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PROFESSOR'S INTRODUCTORY STATEMENT (Why take chemistry?)

Engineers are people who make things with “stufh” (materials); therefore, they should understand the properties of the materials they use. Chemistry is the science of atoms, molecules, and the chemical bonds that connect atoms. The properties of ALL materials arise from their chemical make-up. Engineers need to understand chemistry, and this is reflected in the requirements that accrediting agencies have for engineering programs.

It is a challenge to teach or take a one semester “all-you-need-to-know-about-chemistry” course. You need to have been well prepared in a high school chemistry course before you arrived, and I will (of necessity) assume that you have had that good preparation. The first few weeks of our course should largely be a review of high school chemistry. If you are rusty in chemistry, you will have to do whatever work is necessary to re-familiarize yourself with the material. The course goes very fast, and its priority needs to be on par with any challenging engineering course.

We start out with the basics, which I compare to learning the vocabulary of a foreign language before one can speak it. We then progress into selected advanced topics (commonly taught in the second semester of General Chemistry).

Time to learn is crucial. The accepted wisdom is that you need six or more hours a week (including weekends), not counting laboratory preparation and completion. (The two hour laboratory sections in this course are shorter than the three hours sections used in General Chemistry.) Lecture attendance helps the vast majority of students and is highly recommended.

Contact me by any means at your disposal in order to get your questions answered. E-mail is the most convenient means to contact me since I frequently read and reply to my E-mail. I require that you check your own E-mail at least every 24 hours. You may also call my home or try my office at any time of day. You should feel free to drop by my office any time and see if I am free.

OVERALL COURSE DESCRIPTION

This course, like the first semester of General Chemistry (CHEM-1110), emphasizes the basic ideas and methods of chemistry, some atomic and molecular structure, descriptive chemistry, and scientific problem-solving skills. Chemistry for Engineers abbreviates some topics and adds advanced topics, normally covered in the second semester of General Chemistry (CHEM-1120), such as the gas laws and thermodynamics.

TEXTS AND REQUIRED MATERIALS

Brown, L., and Holme, T.; *Chemistry for Engineering Students*, Do not use the text which is used in General Chemistry!

Rathbone, Steve; Student Solutions Manual and Study Guide for above text

You should go through the worked examples in our text and then attempt to work out the "Check Your Understanding" Exercises (the answers to these exercises appear in Appendix J in the back of the book). If you use them correctly, these exercises will help test your understanding of the text and help you to develop some problem solving skills.

I will lecture on the assumption that you possess and use the Student Solutions Manual, the included Study Goals, and the Chapter Objective Quizzes.

LECTURE COVERAGE

Major topics studied in this course are Atoms and Molecules, Chemical Equations, the Mole Concept, Stoichiometry, Gases, the Periodic Table, Atomic Structure, Chemical Bonding, Molecular Structure, Molecules and Materials, Thermodynamics and Chemistry, and Chemical Equilibrium. **Coverage tentatively includes portions of the sections listed here: 1.2 – 1.5, 2.1 – 2.8, 3.1 – 3.5, 4.1 – 4.6, 5.1 – 5.6, 6.4 – 6.7, 7.1 – 7.5, 8.1, 8.2, 8.4, 8.5, 9.2 – 9.7, 10.2 – 10.7, 12.2 – 12.5.**

My lectures will follow the same order of topics as the text. A very tentative lecture schedule is included in this syllabus. The lectures will not necessarily duplicate the text. **You are responsible for ALL material found in the text or Student Solutions Manual and Study Guide, added in lecture, or introduced in assigned homework.** Missed notes will likely put your understanding of the course at risk! Some topics discussed in the text may never be mentioned by me, although you will be responsible to know them.

With the exception of the first lecture, I will lecture on the basis that you have already read the text and studied the examples. Of course, I will not expect you to have completely mastered the material. After each lecture, you should review your notes and relate them to the text. Next, you should begin working the recommended problems. You will probably have questions and should seek assistance from your classmates or from me.

