CHEM-111 INFORMATION SHEET (Sections 020D - 025D)
Fall, 2015

Lectures: Every Monday, Wednesday and Friday, 9:05-9:55 A.M., Brown Laboratory 101, Dr. John Burmeister

Discussion Sections: Every Friday, as follows:

<table>
<thead>
<tr>
<th>Section</th>
<th>Instructor</th>
<th>Meeting Day/Time/Place</th>
<th>Instructor's Office</th>
<th>Instructor's Telephone #/E-mail</th>
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<td>020D</td>
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<td>F 12:20 - 1:10PM</td>
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Help Session:
A weekly help session (day, time, and place to be announced) will be supervised by each of the discussion section instructors. Each of the three UG CHEM-111 Teacher's Assistants will also hold weekly help sessions [Kimberly Buchanan (BS/CHM/16 kabuchan@udel.edu), Matthew Hurlock (BS/BIOC/17), mhurlock@udel.edu; Sean Lein (BS/BIOC/17), slein@udel.edu]

Texts:
Student Solutions Manual for CCR (9th ed.), by Banks; (ISBN: 978-1-133-94964-0)
CHEM-111 Personalized System of Instruction (2015 ed.), by Burmeister. Additional general chemistry texts, each by a different author, have been placed on reserve in the Reserved Book Room of Morris Library for your use, should you need/desire an alternative to CCR - see attached list.
Reading Assignments and Lecture Notes:

Background reading assignments (in KTTT) and detailed lecture notes will be found in the eleven CHEM-111 PSI modules.

Problem Assignments:
Problem assignments (drawn from KTTT, and special problem sets in the CHEM-111 PSI) will be found in the CHEM-111 PSI. Detailed answers to each of the PSI problems are given in the PSI booklet. Short answers to the questions and problems in KTTT are given in Appendix N. Detailed answers to the blue numbered Study Questions in KTTT are shown in the Student Solutions Manual, by Banks.

Quizzes:
Short (ca. 25 min.) quizzes will be given during the discussion section periods every week that an "hour" examination is not scheduled. Coverage will be announced on a week-to-week basis.

"Hour" Examinations:
Exam I - Saturday, October 3, 9:00AM-noon, (TBD). Material covered between September 2 and September 25, inclusive. Review session will be held on October 2, during the lecture period.

Exam II - Saturday, November 7, 9:00AM-noon, (TBD). Material covered between September 28 and October 30, inclusive. Review session will be held on November 6, during the lecture period.

Exam III - Friday, December 11, 5:00-7:00 p.m., (TBD). Material covered between November 2 and December 9, inclusive. Review session will be held on December 11, during the lecture period.

A four year file of past exams, with detailed answers, is included in the CHEM-111 PSI. The questions in these exams provide an excellent means for preparing for the current exams, as well as for the quizzes.

Final Examination:
Date, time and place to be announced (Final Exam period: December 14 through December 19). The exam will cover all of the material dealt with in CHEM-111.
Lecture and Quiz Schedule [CHEM-111 PSI Guide module numbers in square brackets]:

Week 1 (2 lectures): Course Overview, Tools of the Trade (Sig. Figs., Exponential Notation, Logs, Units, Temperature Conversions), The Mole Concept, Formulas (Empirical and True) [Module I]

Week 2 (2 lectures): The Gaseous State [Module II] (Quiz I)

Week 3 (3 lectures): Real Gas Behavior, The Solid State [Modules II and III] (Quiz II)

Week 4 (3 lectures): Nomenclature, Stoichiometry (including Hess's Law) [Modules III and IV] (Quiz III)

Week 5 (2 lectures): Concentration Calculations (including Titrations) [one lecture period devoted to Exam I review] [Module V]

Week 6: (3 lectures): Colligative Properties, The Periodic Table, Oxidation Numbers, Balancing Redox Reactions [Modules III, V, and VI] (Quiz IV)

Week 7: (3 lectures): Nature of the Atom (Classic Experiments, the Bohr Model), Dual Nature of Light and Matter [Module VII] (Quiz V)

Week 8: (3 lectures): The Schrodinger Approach, Orbitals, Electronic Configurations [Modules VII and VIII] (Quiz VI)


Week 10 (2 lectures): Electronegativity, Lewis Structures, Oxidation Numbers (revisited), Formal Charges [one lecture period devoted to Exam II review] [Module IX]

Week 11 (3 lectures): VSEPR Theory, Bond and Molecular Polarity [Module IX] (Quiz VIII)

Week 12 (3 lectures): Valence Bond Theory (including Hybridization) [Module X] (Quiz IX)

Week 13 Thanksgiving Holiday

Week 14 (3 lectures): Molecular Orbital Theory [Module X] (Quiz X)

Week 15 (2 lectures): Symmetry in Chemistry (Point Groups, Polarity, Optical Activity) [one lecture period devoted to Exam III Review] [Module XI]
Please note that all aqueous equilibria calculations (weak acids, weak bases, buffers, solubility products) are covered in the co-requisite CHEM-115/120 courses, which include all of the lab work. The freshman CHEM-111/112/115/120 sequence for our CHEM and BIOC majors totals 11 credits, instead of the customary 8.

