Chesapeake Bay Governor's School
For Marine and Environmental Science
Bowling Green Campus

Chemistry

2014-2015

Eric D. Lund

Description (CHM 111-112)
This course explores the fundamental laws, theories, and mathematical concepts of chemistry and will cover the structure of matter, the characteristics of the states of matter, types of reactions, thermodynamics, chemical kinetics, equilibrium, and electrochemistry. The lab component of the course, which counts approximately thirty percent of the overall grade, will focus on qualitative and quantitative support of the general chemistry concepts. A working knowledge of algebra is required. Applications to environmental phenomena will be emphasized where possible.

Course Credit: 4 credits per semester, including lab.

Text:
Chemistry: The Central Science, Brown, LeMay, and Bursten, (Prentice Hall, 2006)

Contact information:
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Required Materials: graphing calculator, 3-ring binder with dividers for class notes, spiral notebook for homework, lab notebook of bound composition type.

Learning Sequence:

Chap	Topics	Exercises
1	Introduction	9-55 odd
	Basic Terms	75+76
	Uncertainty in Measurement	
	Dimensional Analysis	

2	Atomic Theory Atoms, Molecules, Ions, Isotopes Subatomic particles, Periodic Table Symbols, Formulas, Naming	7-71odd 79,82,89 96,97
3	Molecular and formula mass The Mole and Avogadro's # Molar Mass, % Composition Writing and balancing Chemical Equations Stoichiometry problems Theoretical Yield, % yield, Limiting reactant	9-79 odd 101,103
4	Solution Chemistry Acids, Bases, Salts Electrolytes, Precipitates Oxidation-Reduction	11-87 odd 105,107,110,115
20	Balancing ReDox Reactions	9-19 odd
5	Thermodynamics: Energy, Heat, Enthalpy Endothermic vs exothermic Calorimetry, heat capacity, specific heat Hess's Law, Heats of Formation	9-77 odd
6	Structure of Atom Nature of light, Electromagnetic spectrum The Photon, Quantum Theory Quantum numbers, orbitals Writing electron Configurations Orbital Diagrams	9-73 odd 75,77,80,90 99
7	Periodic Properties Periodic Table, Group Trends	7-77 odd
8	Chemical Bonding Lewis symbols, Octet Rule and exceptions Ionic bonds and lattice energy Covalent bonds, polar vs non-polar Electronegativity, bond length and energy Lewis structures and resonance	7-71 odd 73,90

9	Molecular Geometry: VSEPR Orbital hybridization	11-57 odd 76,82,96,99
10	Gases: Ideal Gas, Pressure Gas Laws, gas stoichiometry Gas mixtures, partial pressure, Kinetic-Molecular Theory Effusion and Diffusion	 9-73 odd, 74, 75a, 77-85
11	Intermolecular Forces States of Matter, changes of state, Phase Diagrams	9-59, 71-77
13	Solution concentrations: molality, molarity, mass %, mole fraction, normality, Colligative properties	11-59, 63-73,
14	Kinetics	TBA
15	Equilibrium, K_{eq} LeChatelier's Principle Reaction Quotient	9-55
16	Acid-Base Equilibria pH, pOH, K_a, K_b, K_w, pK_a, pK_b, pK_w	11-47, 51-66, 71-103
17	More on Aqueous Equilibria Common-ion Effect Buffer Solutions, Henderson-Hasselbalch Equation (Titrations revisited) K_{sp}, Solubility Equilibria	9-55

Attendance: Class attendance is required. Be reminded of the CBGS policy you signed at orientation! Absences and tardies will be reported daily to your home school and will result in parent notification and conferences where necessary. Contact me for weekly work if you miss a day.

Turning in work: Unless otherwise noted, class work and tests are due at the end of the class period in which they were assigned. Homework (including papers, labs, and other projects) are due at the beginning of class on the due date. In general, most assignments can be emailed to me, but when specified, hard copies must be brought in. If you do not have email access, bring it in on a USB drive, but make sure it is on my computer before class starts. When submitting assignments electronically, all files must be labeled as lastname_firstname_assignment and the subject line of emails must include the assignment

name. Attachments or emails that do not fit these criteria will not be read, assignments can be resubmitted, but will be considered late. As always, please come to me with any issues you have.

Make-up work policy: If you miss a class, you are responsible for discovering what work you missed. It needs to be completed and turned in within two days of your return to class. Tests and quizzes missed will be taken on the date of return to class as they are scheduled well in advance.

Missing work: 10 points a day will be deducted from all work not turned in on the due date. Students typically find quizzes and tests in this class to be quite challenging. Good attendance and strong effort in completing homework and laboratory exercises in a timely manner is very beneficial to a student's final grade. Coursework in this class is cumulative. It is exceedingly difficult to catch up once one is behind in comprehending concepts presented in class and reinforced with homework exercises. DO NOT allow yourself to fall behind!

Honor Code: Students are expected to follow the rules and procedures as outlined in the Student Honor Code. Please refer to the Student Handbook if you need guidelines. Failure to do so may result in dismissal from the course. All quizzes and tests are pledged.

Emergency Evacuation Plan: In each classroom, laboratory or other places where students are assembled for the purpose of instruction, a fire evacuation plan will be posted indicating the direction of travel from the room in the event it becomes necessary to evacuate the building as a result of fire or other emergency. This plan will be posted in a conspicuous place near the exit from the room.