WEBCT USAGE (the power of CedarNet)

WebCT will be utilized to deliver a wide range of content to the class. The WebCT course with the label, "AA", appended will deliver the class PowerPoint slides, HW assignments, answers to selected HW questions, extra lab content, and, under assessments, the four class quizzes. The WebCT listings with the section numbers appended (e.g., 1050-01) will be used primarily to deliver the pre-lab quizzes. Quizzes will have date and time deadline and, once started, a duration limit (usually one hour). Students are expected not

to share the exact question text or share answers with fellow students. Students are encouraged to use the texts and the internet to search for information that will assist them with quiz questions. Missed WebCT quizzes may not be made-up and earn a grade of zero.

EARNING COURSE POINTS (the master plan for grades)

You earn points in this course through good performance on exams, quizzes and labs. Neither simple attendance nor excessive effort automatically entitles you to a high grade.

Material for the tests may come from the text, the lecture, the Lecture Outline, the recommended homework, or anything that vaguely suggests itself to my thinking.

4 Unit Exams & 4 Lecture-based Quizzes: Unit Exams are worth 100 Course Points apiece and will be primarily composed of multiple choice questions (20 to 25 problems) with the possible inclusion of some calculation-type problems for which work must be shown. Selected multiple choice questions may be examined for partial credit if sufficient work is shown. Exams papers will NOT be returned, but will instead be held in my office for your inspection until the end of the semester. The scan-tron answer sheets for the exams will be returned, unless you object, via campus mail without attempts to conceal the name or grade. Four short WebCT quizzes, each worth 8 points, will also be given. No make-up quizzes are given.

One Comprehensive Final Exam: The Final covers all chapters covered in the lecture and is worth 180 Course Points. Chapter 10 material is covered for the first time on this exam. No portion of this grade is ever dropped.

Laboratory Points: You may earn up to 140 Course Points in lab. See the lab syllabus for important details of the laboratory portion of this course.

<u>POINT ASSIGNMENT</u>	<u>PTS %/Grade</u>	
Unit Exams (4 at 100 course points each)	400	53.2
Quizzes (4 at 8 course points each)	32	4.3
Comprehensive Exam (ALL Chapters)	180	23.9
Lab Material	<u>140</u>	<u>18.6</u>
TOTAL	752	100.0

Your grade is determined by the percentage of points that you earn from the total available. The course total for this semester is 752.

Grade ranges are indicated below. Underlined numbers indicate an inclusive score for that grade range. Values not underlined are not included in that grade range.

95 (715 points) - 100 = the range for A
90 (677 points) - 95 = the range for A-
87 (655 points) - 90 = the range for B+
83 (625 points) - 87 = the range for B
80 (602 points) - 83 = the range for B-
75 (564 points) - 80 = the range for C+
70 (527 points) - 75 = the range for C
65 (489 points) - 70 = the range for C-
62 (467 points) - 65 = the range for D+
58 (437 points) - 62 = the range for D
55 (414 points) - 58 = the range for D-
Below 55 (414 points) = F

I reserve the right to lower certain of the above grade cutoffs, thus raising some grades. Borderline grades may be decided on the basis of an individual student's attitude, improvement, and class participation. Tests may be curved upward (never downward) if the average on that test needs to be raised in order to make it equivalent to the other tests given in this course, and if, in my judgment, it is warranted. Please note that curving occurs so that each test may be fairly compared to other tests. Curving is NOT used in this course to "repair" a poor exam nor to assign a predetermined number of A, B, C, D, and Fs. Laboratory scores and the final course average are never curved.

It is highly probable that each student will receive the grade that he earns or better. If you believe that an error has occurred, please see the instructor as soon as possible.

