# CHEMISTRY 1114 LECTURE SYLLABUS FALL 2012

**Professor:** Dr Jerry Fong (587-3692, Physical & Health Sciences Bldg 305 ) e-mail: FONGJD@alfredstate.edu

**Required Text:** **Chemistry: an Atoms First Approach,** S. S. Zumdahl and S.A. Zumdahl, Brooks-Cole 2012

**Syllabus:** Chapters 1-5; 7-10; 13-14 of text (see also: *Course Outline*, back page)

**Course Website:**  [**http://web.alfredstate.edu/fongjd/GenChem1.htm**](http://web.alfredstate.edu/fongjd/GenChem1.htm).

**Grading: Item pts each total pts % of total**

Daily quizzes ~5 ~200 20

Exams (4) 50-100 350 35

Challenge/Marathon Problems 10 50 10

Lab1 250 25

Comprehensive Final 100 100 10

1000 100

**1Flunk Lab=Flunk Course !!!**

Course Letter grades will be assigned so: **A: 90-100% B: 80-89% C: 70-79% D:60-69% F: <60%**

**Course Mechanics:**

Short, in-class quizzes covering material covered in the previous lecture, previously assigned reading and suggested homework problems will be administered daily. One `challenge’ or `marathon’ problem taken from the text or created by the instructor will be assigned each week and due a week from the assignment date. Exams will be based on quizzes, suggested homework and the many in-class exercises handed out during the class. A course website listed above serves as the repository for answers to the quizzes, marathon problems, suggested homework, exams and copies of in-class exercises, All Powerpoint lectures and other course documents are likewise accessible at the course website.

**Attendance and Student Conduct:**

Attendance is up to you. It’s your money so do what you want, but it’s a good show you’ll be missing if you chose to absent yourself. Also, daily quizzes represent 25% of the total course, so it’s clearly in your academic interest to attend. Please note that if you arrive to class **after** the quiz has been distributed you forfeit that quiz. If you cannot attend the day of an exam or quiz I will need a reason > 8 hours ***in advance*** of the class unless you have a verifiable medical excuse or legitimate personal emergency, Just an e-mail saying you’re `sick’ or that your hamster died 10 minutes before class is not sufficient. If you do claim sickness, I’ll need definitive proof, not just your word.

You will be ejected from class permanently with an Instructor Initiated Drop if you act with chronic and blatant disregard with the Alfred State code of behavior. This policy will be in particular force if you are caught cheating or acting unethically in any way. I detest cheaters.

All cell and smart phones, PDAs, I-whatevers and laptops are to be stowed and turned off during class. For each 50 minute lecture you’re mine. You’ll be asked to leave the lecture room for that day if you fail to abide by this rule.

However, I strongly encourage direct contact. Feel free to talk to me without fear of reprisal concerning any and all problems in the class. I am almost always skulking about either in lab or in my office and practice an open door policy.

Most importantly, if you have question or problem on what we’re doing in chemistry-see me about it; it’s what I live for. My office hours are above and I am **always** willing to drop whatever I’m doing to help a student.

**Student Learning Outcomes (SLOs).** At the end of the course students will be able to:

1) convert between pertinent unit systems : metric-metric, metric-English.

2) provide a basic description of atomic and electronic structures of atoms .

3) rationalize and manipulate electronic models for stable cases of molecules and atoms.

4) predict and name common inorganic compounds using Lewis rules and naming protocols.

5) perform basic chemical calculations connected to mole-weight conversions; reaction stoichiometry and limiting yields.

6) write, balance, identify and name pertinent reaction classes and components (metatheses, acid-base, redox).

7) interpret basic phase diagram and cooling/heating curve plots for key phenomena: specific heats, bp, mp, transitions and multiple phase boundaries.

8) predict reaction directions and concentrations for equilibrium conditions using both quantitative (K) and qualitative (Le Chatelier) methods.

9) demonstrate competence in basic laboratory skills, notably gravimetric and volumetric methods, distillation, filtration , melting point determination and chemical synthesis.

