a href="http://learning.hccs.edu/faculty/steven.dessens">http://learning.hccs.edu/faculty/steven.dessens</a></p>

**🔑 Important Dates 🔑**

Aug	22	Monday	Classes Begin
Oct	28	Friday	Last Day for Administrative/ Student Withdrawals with a grade of "W"
			<b>After the withdrawal date no W can be given, you <u>must</u> receive a regular grade (A-F) in the course.</b>
Dec	4	Sunday	Instruction Ends
Dec	7	Wednesday	<b>Final Exam</b> (No deviation from the printed schedule is permitted.)
Dec	12	Monday	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](http://learning.hccs.edu/faculty/steven.dessens/chemistry_resources/tutoring-schedules).

**Upswing** In addition to “face to face” tutoring, HCC also offers online tutoring from Upswing. It is also free and is available for chemistry and many other subjects. The login page is at <https://hccs.upswing.io>.

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 **MasteringChemistry** at <http://www.masteringchemistry.com>. Access to the full features requires an account and password.

The student companion site for the tenth edition of the previous Chang textbook is at [http://highered.mcgraw-hill.com/sites/0023654666/student\\_view0/](http://highered.mcgraw-hill.com/sites/0023654666/student_view0/). This has multiple-choice chapter quizzes and 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>

## **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/district/students/apply/meningitis/>



## 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 make notes.



When beginning a new chapter, I recommend that you first read through it quickly, just to give yourself a good feel for what it is about. Once you begin working practice problems, you will necessarily examine sections in detail.



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,  $x^2$ ,  $\sqrt{\quad}$ , 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 fairly small though, so everyone gets a chance to participate.



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 this semester.

A handwritten signature in black ink, reading "Steve Dessens".



Steve Dessens  
August 2016