#### **SUMMER 2014 - GENERAL CHEMISTRY - CHEM 210 - 0001 (1288)**

(Credit Hours: 3.00)

Co-requisite: CHEM 212 - General Chemistry Laboratory I

Classroom Instructor - Professor Narayan S. Hosmane, FR 305, 753-3556, <a href="mailto:hosmane@niu.edu">hosmane@niu.edu</a> (short e-mail questions)

Office Hours – Tu and Th, 2:30 - 3:30 PM, or by appointment

Lectures – 01:00 – 02:15 PM; Monday-Thursday; Room La Tourette (Faraday West) 201

**Materials**: "Principles of General Chemistry", by Martin S. Silberberg, 3<sup>rd</sup> Edition (McGraw Hill: 2013).

#### Exams, Assignments, Quizzes and Grading

*Exams* - Tentative dates for TWO 100 point hourly exams and the fixed date for 100 point FINAL EXAM are indicated in the lecture schedule (see below). Make-up exams will **NOT** be given **under any circumstances**. Missed exam (including Final) will be considered as one of the lowest exam grades. **One of the lowest exam grades will be replaced by ALEKS grade!** 

Surprise Quizzes (Pop Quizzes): Surprise quizzes (believe me you will be surprised!) for a TOTAL 100 points (worth a grade of ONE exam) will be given during the lecture hour. However, only **BEST TEN** quiz grades will be counted toward your FINAL GRADE. There will be **ABSOLUTELY no** make-up quizzes. **Exam and Quizzes will not be curved!** 

Total points = 400 points (TWO hourly exams + ALEKS) = 300; Surprise Quizzes = 100)

Grading scale: A > 90% (360 pts.), B > 80% (320 pts.), C > 70% (280 pts.), D > 60% (240 pts.), F < 60% (<239 pts)

Any student who may need an accommodation due to a disability, please make an appointment to see me during my office hours, or when convenient. A letter from Disability Support Services authorizing your accommodations is usually needed before accommodations can be granted.

# TENTATIVE LECTURE SCHEDULE

<u>WEEK</u>	<u>CHAPTER/TOPIC</u>	<u>Exam</u>
1. June 16	Ch. 1: Keys to the Study of Chemistry + Ch. 2: The Components of Matter	
2. June 23	Ch. 2 (continued) + Ch. 3: Stoichiometry of Formulas and Equations	
3. June 30	Ch. 3 (continued) + Ch. 4: The Major Classes of Chemical Reactions	
4. July 07	Ch. 4 (continued) + Ch. 5: Gases and the Kinetic Molecular Theory	Exam I (July 10)
6. July 14	Ch. 5 (continued) + Ch. 6: Thermochemistry: Energy Flow and Chemical Change	
7. July 21	Ch. 7: Quantum Theory and Atomic Structure	
	+ Ch. 8: Electron Configuration and Chemical Periodicity	
8. July 28	Ch. 9: Models of Chemical Bonding + Ch. 10: The Shapes of Molecules	Exam II (July 31)
9. Aug 04	Ch. 10 (continued) + Ch. 11: Theories of Covalent Bonding	
August 7, 2014	FINAL EXAM in La Tourette Hall (FW) 201 - 1:00 PM – 02:15 PM	Exam III (FINAL)

#### **SUMMER 2014**

# **Getting Started with ALEKS**

# You must register and complete your Initial Assessment by 11:00 pm on the first day of Classes (but it's great to start now to get ahead!)

ALEKS IS VERY UNFRIENDLY TO PROCRASTINATORS. ALEKS was designed by psychologists who specialized in learning, who know that procrastinating until the night before an assignment is due and then cramming until the wee hours is not a good way to learn. You can't do ALEKS that way. You must put in some time every day, or else you will fall so far behind on basic topics that you won't have time to complete the Objectives. It is impossible to earn a good score in ALEKS by cramming all night right before the due date!

