

CHEM 161 - GENERAL CHEMISTRY I (3 credits)

April-June 2014

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Office hours: 1:10-1:30 PM W,F, **also by appointment.**

Textbook - Chemistry, Sixth Edition by J. McMurry and R. C. Fay (with contributions by J. Fantini) - 2012 Prentice-Hall

Location and Time: 268 CAT building; Thursdays at 6:30 to 9:20 PM

Prerequisites: basic algebra (high school chemistry recommended)

The **objective** of this course is to teach some basic principles of general chemistry. The lecture objectives are for the students to learn the following: 1) the structure of the atom. 2) mass relationship of different elements and number of molecules, 3) stoichiometric calculation, 4) empirical formula and % composition calculation, 5) basic gas laws with calculations, 6) electronic configuration of atoms and how it determines chemistry, 7) periodic properties of the elements, 8) thermodynamic calculations as applied to chemical and physical changes, 9) ionic and covalent bond, 10) and others topics

The **description** of the course is give by the detailed topics which are listed below with the problem set.

Check your Drexel e-mail often during the term for information and attachments.

Exams 1 and 2 are 1 hour each and there will be lecture for the remainder of the class.

Exam 1- Thursday May 1 (subject to change). The material covered will be announced in class (all topics from the beginning of the term (most likely chapter 1,2, and 3. It is 25 % of your grade.

Exam 2- Thursday May 29 The material covered will be announced in class (all material from the end of the first exam). It is 25 % of your grade.

Final Exam- June 12 at 6:30 PM: It covers the **complete term** and is 50 % of your grade.

The exams will cover all lecture material, handouts, e-mails and material from the text book.

For your Final grade: Exams 1 and 2 count 25% each and the final exams counts 50%.

Tentative grading scheme A+ = above 95, A = 90 to 95, A- = 88 to 90, B+ = 82 to 87, B = 75 to 82, B- = 70 to 75, C+ = 64 to 69, C = 60 to 64, C- = 56 to 60 . D+ = 53 to 56. D = 50 to 53. F = below 50. You must take all 3 exams and have a passing average in order to pass the course. There is no extra credit work for this course.

You may not use programmable calculators, alpha-numeric calculators, cell phones and translators (or any other electronic devices) for the exams. You may use calculators which are not programmable for the exams. Remove any papers or notes from your calculator case. You are not allowed to use any notes or other material during the exam. You must learn and understand formulas.

Class attendance is expected. You cannot leave the exam room and return during an exam.

Missed Exam, **You are expected to attend the exams as scheduled.** A make up exam may be given in some case when an exam is missed but you must contact me immediately. You should try to E-mail and call me to leave a message **before** the exam is missed if possible. A make up exam should be taken as soon as possible at the time I set. Contact me for arrangements for a time and place for the exam. If possible, the make up should be taken within 6 days of the missed exam (before the next Thursday after the missed exam) unless I agree to some other time. **A make up exam will not be given for a poor grade on an exam.**

Cheating on exam may result in Failure for the course. It may also be reported to the Office Student Conduct and Community Standards and departmental offices.

The last day to withdraw from this course (by paper) this term is May 16, 2014 Friday with the help of an advisor (before offices close usually at 5:00 PM or earlier). Signatures are needed. Do not wait until last minute.

The main **Topics** are listed below. **However** the material covered is not limited to these topics and other will be added in class. **Entire chapters** will be covered with some exceptions (for chapters which are not covered completely page numbers are given).

Assignments below: All **problem** are at the end of the chapter. At least do the underlined problems. Problems in () are optional.