MAKE-UP POLICY (Woe to those who ignore this)

Exams and Quizzes MUST be taken at the scheduled time. Arrangements should be made with the professor before any missed exam. Make-up exams are normally given earlier than the normal date. If possible, contact the professor within 24 hours of an exam missed due to an emergency. Exams not taken within four weekdays after the date initially given can not be made-up. Non-approved absences will result in a grade of zero for that exam. There are no make-ups of any WebCt quiz.

The only excusable reasons for missing exams or quizzes are officially sanctioned class trips, personal illness, and family emergencies. You must observe the University's rules concerning such absences. I must receive, in most cases, before the absence, a personal E-mail from you concerning the absence. Personal illness should be documented via a slip from the clinic or doctor. No details of your medical problem need be divulged to me at any time. Notify me (in writing or via E-mail) before any excusable absence. Examples of non-excusable absences are those due to weddings (except your own), car trouble (flat tires etc.), air travel reservations, and vacations back home.

HOMEWORK (This is where you really learn chemistry.)

Homework lists and solutions not included in the solutions manual will be delivered to the class via WebCT. No homework is collected or graded. The exam grades will definitely be indicative of how much homework you did and understood.

The logical completion of homework substantially increases your probability of understanding chemistry and receiving a satisfactory grade. At the end of each chapter are several homework problems. The problems are arranged in groups. The odd-numbered end-of-chapter exercises have their answers listed in Appendix K and their worked out solutions in the Student Solutions Manual. My current practice is to list solutions to even-numbered problems on WebCT.

I normally assign several of the odd-numbered end-of-chapter exercises and a few of the even-numbered ones. Do as many of the assigned problems as needed to master each concept. Unassigned questions may also be done for more experience. Do not spend too much time on any one question. Seek help.

Consider as important the **Study Goals** found in the Student Solutions Manual and Study Guide and the **Key Terms** located at the end of each chapter.

STUDENT BEHAVIOR (So, you want to drop your lowest exam grade?)

The Cedarville University Student Handbook discusses the **Community Covenant** and the **Character Creed**, which describe how our behavior should be in respect to each other. Those standards apply to this class as well. Respectful, Christian attitudes will be expected for all students attending class. No eating (except drinking from water bottles), talking, sleeping, reading (other than the chemistry text), gaming, or internet browsing should take place during class. Leaving the classroom (without prior permission) before the dismissal of the class is also considered inappropriate behavior. [Note: Sickness is always a valid reason for leaving class without permission.] Violation of these standards may be reason to deem a student's behavior "unacceptable". Embarrassment is sometimes an unavoidable consequence of improper behavior.

The privilege of dropping the grade of one non-zero Unit Exam is tied to both the class' behavior and to the behavior of each individual. (A grade of zero needs to be discussed with the instructor if you wish to request that it be dropped.) If the class' behavior, as evaluated by me at the end of the semester, is judged to be in line with Cedarville's standards, then the privilege of dropping the lowest Unit Exam's grade will be extended to all students, except for individuals whose poor behavior has singled them out.

Attendance at lectures is highly encouraged and is statistically tied to higher grades. On the other hand, attending does not magically increase the grades of an individual who is mentally absent.

CALCULATOR POLICY

Use of PDAs or laptops will not be allowed during exams. Every student is expected to have, especially during exams, use of a basic scientific calculator capable of normal scientific functions, including manipulation of numbers expressed in scientific notation. Calculator capabilities beyond that of a basic unit may not be used during exams and such use will normally be considered and treated as academic dishonesty. Graphing capabilities are not to be used during exams unless permission to do so is granted. Extra calculators or batteries are **NOT** available from me during exams. All constants and some equations will be provided on exams. Other related testing policies may be announced in class.

