

<b>Course:</b>	<b>CHE 132-01 General Chemistry II Spring 2012</b>
<b>Term:</b>	<b>MWTHF 2:00-4:50 pm King Science Bldg. 103</b>
<b>Instructor:</b>	<b>Dr. F. Jordan 104 King Science Bldg. fjordan@wilberforce.edu Phone Number: 937-708-5633 Office Hours MWF, 11-11:50, 1-1:50 (drop-ins and appointments welcome)</b>
<b>Catalog Description:</b>	<b>Course Description:</b> General Chemistry II will continue your education in the basic principles of chemistry. Your education will include: the properties of solids, liquids, and solutions; chemical kinetics; simple chemical equilibrium; chemical equilibrium applied to acids, bases, salts, and solubility; theories and applications of acids and bases; thermodynamics; electrochemistry; introductory transition metal chemistry; and introductory nuclear chemistry (Chapters 12-21 of the lecture textbook).
<b>Prerequisites</b>	<b><u>Pre-/Co-requisites:</u></b>  1) CHE 131 (General Chemistry I) with a grade of C or better.  2) MAT 113 with a grade of C or better OR concurrent enrollment in MAT 113; MAT 115 recommended but not required. As with CHE 131, it is <b>critical</b> that you are able to <b>use and apply algebra</b> to be successful in the course; the level of algebra used is higher than that of CHE 131 (applied quadratic equation and logarithms).  3) Concurrent enrollment in CHE 132L (General Chemistry II Lab).
<b>Course Level Learning Outcomes:</b>	<b><u>Student Learning Outcomes:</u></b> A student who successfully passes this course will know and be able to perform the following: (Please note that this list does not state all topics that will be covered in this course, but emphasizes those topics of greatest importance in this course that will be covered.)  <b>Chapter 12: Intermolecular Forces and Liquids and Solids</b> <ul style="list-style-type: none"> <li>• The basic Kinetic Molecular Theory of solids, liquids, and solutions</li> <li>• Determine which intermolecular force(s) are involved in solids, liquids, and solutions</li> <li>• The four general types of crystalline solids</li> <li>• Discuss phase changes and interpret phase diagrams</li> <li>• Calculate the vapor pressure of or molar heat of vaporization of a liquid using the Clausius-Clapeyron equation</li> </ul>

**Chapter 13: Physical Properties of Solutions**

- Predict the relative solubility or insolubility of a substance in a solvent, and the effects of temperature and pressure thereon
- Calculate and interconvert concentration units of a solution (mass percent, molarity, molality)
- Discuss the four colligative properties qualitatively
- Calculate the vapor pressure lowering, boiling point elevation, freezing point depression, and osmotic pressure for any ideal electrolyte or non-electrolyte solution
- Determine the molar mass of a solute based upon data from colligative properties

**Chapter 14: Chemical Kinetics**

- Write the rate expression for any balanced chemical equation
- Determine the rate law of a reaction from experimental data
- Determine the concentration of a reactant at any time during a zero-, first-, or second-order reaction using the concentration-time equations (integrated rate laws)
- Calculate the rate constant, frequency factor, or activation energy using the Arrhenius equation
- What elementary steps and rate-determining steps are, and what a catalyst is
- Identify reactants, products, intermediates, transition states, activation energies, rate-determining steps, and free-energy changes on a reaction energy diagram

**Chapter 15: Chemical Equilibrium**

- Write the equilibrium constant expression in concentration units for a reversible reaction (homogeneous or heterogeneous)
- Predict the direction of a reaction based upon initial concentrations and the equilibrium constant
- Calculate the initial and/or final concentrations of chemical species present in a chemical equilibrium
- Use Le Châtelier's Principle to determine shifts in equilibrium

**Chapter 16: Acids and Bases**

- Determine whether an acid or base is strong or weak using values of dissociation constants
- Calculate the pH, hydronium ion concentration, or hydroxide ion concentration of a solution of a strong acid or a strong base
- Calculate the pH, hydronium ion concentration, or hydroxide ion concentration of a solution of a weak acid or a weak base, especially by using the dissociation constants
- Predict whether a salt will make an acidic, basic, or neutral solution, and calculate the pH of that solution
- Predict if a simple chemical entity is a Lewis acid, a Lewis base, both, or neither