Math review appendix A page A-1 to A-8 (do this your self)

Chapter 1; Problems 30 30 22 32 34 35 36 38 39 40 41 46 52 56 56 68ab 70def 72 74abc 78ad 79a 82 782ac 83ae 91a 92 98 100 47 110 116 (hint let x = temperature) 123 read only (33 69 99 108 111) 102

Topics: elements and their symbols (learn table 1.1) , periodic table, groups of elements and the names of special groups, metals, nonmetals, and "semimetals", some properties of elements; Scientific notation, measurements - accuracy, precision and significant figures; some SI Units (length, mass, temperature, energy, derived units) and SI prefixes (learn tables 1.3 and 1.4): **unit factor method of calculations and conversions**; density

Chapter 2 ; Problems 35 39 42 62a 63a 64b 66a 71 70 72 90 91 94 95 98 102 103abde 104bdei 104 105 110abc 114b (38 39 44)

Topics: Structure of the atoms (electrons, neutrons protons, atomic and mass numbers); isotopes, atomic mass units, average atomic masses ("atomic weights") in the periodic table; Laws of conservation of mass in chemical reactions. of definite proportions and of multiple proportions; writing chemical equations; mixtures, pure substances -elements and compounds (molecules and ions), covalent and ionic bonds; Naming compound, ions [learn rules, endings, and tables 2.2, 2.3 (Polyatomic ions)] , and 2.4 (common acids); mixtures, pure substances

Chapter 3 and maybe handouts; Problems 40ac 41c 44bc 48d 50 52 55 56 57abc 62 64 66b 72 74 80 82 98 102 108 119a 121 125 84a 88 92

Topics: balancing chemical equations, molar mass, calculation of the number of moles, Avogadro's number, number of atoms and molecules; stoichiometry calculations-amounts of reactants and products; limiting reagents; theoretical and per cent yield; percent composition by mass from the molecular formula, empirical, molecular and structural formula, calculation of empirical formula from percent composition and of molecular formula from empirical formula and molar mass

Chapter 9; Problems 36 38 46 48 50 52 62 64ab 66 70 88 92 84 76 111 78 (optional 37 85 86)

Topics: gases - pressure; Boyle's, Charles', Dalton's and Graham's (diffusion and effusion), and ideal gas Laws, speed of gas molecules ; mole fraction: stiochiometric calculations involving gases; molar masses of gases; Kinetic theory of gases

Chapter 8; Pages 273 to 298 center and 305 to end Problems 28 38 40 46 47 48 56 65 66 78 80 112 82 84 88 116 c b 110 (optional 34 62 63 70) 120

Topics: energy- potential and kinetic, heat , work, Thermodynamics- 1st Law, internal energy, (ΔE), measurement and calculation of enthalpy (ΔH), heat capacity and specific heat, calorimetry, ΔH of physical changes - fusion, freezing, vaporization, condensation, sublimation, deposition, **Standard** heat of formation (ΔH°_f), heat of reaction, formation and combustion, Hess Law, Bond energy.

Chapter 10 pages 363 to 373 and 386 to 391; Problems 50 58 51 52 54 60 68-graph vapor pressure vs T
Topics: of phase changes- fusion, vaporization, freezing, condensation, sublimation, vapor pressure

Chapter 5 Problems 22 23 26 28 29 30 34 36b 40a 48 44a red only 67 96 54 55 58 60ac 61bc 72 74ab 76adce 78a 79a 82 83a 86 87 88 (36a 40b 50 76b 90 91)

Topics: electromagnetic radiation- wave length, frequency, energy of photons (Planck's equation), photoelectric effect, wave and particle like properties of small particles (De Broglie equation). atomic spectra and energy levels of electrons in atoms; Heisenberg uncertainty principle, quantum numbers- n, l ,m_l, and s; orbitals- s, p, d, f, - their "shapes and energy levels.": Aufbau and Pauli principles, Hund's rule, diagramming electronic structure of the atoms and ions, atomic radii

Chapter 6 Problems 23 40 41 42a 44 48 52 55 76 77ab 78 (77)

Topics: ionization energies, electron affinity, ionic bonds and their formation; alkali and alkaline earth metal (and their reactions with water, oxygen, and halogens), noble gases and the octet rule

Chapter 7 Problems 38 40 42 43ab 44a 45a 54 56 58abc 59ab 62 66 68 80 84c 78acdf 69c 118a