**Absences from Quizzes and Exams:**
Unexcused absences will count as zeroes. Make-up quizzes and exams will be required for excused absences, i.e., those for which an acceptable written excuse is provided, e.g., illness, death in the family, job conflicts, jury duty. All written excuses are to be given to JLB. Make-up quizzes will be administered by the TA's; make-up exams will be administered by JLB.

**Grading Policy:**

| Average of all quizzes | 20% |
| Exam I                 | 20% |
| Exam II                | 20% |
| Exam III               | 20% |
| Final Exam             | 20% |

CHEM-111 course grades will be determined as follows:

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<th>Course Grade</th>
<th>Required Performance Level Overall Average</th>
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<tr>
<td>A</td>
<td>85 and above</td>
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<td>A-</td>
<td>80-84</td>
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<td>B+</td>
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<td>B-</td>
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<td>C+</td>
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<td>39 and below</td>
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**Course Evaluation:**
Your evaluation of your CHEM-111 experience (instructor, TAs and course) will be executed on-line during a two-week period at the end of the fall semester. You will be given detailed instructions in due course.
Burmy Award:

A CRC Handbook of Chemistry and Physics will be given to the student having the highest overall average for CHEM-111/112.

Model Kit:

You will find that a molecular model kit is a very valuable accessory in CHEM-111. You will be permitted to use these model kits (excluding all associated written material) during all relevant quizzes and exams. Make sure that your molecular model kit is designed for general chemistry, NOT organic chemistry.

Calculator:

You will find a non-programmable electronic calculator to be a necessity in CHEM-111.

Course Capture:

My CHEM-111 lectures will be automatically digitally recorded by the University's Course Capture system. You will be able to access the audio and video record of the proceedings, via your smart phone and/or laptop, as soon as the lecture has been completed. You will also be able to annotate the lectures electronically, as they are given. Log-in information will be provided in due course.

John L. Burmeister
102 Brown Laboratory
Phone: 831-1130
FAX: 831-6335
Email: jlburm@udel.edu
Appointments: call Linda Staib
Brown Lab, Rm. 102, 831-2465
Email: lstaib@udel.edu
Texts on Reserve for CHEM-111/112
Reserve Room
Morris Library


*Honors-level text
<table>
<thead>
<tr>
<th>Month</th>
<th>Week</th>
<th>M</th>
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<td>11 Last Class &amp; CHEM-111 Exam III</td>
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CHEM 111 Course Learning Goals
(Numbers in parentheses indicate the departmental learning goals
(http://www.udel.edu/chem/goals.html) with which each course goal is aligned.)

After successful completion of this course, a student should be able to:

1. Describe key historical ideas and interpret/evaluate experimental evidence related to
   the atomic model of matter and the physical structure of atoms. (1)
2. Assign/interpret names and formulas for ionic/binary compounds, know charges of
   common mono- and polyatomic ions, and use in balanced equations. (1)
3. Recognize and apply fundamental stoichiometric relationships in analyzing and solving
   quantitative problems for both irreversible and equilibrium systems. (1)
4. Describe the characteristic features of ionic bonding and explain/apply their connection
   to the physical and chemical properties of ionic compounds. (1)
5. Describe the basic features of structure determination through x-ray crystallography;
   know and apply the characteristics of simple unit cells and packing motifs in
   calculating/interpreting densities and packing efficiencies of crystalline solids;
   describe/explain/visualize common ionic structures. (1)
6. Know the distinguishing features/common types/formulas of electrolytes; apply that
   knowledge in explaining/visualizing/predicting the molecular level behavior of such
   substances in solution; explain/predict the qualitative conductivity behavior of
   electrolytes in solution. (1)
7. Explain the nature of and driving forces behind common reactions of aqueous ionic
   compounds including metathesis and redox processes; recognize common
   oxidants/reductants; and balance/use complex redox reactions. (1)
8. Describe/explain/apply key observations and concepts of quantum theory;
   explain/apply the electronic structures of a one-electron and multielectron atoms. (1)
9. Explain/apply the connection between electronic structure and periodic trends in the
   prediction/analysis of the physical and chemical behavior of elements and compounds.
   (1)
10. Describe the characteristic features of covalent bonding and explain/apply their
    relationship to physical properties; write/analyze Lewis structures and explain/predict
    molecular geometries and polarities for covalent compounds; explain/apply valence
    bond and molecular orbital theory in evaluating bonding in covalent molecules and
    extended solids. (1)
11. Describe the characteristic features of metallic bonding and explain/apply their
    connection to physical and chemical properties of metals and alloys using the electron
    sea model. (1)
12. Describe empirical gas laws; explain/apply kinetic theory in the analysis/prediction of
    the behavior of ideal and real gases. (1)
13. Work together with other students in discussing ideas, evaluating information and
    formulating solutions to problems. (8)
14. Communicate ideas clearly and effectively in written and oral formats. (10)
15. Find and evaluate sources and information needed in solving problems. (3)