**Some Comments:**

Most of you are being ***forced*** to take Chemistry. I wish it were otherwise but if we gave students a choice between taking Chemistry and a full colon enema, most would pick the latter. So why do all engineering and science curricula require you to take this apparently gut-wrenching subject? Bill Gates of Microsoft fame dropped out of Harvard, never took Chemistry but now has more money than Finland. Yet, it is undeniable that as a species we live only by the spidery grace of chlorophyll, breathe only on the sticky strength of iron hemes, sleep only by order of melatonin, see only by permission of 11-cis/trans retinal. Our deepest human essence is written in the dense music of DNA. Even Mr. Gate’s software operates at the sufferance of phosphorus and boron-doped silicon. Chemistry ***rules***. You can ignore it, but it is central to ***everything.***

Now consider that all the above are molecules, the main focus of Chemistry. Yet molecules are too small to glimpse even with the most expensive and extreme of instruments. They are 99.99% empty space, yet form all solid matter including the chair you are sitting on. Their detailed behavior is fundamentally unpredictable, yet given time, opportunity and communication they can aggregate and transform into things as disparate and improbable as elephants and viruses, Twinkies and microchips.

Chemistry is where you get a handle on all of this. It is a long, twisting, marvelously intricate tale about how our flawed, yet diversely talented species attempts to see and manipulate the un-seeable entirely by indirect means-like figuring out what that elephant looks like by sniffing its musk, or making it dance by changing the lighting. The style of thinking that lets you do this-and get it right- is what I refer to as `**TLC**’ =**T**hinking **L**ike a **C**hemist. **TLC** is what I’m going to try to teach you-if you’re willing.

We’ll do it by getting into the heads of people like Dalton, Mendeleev, Arrhenius, Lewis, Gibbs and Pauling. Each of these legendary chemists are `masters’ of a particular flavor of **TLC** unique and distinct to their time, culture and personality. My dumb idea is that by having you relive their thought processes, you’ll gain a piece of their habits and disciplines of mind. Do that and you’ll have taken a long step towards understanding both matter and how to think.

The teaching of College Chemistry has too long been dominated by the perceived need to `get *stuff* covered’. I’m bucking this trend. At all times I’m pushing for real dialogue with you in class with a focus on getting at whatever’s hanging you up. If we don’t cover everything below, so be it. But what we do cover you’ll need to know deep into your bones. That sort of understanding – no matter what the subject- provides an enduring benchmark to measure yourself against when it comes to knowing when you’ve really learned something.

Finally, I encourage you all to study chemistry as a human. Study in small groups and teams. Talk to each other. Argue, sweat and squabble over Chemistry. We are a social species. We learn best when there’s someone else to talk and commiserate with. Now get ready to get off your rear end and go to work. Doc Fong 16 August 2012

## COURSE OUTLINE

**weeks dates lecture topics text reading**

**1** 8/27-8/31 Introductions; Images of the atom and fundamental chemical ideas 38-49

**2** 9/3-9/7 Photoelectric effect; H-spectrum; Bohr’s atom; Quantum model 57-74; 76-82

3 9/10-9/14 Quantum model (cont.); Aufbau; Mendeleev’s Table and Periodicity 76-82; 85-99

**4** 9/17-9/21 Lewis’s dot picture, d-electrons & pigeonholes lecture only

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***5 9/24 Monday September 24 Exam I***

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**5** 9/26-9/28 Review of units and conversions 2-18

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**6 9/29-10/2 Saturday 29 September-Tuesday 2 October Academic Mini-Break**

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**6** 10/3-10/5 Moles, Mass and Avogodro’s #: *Bermuda triangle calculations* 112-124

**7** 10/8-10/12 *Bermuda triangle calculations* (continued) 112-124

% composition 384-391

Balancing Equations 392-395

**8** 10/15-10/19 Stoichiometry & Yields 396-406

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***9 10/22 Monday October 22 Exam II***

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**9** 10/24-10/26 Bonding Models and Concepts: Basic Lewis Model 144-172

**10** 10/29-11/2 Lewis Model extensions 172-182

Molecular Shape Prediction: VSEPR Theory 192-205

11 11/5-11/9 Classical Reactions: precipitations; acid-base; 429-435; 443-454

12 11/12-11/16 Classical Reactions (continued): titrations, Redox reactions 454-458; 458-466

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***12 11/19 Monday November 19 Exam III***

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**13 11/21-11/25 Wednesday 21 November-Sunday 25 November Thanksgiving Break**

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**14 11/26-11/30** Gas Laws: Empiric, Combined, Ideal 281-295

**15 12/3-12/7** Cooling/heating curves; Phase Diagrams 363-370

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***15 12/5 50 point Take Home Exam IV released Wednesday 5 December …Due Wednesday 12 December***

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**16** 12/10-12/14 Chemical Equilibrium: simple K calculations & Le Chatelier’s Principle 578-587; 602-608

17 12/17-12/20 Final exam week