Topics: Covalent bonds and their formation, electronegativity, polar and non-polar covalent bonds; Lewis electron dot structures for atoms, molecules and polyatomic ions, resonance; valence electrons; VSEPR theory and shapes of molecules; valence bond theory

Chapter 10 pages 353 to 363; pages 372 to 376 ; pages 382 to 386 ; (page 376 to 382 may be covered)

Problems 32 34 38d 42 46 47 74 the following may be covered 82 83 84 128ab

Topics: dipoles intermolecular forces, hydrogen bonding and boiling points: types of solids, unit cells,

If time permits additional material may be added. The assignments would be given in class

All above are subject to change and additions. (any changes will be announced in class or by email)

Additional Information

The last day to drop from this course with an advisor help is **April 11, 2014** Friday of the second week of classes before the offices close and if you do not need your advisor's permission by using Drexel One on-line Sunday April 13 before 11:00 PM this term.

(see below)

The last day to withdraw from this course with an advisor's help is **May 16, 2014** Friday before the offices closes. (see below)

Before you drop or withdraw from a course you should check with your Advisors as there may be consequences. Dropping or withdrawing from a course may affect your academic standing or your financial situation. It may have serious effect on billing at Drexel, financial aid, VA benefits, NCAA athletic eligibility, immigration status for foreign students, and other possible consequences. As a student you are responsible for transactions against your academic record.

If you register for a course, the student's responsibility is to complete the course, drop it, or withdraw from the course. If you register for a course and do complete it, drop or withdraw from the course, eventually an NGR grade will turn to a failing grade F.

Different policies apply to dropping a course and withdrawing from a course (Dropping a course result in the course being removed from your transcript. Withdrawing from a course results in a grade of W on your transcript for that course). Student should consult their Advisors (both academic and financial Aid Advisors) and in some cases the instructor before dropping or withdrawing from the course.

In order to drop or withdraw from a course, a student must have the "Add/Drop/Withdraw" form signed by the course instructor and the student's Academic Advisor. Dropping or withdrawing from the course may affect your billing and academic record (follow procedures and consults Advisors). Forms are available in many Department offices, in the lobby of Goodwin College and at

<http://www.drexel.edu/drexelcentral/courses/adjustments/course-withdraw/>

http://www.drexel.edu/provost/policies/course_drop.asp

Incomplete grade "I" or No grade reported or No-Credit. Student must take responsibility to meet the University's policies and deadlines for requesting an incomplete grade and completing a course before the deadline passes. If a student stops attending a course, the student is not automatically removed from the course. The student's responsibility is to complete the course, drop it, or withdraw from the course. If you register for a course and do complete it, drop or withdraw, eventually an NGR (no grade reported) grade will turn to a failing grade F. An Incomplete grade "I" will turn to an F (failure) grade if the student does not complete the course.

If a student has an Incomplete grade or a No Grade Reported, the student should see the instructor for the course and the student's Academic Advisor **immediately,**

If the student's financial obligations to Drexel University are not met, the student is not entitled to a grade from the University and from the instructor.

Please read the "Academic Honesty Policy in the student Handbook at

<http://www.drexel.edu/studentlife/SLhandbook.htm>. Students are expected to follow these policies.

The handbook also explains policies for dealing with cheating and other forms of academic dishonesty.

http://www.drexel.edu/provost/policies/academic_dishonesty.asp

http://www.drexel.edu/studentaffairs/community_standards/studentHandbook

http://www.drexel.edu/studentaffairs/community_standards/studenthandbookgeneral_information/code_of_conduct

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For the "Americans with Disabilities Act" Drexel University has the "Office of Disability Services at 3201 Arch Street, Suit 210 and see on line

<http://www.drexel.edu/oed/disabilityResources/Overview>. This office is to be contacted by the student if special course accommodations, emergency medical information or building evacuations are need. This office will also verify any special needs and give a form to the student to give to the instructor. The student should make the arrangements with this office and inform the instructor within the first two weeks of the term or when a new situation occurs. <http://www.drexel.edu/oed/disabilityResources/students>