**Chapter 17: Acid-Base Equilibria and Solubility Equilibria**

- Calculate the pH of a prepared or perturbed buffer solution

	<ul style="list-style-type: none"> <li>• Calculate the pH, <math>pK_a</math>, or ratio of base to acid using the Henderson-Hasselbalch equation</li> <li>• Calculate the molar solubility of a salt using the dissociation constant of the salt</li> <li>• Discuss the Common Ion Effect and complex ion equilibria qualitatively</li> </ul> <p><b>Chapter 18: Thermodynamics</b></p> <ul style="list-style-type: none"> <li>• State the Three Laws of Thermodynamics</li> <li>• Predict if a chemical or physical change involves a net change in entropy</li> <li>• Calculate the change in Gibbs Free Energy</li> <li>• Use the value of Gibbs Free Energy to determine the spontaneity of a reaction, the presence of equilibrium, the direction of a reversible reaction, and the equilibrium constant of a reversible reaction</li> </ul> <p><b>Chapter 19: Redox Reactions and Electrochemistry</b></p> <ul style="list-style-type: none"> <li>• Predict the products of and balance simple and complex redox chemical equations</li> <li>• Calculate the standard emf of a cell or chemical reaction</li> <li>• Interconvert the standard emf of a cell, the equilibrium constant, and the change in Gibbs Free Energy</li> <li>• Calculate a cell's or reaction's emf under various non-standard conditions using the Nernst equation</li> <li>• Determine the amount of material produced during a simple electrolysis experiment</li> </ul> <p><b>Chapter 20: The Chemistry of Coordination Compounds</b></p> <ul style="list-style-type: none"> <li>• Determine the electron configuration of, oxidation number of, and coordination number of simple transition metal compounds</li> <li>• Name simple coordination compounds</li> <li>• Draw simple coordination compounds in proper 3D perspective</li> <li>• Use Crystal Field Theory to discuss color and magnetism, given the appropriate diagrams</li> </ul> <p><b>Chapter 21: Nuclear Chemistry</b></p> <ul style="list-style-type: none"> <li>• Three basic types of radiation (alpha, beta, gamma) and six basic types of radioactive decay (alpha emission, beta emission, gamma emission, electron capture, positron emission, and spontaneous fission)</li> <li>• Write the nuclide notation for elements, alpha particles, beta particles, positrons, gamma rays, protons, and neutrons alone or in nuclear equations</li> <li>• Balance simple nuclear chemical equations</li> <li>• The general factors involved in nuclear stability</li> <li>• Calculate mass defect, nuclear binding energy, and binding energy per nucleon of a nuclide</li> </ul>
<b>Materials:</b>	<p><b><u>Required Materials:</u></b></p> <p>1) Lecture Text: <i>General Chemistry, The Essential Concepts</i>, 6th Ed., Chang. This was a <u>new edition</u> for Fall 2010. <i>Old editions won't work.</i></p>

	<p>2) Scientific Calculator: With parentheses, scientific notation, and logarithms. Programmable calculators are not permitted, and your cell phone can not substitute as a calculator.</p> <p><b><u>Recommended Materials:</u></b></p> <p>3) Periodic Table (Preferably the laminated type shown in class.)</p> <p>4) 2” 3-ring binder: For holding the large number of handouts in this class.</p> <p>Note: These are the same required and recommended materials for CHE 131 (General Chemistry I); there is nothing new to buy (provided you bought them last term...).</p>
<p><b>Grading:</b></p>	<p><b><u>Grading Scale:</u></b> Approximate cutoffs are given below. <i>The exact grade cutoffs will not be publicized.</i></p> <p>A = 100% to 87%  B = 86% to 76%  C = 75% to 66%  D = 65% to 60%  F = less than 60%</p> <p>Each exam-equivalent is worth about 14% of your grade, and the final is about 29%. 3.5 points equals 1%, so 5 bonus points is roughly a 1.4% grade boost, and one letter grade up is about 35 points.</p>