## To register as an ALEKS user:

- 1. Go to the ALEKS web site at <a href="http://www.aleks.com">http://www.aleks.com</a>.
- Click on the link marked "SIGN UP NOW" (upper left corner of the screen). 2.
- On the next screen you will be asked to provide the following course code: LHU3U-P34QX 3.
- 4. The next screen will ask for your full name, your email address, and your NIU student Z-ID number. Please provide all the information requested, even the information that is listed as optional. Remember, your NIU student Z-ID number is NOT your social security number. You must enter your NIU Z-ID number to receive credit for your work.
- On the next screen you will receive your ALEKS login name and a temporary password, and you will have the 5. chance to chance your temporary password. We recommend that you change your temporary password.
- 6 ALEKS will now walk you through a tutorial of how to input answers.
- Once you have completed the input tutorial, ALEKS will prompt you to complete the Initial Assessment. This initial 7. assessment is VERY important. It will identify any pre-requisite topics you need to learn before you can be successful in this course, it can also identify what you already know, so you don't waste time on topics you already know. This is not a test for points - it is ALEKS trying to build an efficient and customized learning path for you to achieve success. Don't use any outside resources during this assessment - if ALEKS thinks you know more than you do - your homework will be really hard and take you much longer to do! Also, when you know how to do a problem do it! If you prove mastery of that topic, you'll have less to do in learning mode.

NOTE: ALEKS has two modes, assessment mode and learning mode. Assessment mode measures what you know today (and will figure out if you have forgotten any previously learned topics). Learning mode is where you learn, practice and master the topics – and grow your ALEKS pie (your knowledge). You will frequently be assessed throughout the ALEKS course to ensure ALEKS is providing you the best instruction possible.

#### **ALEKS Technical Support**

No one in the department of chemistry at NIU can provide you with competent technical support for ALEKS. Do not write to your teacher with operational questions about ALEKS...he will not be able to help you. Instead, try the following resources on the ALEKS website:

- Frequently Asked Questions: http://www.aleks.com/fags 1.
- 2. User's Guide: http://www.aleks.com/user\_guides/learners-gchem
- **Troubleshooting**: http://www.aleks.com/support/troubleshooting 3.
- Email the Support Team: http://support.aleks.com

# CHEMISTRY 210 - GENERAL EDUCATION AND COURSE CONTENT OBJECTIVES

## **General Education Course Objectives**

- Improve ability to think critically and logically
- Improve ability to reason quantitatively and to perform basic chemical computations
- Improve ability to interpret mathematical models
- Learn how to use the scientific method and theories to understand chemical phenomena
- EXAM-I: JULY 10; EXAM-II: JULY 31; **EXAM-III (FINAL EXAM): AUGUST 7**

## CHEM 210 SUMMER 2014

- Develop an appreciation for the importance of the role of chemistry in everyday life
- Develop an understanding of the historical development of the field of chemistry

## **Content Objectives of this Course**

- Understand the components of atoms and ions
- Learn how to write chemical formulas, and how to name compounds
- Learn how to balance chemical equations and how to perform simple stoichiometry calculations
- Understand the behavior of gases, liquids, and solids
- Become familiar with the electronic structure of atoms and understand how chemical reactivity depends on electronic structure
- Correctly predict the shapes of complex molecules and ions, and become familiar with the theories of chemical bonding.

#### HOMEWORK ASSIGNMENTS:

• There is no specific homework assigned for this class. However, it is your responsibility to do as much end-of-chapter problems as possible in order to perform well in the pop quizzes, exams and ALEKS. You can check your answers in the solution manual, but the professor of this class will not evaluate and grade your homework problems.

#### Introducing ALEKS for Chem210 at Northern Illinois University

Chemistry is a complex and challenging subject. To make sure you do well enough in it to fully advance your personal educational and career goals, Professor Foo has incorporated into his instruction the ALEKS online chemistry assessment and tutoring service. We have solid data that show this service can improve mastery and retention, particularly for students who would otherwise have difficulty passing.

You will have regular required assignments using ALEKS, and you can expect to spend at least several hours a week working on them. Just how much time you have to spend will depend critically on how efficiently you use the ALEKS service. The purpose of this introduction is help you get the most from ALEKS with the least time and effort.

ALEKS stands for "Assessment and Learning in Knowledge Spaces." The basic idea is pretty simple, and will certainly make sense to you from your own experience. We divide mastery of general chemistryl into a little over two hundred concepts and skills, called topics.

Then we study how all these topics are related. Some topics are pre-requisites for others, meaning you can only successfully master Topic A after Topic B. So B is a pre-req for A. We know these pre-req relationships not only from common sense and logic, but from studying the actual records of hundreds of thousands of college students just like you, over many years.

The ALEKS "knowledge space" is the complete picture of all these topics and how they are related. ALEKS will help you by "placing" you in this knowledge space -- finding out YOUR individual state of knowledge -- and then tutoring you in only the topics on which YOU need to work.