INFORMATION ABOUT ME (for the curious student)

I have a Ph.D. in Inorganic Chemistry from the University of Colorado with undergraduate degrees from the University of Rochester and Baptist Bible College of PA. Post-graduate work was done at the University of Iowa and Hunter College of the City University of New York. Past research has been funded by NASA and the Air Force Office of Scientific Research. I have carried out basic research on precursors to thermally resistant silicon carbide ceramics, on conductive polymeric materials, and on other electrochemically active materials, including "buckyballs." The most recent work has been carried out at Wright-Patterson Air Force Base, located near Fairborn, Ohio.

My wife is a homemaker who takes care of our youngest child. My wife enjoys handicrafts including knitting, crocheting, and tatting. My adult son, who is a Staff Sergeant (Geophysics Technician) in the USAF, loves on-line gaming and Science Fiction. He is newly married and recently finished a tour in Iraq. I, also, love Sci-Fi, but spend time on computers primarily to get them to work the way they should. I am quite enamored with the TV series, Babylon 5 (no longer being produced), and the software game series of Myst, Riven, RealMyst, Myst 3: Exile, URU, Myst 4: Revelations and Myst 5: End of Ages. I am a member of an on-line BBS for the support of FireFox, Mozilla and Netscape browsers. My daughter loves knitting, listening to music on her mp3 player, and taking notes in church. We have two cats, Vapor and Delenn. Delenn has perfected a form of anti-gravity jumping while Vapor is tries to imitate an inert mass.

My family has made two trips to Philadelphia to see the typical historical locations and some science museums. I enjoyed the history there, especially as it related to the early American scientist, Benjamin Franklin, who coined the electrical terms of "positive" and "negative." My wife and I have also developed a taste for "Hank's Root Beer" which we occasionally have shipped in from Philadelphia.

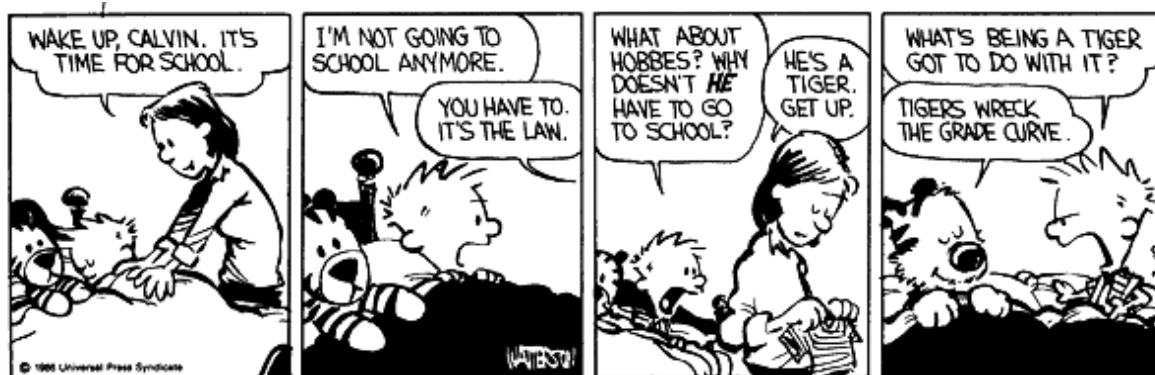
My family has many challenges. My wife has Multiple Sclerosis, and I have been diagnosed with, among other things, Fibromyalgia. Our daughter has special, learning challenges of her own. These aspects of my family sometime restrict my on-campus availability. I highly urge you to use E-mail to contact me.

VERY VERY TENTATIVE LECTURE SCHEDULE F2009

Changes in lecture coverage or test dates will be announced in class. You are responsible for knowing these changes announced in class, although such changes may also be sent out via E-mail. We will try to go through the first two chapters in rapid progression. You must rely upon the Text, the Student Solutions Manual and Study Guide, and the assigned HW to fill in any gaps left from the lecture.