Whenever the fire alarm sounds, the building will be evacuated. The instructor will ensure the fire door is closed upon leaving the area (doors with automatic closures on them). Instructors are also responsible for assisting disabled students.

If a classroom does not have an evacuation plan posted, the student or instructor should notify the academic dean.

Course Expectations:

1. **RESPECT!** Respect yourself, others in the room, the room and all equipment and materials in the room, everyone we deal with and the environment. Disrespectful behavior <u>WILL NOT</u> be tolerated!

2. **SAFETY!** We will work with some materials that can be dangerous if not handled and disposed of in a safe manner. Use eye protection and lab aprons

when appropriate. Closely follow instructions for use of all lab materials. Be aware of yourself and your surroundings in all lab situations.

3. **Class Participation:** You will get the most out of this class if you come prepared each day and participate in the discussions and other activities. Participation is a component of your daily, lab, and homework averages each marking period.

4. **Note Taking:** You will need a notebook for the notes you will take in class as well as the notes you *should* take as you read each chapter. It is wise to learn now how to take detailed notes during class discussions. **Note Making:** You will need to stop periodically to review and rewrite your notes (at least at the end of each chapter). Summarizing your notes in this way is an excellent way to study, and, if you do it nightly, it will point out questions you need to ask the next day in class.

5. **Laboratory:** Lab work is an integral part of Chemistry. We will do approximately two labs per month. These labs are of College/Advanced Placement design and quality and as such are long, involved, require data analysis and manipulation, and formal and informal lab reports will be written. Therefore, you will need a separate lab notebook for data collection and reporting. It needs to be of the bound composition book/quadrille type. Your own personal involvement and performance on the actual lab will be 20% of your grade for the lab.

6. **Evaluation:** Formal evaluations (i.e. tests!) will be part multiple choice in format and part free response. Multiple Choice items will come from old AP Tests among other sources so that you will constantly be challenged to use that grey matter. The free response section can be problems, short answers, graphs with data analysis, and/or essays. These will all involve critical thinking skills to prepare you for future scientific endeavors. Evaluations will usually occur at the end of each chapter. Quizzes will be given 1- 2 times per week as quick homework checks or memorization skill checks (i.e. can you name and write formulas for all of the polyatomic ions!)

7. **Grading:** Lab work: 30%, Evaluations: 60%, Class participation and homework: 10%. We use a 10 point grading scale with an A being 90% and above, etc.

8. **Homework:** At the end of each chapter you will notice two types of questions: "Visualizing Concepts" and "Exercises." The VC are designed to assess whether you have mastered the key concepts in each chapter. The Exercises are divided into sections that align with the chapter sections. This is where you will find the problems that need to be worked out. Please do these as we complete each section in class. We will put some of these on the board when we go over them in class. I will do a quick notebook check to determine if you have done them, or give a quick homework quiz. Chemistry is not like biology with factual memorization. To do well in this class you will need to apply concepts from the course curriculum. Practice is the only way to master the concepts. Also notice

that in many chapters I have asked you to do some of the "Additional" or "Integrative" exercises to keep you thinking. Developing your powers of logical thinking and problem solving skills is one of the major goals in this class!

You must have a section in your notebook or a separate spiral bound notebook designated for homework. In the upper right hand corner of the page indicate the date, the page, the assignment and the problem numbers you are doing. Please keep these pages in chronological order to facilitate homework checks in class. I will not spend a great deal of time at each notebook searching for a particular problem set.

9. **Tips on how to survive a college level course:**

*Keep up to date.
*Realize that you will have to work/read on weekends and holidays. You should spend at least 5 hours a week outside of class on Chemistry. Lab analysis will require more time.
Get organized!
*Get a 3-ring binder and dividers.
*Sharpen your critical reading, note taking, and essay writing skills.
*Schedule your time and use it effectively!

Inclement Weather and School Closings Policy

- Closing of the Chesapeake Bay Governor's School, Bowling Green Site, is determined by the Caroline County School Board. If Caroline County Schools are closed CBGS-BG is closed.

- If a school system (King William or King George) is closed due to inclement weather and the CBGS-BG is open, students from the ***closed*** school system may attend pending the safety of the roads and permission from parents.

- There may be an emergency in which the CBGS is closed and the particular school system is open. Students shall report to their respective school instead of going to CBGS.

- If there is a one-hour delay for the CBGS site, CBGS will open one hour late.

- If there is a two-hour delay for the CBGS site, CBGS will be closed and students are to report to their home high school.

- If the home high school opens one hour late, and CBGS opens on time, students from the home high school are to report to CBGS, one hour late.

- At the Bowling Green site (and other sites as well) we have a phone tree to notify students directly of CBGS closings.

CBGS Statement on Safety

What to know and do to be prepared for emergencies at CBGS/RCC:

- Sign up to receive RCC text messaging alerts Keep your information up-to-date (https://alert.rappahannock.edu/index.php?CCheck=1)

- Know the safe evacuation route from each of your classrooms. Emergency evacuation routes are posted in campus classrooms.
- Listen for and follow instructions from CBGS/RCC or other designated authorities.
- Know where to go for additional emergency information.
- Report suspicious activities and objects

Statement on Americans with Disabilities Act

Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 require Schools to provide an 'academic adjustment' and/or a 'reasonable accommodation' to any qualified individual with a physical or mental disability who self-identifies as having such. Students should contact inform CBGS faculty for appropriate academic adjustments or accommodations.