	<p>A student’s proficiency in course work is measured in terms of the following Alphabetical symbols. Minuses and pluses are not accepted.</p> <p>A: Excellent</p> <p>B: Good</p> <p>C: Satisfactory (Grade C or better required in major courses).</p> <p>D: Poor (passing, except in major courses).</p> <p>F: Earned Failure. (Removed only by repeating the course). Upon successfully passing the course, the first grade is “excluded” from grade point average. The second grade is “included in the recalculation of the grade point average.</p> <p>I: Incomplete (student performing satisfactorily, but unable to complete coursework due to valid reason).</p> <p>N: Used in cases where grades are not yet submitted.</p>
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	<p>W: Withdrew before course drop deadline.</p> <p>WP: Student withdraws from University. Withdrew passing after course drop deadline (2 weeks after mid-term).</p> <p>WF: Student withdraws from University. Withdrew failing after course drop deadline (2 weeks after mid-term. WF is treated as an F (punitive grade).</p> <p>CR: Credit/pass</p> <p>NC: No credit/fail</p> <p>Z: Failed course for non-attendance/unofficial withdrawal (treated the same as an F grade). Last date of attendance is reported by faculty.</p>
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<b>Activities:</b>	<p><b>Course Assignments:</b> Your grade in this class will be determined primarily by exam performance. However, homework, class citizenship (hard work, respectful discourse, courtesy, class participation, attendance, and timeliness), assessment exams, and possible bonus points can modify your grade, as discussed below. Depending on the personality and needs of this semester's class, other assignments may arise.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Highest 5 of 8 exam-equivalent scores (50 points each)</td> <td style="width: 10%; text-align: center;">=</td> <td style="width: 20%; text-align: right;">250</td> </tr> <tr> <td style="padding-left: 20px;">points</td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">5 of 5 hour exams</td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Post-test (assessment exam)</td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Homework</td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Attendance/Citizenship</td> <td></td> <td></td> </tr> <tr> <td>Final Exam</td> <td style="text-align: center;">=</td> <td style="text-align: right;">100</td> </tr> <tr> <td style="padding-left: 20px;">points</td> <td></td> <td></td> </tr> <tr> <td>Bonus points</td> <td style="text-align: center;">=</td> <td style="text-align: right;">0</td> </tr> <tr> <td style="padding-left: 20px;">points (adds to total)</td> <td></td> <td></td> </tr> <tr> <td style="border-top: 1px solid black;">Total</td> <td style="text-align: center;">=</td> <td style="text-align: right;">350</td> </tr> <tr> <td style="padding-left: 20px;">points</td> <td></td> <td></td> </tr> </table> <p>There will be five hour exams and a final exam. <i>All exams are cumulative.</i> The hour exams will place more emphasis on current material, and will use older material as necessary, <i>including material from General Chemistry I.</i> The final exam is evenly comprehensive. <i>There are no make-up exams for any reason.</i> If you know ahead of time that you must be absent, it may be possible to take an exam early.</p> <p>There will be three assessment exams given over the <u>full year</u> of general chemistry: a pre-test at the beginning of General Chemistry I, a mid-test at the beginning of General Chemistry II, and a post-test at</p>	Highest 5 of 8 exam-equivalent scores (50 points each)	=	250	points			5 of 5 hour exams			Post-test (assessment exam)			Homework			Attendance/Citizenship			Final Exam	=	100	points			Bonus points	=	0	points (adds to total)			Total	=	350	points		
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	<p>the end of General Chemistry II. <i>Taking these exams is mandatory.</i> The mid-test and post-test will both be administered in King 103 (General Chemistry Lab) during the normal laboratory time (T 1:00-4:00), on Tuesday, January 18th and Tuesday, April 26th, respectively. If you are not registered for CHE 132L this term, you must still take the exams at these two times.</p> <p>Taking the mid-test will earn you 5 bonus points. Your grades for 1) the post-test; 2) homework assignments; and 3) attendance/citizenship will be transformed into three separate exam-equivalent scores which may help your grade. While these three activities represent a possible way to make up for poor hour exam grades, it would be wise not to count on them, and to focus instead on earning good marks on all exams.</p> <p>Bonus points may be earned from a variety of activities, including resubmitting incorrect exam or homework problems, solving bonus problems given during lecture, and creating study aids. More information will be provided in class. A student may not earn more than 50 bonus points.</p> <p>To summarize, you will receive the equivalent of 8 hour exam grades: 5 from hour exams, 1 from homework, 1 from attendance/citizenship, and 1 from the post-test. Of these 8 grades, the lowest 3 will be dropped, and then the final exam score and bonus points will be added. Exceptional class citizens may receive bonus consideration and adjustments to a higher grade. Likewise, poor class citizens may be adjusted to a lower grade.</p>
<p><b>Policy Statements:</b></p>	<p><b><u>ADA Policy:</u></b> In accordance with the Americans with Disabilities Act (ADA), please inform the instructor of any special learning needs you may have at the beginning of the semester so that reasonable accommodations may be provided. Please present documentation of the same to the instructor.</p>
<p><b>University Policies:</b></p>	<p><b><u>Academic Honesty:</u></b> Plagiarism and cheating are completely unacceptable in an institution of higher education and learning. Such behavior deprives the student involved of the desired education and development of an appropriate value system. It is extremely unfair to other students, and it severely diminishes the value and integrity of a University degree.</p> <p>Plagiarism occurs whenever another's work is submitted as one's own. This includes the use of information from an Internet site or from a published author's ideas and words without proper attribution or documentation. It also includes the copying of term papers, other unpublished works, homework, case reports, computer programs and spreadsheets, and any other course assignments which are submitted for course credit as the student's own effort.</p>

Each instructor shall state the specific penalties for plagiarism and cheating in the course syllabus. The instructor has final responsibility for assessing the penalty in such cases regarding the course grade.