D01	August	19 W	Introduction, Chapter 1 (Intro to Chemistry)
D02		21 F	Chapter 1
D03		24 M-	Chapter 1
D04		26 W	Chapter 2 (Atoms and Molecules)
D05		28 F	Chapter 2
D06		31 M-	Chapter 2
D07	Sept.	2 W	Chapter 2
D08		4 F	Chapter 2
		7 M-	Labor Day -- <u>No Class</u>
D09		9 W	Chapters 2 & 3 (Molecules, Moles, and Chemical Eqns)
D10		11 F	Chapter 3
D11		14 M-	Chapter 3
		16 W	DOP-- <u>NO CLASS</u> (Lab does meet.)
D12		18 F	Chapter 3
D13		21 M-	Chapters 3 & 4 (Stoichiometry)
D14		23 W	EXAM #1 on Chapters 1, 2, & 3 (but <u>not</u> molarity)
D15		25 F	Chapter 4
D16		28 M-	Chapters 4 & 5 (Gases)
D17		30 W	Chapter 5
D18	Oct.	2 F	Chapter 5
D19		5 M-	Chapters 5 & 6 (Periodic Table and Atomic Structure)
D20		7 W	Chapter 6
D21		9 F	EXAM # 2 on Chapters 3 (mainly molarity), 4 & 5
D22		12 M-	Chapter 6
D23		14 W	Chapter 6
		16 F	<u>NO CLASS</u>
D24		19 M-	Chapters 6 & 7 (Chemical Bonding and Molecular Structure.)
D25		21 W	Chapter 7
D26		23 F	Chapter 7
D27		26 M-	Chapter 7
D28		28 W	Chapter 7
D29		30 F	Chapter 8 (Molecules and Materials)

D30	Nov.	2 M-	Chapter 8
D31		4 W	EXAM #3 on Chapters 6, 7 & sections 8.1, 8.2
D32		6 F	Chapters 8 & 9 (Energy and Chemistry)
D33		9 M-	Chapter 9
D34		11 W	Chapter 9
D35		13 F	Chapter 9
D36		16 M-	Chapter 12 (Chemical Equilibrium)
D37		18 W	Chapter 12
D38		20 F	Chapter 12
D39		23 M-	Chapter 10 (Entropy and the 2 nd Law of Thermo)
D40		25 W	EXAM #4 on Chapters 9, 12 & sections 8.4, 8.5. Vacation starts <u>after</u> exam!
		27 F	No Class
		30 M-	No Class
D41	Dec.	2 W	Chapter 10
D42		4 F	Chapter 10
D43		7 M-	Chapter 10
		8 T	FINAL EXAMS BEGINS
D44		9 W	COMPREHENSIVE FINAL EXAM from 10:30 AM to 12:30 PM, includes Chapter 10 for the first time



ADMINISTRATIVE SECTION

Disability services for students: If you believe you may need support in managing the impact of a disability, please contact [Marilyn Meyer](#), coordinator of [disability services for students](#). Faculty rely on Disability Services to verify the need for academic accommodations and to identify reasonable and appropriate accommodation strategies. Examples of disabilities are AD/HD, specific learning disabilities, hearing, vision, health impairment, psychological, orthopedic, and traumatic brain injury.

Disability Services is part of the [Academic Enrichment Center-The Cove](#) located in the Center for Biblical and Theological Studies.

Center for Biblical and Theological Studies, Office 217

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Course Objectives

1. To recall and properly use the vocabulary and basic concepts of chemistry, including the fields of inorganic chemistry, organic chemistry, and polymer chemistry.
2. To use and apply the various scientific models, including the kinetic molecular theory of gases, the quantum mechanical model of the atom, and chemical bonding.
3. To recall and apply the concepts of thermodynamics to chemical systems.
4. To use the concepts of stoichiometry and chemical equilibrium to solve chemical problems.
5. To enable students to clearly show others how they logically solved complex chemistry-based problems, especially those involving mathematical calculations.
6. To successfully carry out laboratory manipulations in order to come to correct conclusions regarding chemical systems.