All cases of plagiarism and cheating will be referred to the Vice President for Academic Affairs for possible further action. Additional penalties may be imposed for the egregious cases of plagiarism and cheating.

### Drops and Withdrawals

#### Dropping Courses:

A course may be dropped up through the end of the second week of the semester without any record on the transcript. After this date, a course may be dropped up to two weeks after mid-term grade reports are due, with a W appearing on the transcript. Withdrawals after mid-terms must be approved by the Vice-president of academic Affairs.

In certain General Studies core courses, students' assignments to course sections may be changed by faculty with written notification given to the Registrar. In all other cases, a student wishing to move from one section of a course to another must accomplish this by using a drop-add form to drop the old section and add the new section.

#### Withdrawal/Grading Policies

The following procedures will apply to all students withdrawing from the University. Grades will be given in regard to the time of withdrawal. Contact the Registrar's Office for forms and assistance.

- **W** (official withdrawal initiated by the student): To be given when a student withdraws between the first day of class/registration and the last day to drop courses, this is two weeks after mid-term exams.
- **AW** (unofficial withdrawal not initiated by the student): The student does not inform anyone that he/she is leaving campus (the student walks out). The university may also administratively withdraw a student for disciplinary reasons, academic legal anytime during the semester.

#### Special Accommodations:

A student who is ill or who has or develops medical conditions including but not limited to illness, physical or other disability or pregnancy must notify the Director of Health Services immediately.

<p><u>Classroom Conduct:</u></p> <p><u>Contact Hours:</u></p>	<p>See Course Policies, below.</p> <p>All classes meet for the full-time stated on schedule. Classes cannot be shortened or cancelled without prior permission. Cancelled classes must be rescheduled.</p>
<p><b>Course Policies :</b></p>	<p><b><u>Attendance Policy:</u></b> Class attendance is optional but strongly encouraged, and role will be taken daily. Being late or absent will result in a loss of citizenship points, <i>regardless of the reason</i>—you are present in class and on time, or you are not. <i>Reasons for lateness/absence only matter in determining grade lowering or removal from class:</i> More than three unexcused absences may result in grade lowering, and significant absences may result in failure and withdrawal from the course.</p> <p><b><u>Electronic Device Policy:</u></b> Electronic devices used for in-class problem solving (calculators, etc.) may be used during class. All other electronic devices (cell phones, etc.) must be turned off and stowed during class. Texting, etc. during class is not allowed, and will first result in loss of citizenship points, then ejection from the day's class, and ultimately removal from the course. If you have a personal emergency and need a device for communication, please exit the classroom and do what is needed.</p> <p><b><u>Course Management:</u></b></p> <ul style="list-style-type: none"> <li>• I am more flexible and forgiving when I am kept informed. If you know you must miss a class, please tell me ahead of time, and please arrange to get class materials/handouts from a fellow student.</li> <li>• General Chemistry is a year-long course, and this class' material is cumulative with General Chemistry I. <i>Many assignments (including exams) will require you to use principles learned in CHE 131</i>, so review the older material as necessary.</li> <li>• Most lectures use PowerPoint presentations, which are frameworks for discussion only. Additional information and problems will be given in class. Thus, copies of the presentation handouts are not a substitute for class attendance.</li> <li>• Each lecture has a reading assignment that should be read <i>before</i> coming to class.</li> <li>• Each lecture has a homework assignment which is generally due at the next class meeting. <i>Late homework will not be</i></li> </ul>

	<p><i>accepted. No exceptions.</i> The “Lecture Schedule” portion of this syllabus has the exact details about what problems are due when.</p> <ul style="list-style-type: none"> <li>• Exam procedure <ul style="list-style-type: none"> <li>–Remove all items from the desktop other than those permitted (varies by exam, but usually includes a blue or black pen (no pencil), a calculator, a pre-approved periodic table, etc.) All other personal items must be placed in the designated area of the room.</li> <li>–All electronic devices other than an approved calculator must be turned off and stowed. You will lose exam and citizenship points if your cell phone (etc.) activates during the exam.</li> </ul> </li> <li>• To succeed in this course, a <i>minimum</i> of two study hours per lecture hour is expected. During this time you should rewrite your lecture notes, prepare flash cards, read and re-read the textbook, work homework problems, etc. <i>Most of the learning in this class will occur outside of lecture time, and is your responsibility.</i></li> <li>• Cheating and plagiarism will not be tolerated. Students caught will receive an F for that assignment, possibly an F for the course, and may face expulsion from the university.</li> </ul>
<p><b>Weekly Schedules:</b></p>	<p>Chapters 12-21. Exact schedule distributed in class.</p>
<p><b>Advising &amp; Tutorial Support:</b></p>	