The final outcome, the list of topics to be mastered, has been determined by your instructors, and it is the same for everybody. But YOUR individual path, how you will get from your present state of mastery to that ultimate goal, is going to be unique to you. No other student will have exactly the same experience.

This can be unsettling. Sometimes you'll personally be behind other students -- perhaps behind most of the class! -- and at other times you'll be ahead -- perhaps well ahead! It all depends on your individual state of mastery, your work habits, and on what you personally find easy and find hard.

On the one hand, this is also good news, because it means you'll be working efficiently. You won't be wasting your time with material you already know, nor banging your head uselessly against material you're not ready to learn yet.

#### A Critical Decision.

Our experience tells us that you must make a very important decision early in your experience with ALEKS, that this decision will not be easy, but that making it is essential to long-term success. What you must do is decide to trust the system when it assigns you work -- trust that this is indeed the work you should be doing now, and that doing it diligently will build the essential mastery you need to succeed in chemistry as fast as possible.

Why will this be difficult? Because it is very likely ALEKS will assign you work that you don't think you should have to do. You'll be asked to practice problems even though you're sure you already "get the idea." You'll be dinged for "merely careless" mistakes until you stop making them, and you'll probably find this process annoying and question its importance.

But you'll be wrong. The difficulty is that very few people are the best judge of their own level of mastery, particularly new students, and particularly at its edge, where mastery is new and untested by time and experience. It's a natural human tendency to overestimate your mastery on some topics and underestimate it on others. (And after all, if it were otherwise, if students could routinely evaluate themselves accurately, there wouldn't be much need for skilled teachers to do so, would there? We could all just learn by reading books at home.)

Fortunately, ALEKS is driven by cold hard data, mountains of it, and not by wishes or hopes or fears, and it is by design conservative. It is going to make 100% sure you know how to solve a particular problem or apply a particular concept, by asking you to demonstrate that knowledge many times. It will circle around later and ask you about things you learned earlier, perhaps much earlier, to make very sure you don't forget them. It will be a remorseless taskmaster and demanding coach, and you will surely find it at times very irritating, just like a coach who requires you to do way more laps or more sets in the weight room than you really feel

are necessary. But if you trust its judgment and do as it asks, we think you will be very pleased later on -- when you find yourself blasting through exams with ease and understanding every word of lectures, not only this year, but later in your chemistry career.

#### Some Nuts And Bolts.

How to log in: go to <a href="https://www.aleks.com">www.aleks.com</a>, click on "New User, Sign Up Now," follow the onscreen instructions, and enter the following course code in the boxes provided: <a href="https://www.aleks.com">LHU3U-P34QX</a>

## ALEKS works in a regular cycle of assessment and learning. Here's how it will go:

\* You'll begin with an initial "placement" assessment, about 20-30 problems and questions in chemistry to solve. **You'll get no help at all, nor should you try to find any**. The idea is to find out where you should start learning, and you want ALEKS to get that just right.

If you get your friend the chem grad student to help you, or do a lot of googling, you'll just end up with learning that is way too hard and frustrating, because you'll be missing important pre-requisites. If you don't take the assessment seriously, you'll just end up wasting time on material you already know.

The assessment is over the entire first semester material, so you can expect to get problems you have no idea how to solve. Don't worry about that. This is a placement test, not a final exam. You're not going to be graded on it, and there's no reward for doing better or penalty for doing worse.

\* Next you'll enter "Learning Mode." Now you're going to learn how to master topics ALEKS think you need to work on. Do you see topics here you're really sure you already know? See the discussion above!

Almost certainly, you really DO need to work on those topics, to cement your mastery. You DO NOT want to find that out on the first exam! Trust ALEKS. Do the work it assigns.

In Learning Mode you'll study topics by doing problems in them.

You'll have to do several problems in the same topic correctly for ALEKS to conclude you've mastered the topic.

How many can vary, depending on what kind of mistakes you make, if any. The fastest way to be awarded credit is to be methodical and careful. Get three or four in a row correct and you'll be done. Get one right, then one wrong, then another two right, then one wrong, and you could be there a long time. ALEKS puts a real premium on solving a problem perfectly, every i dotted and t crossed - units correct and complete, answers rounded to the correct number of significant figures, names spelled correctly, not a single small careless error.

This is not to say you can't make mistakes in ALEKS and do just fine. ALEKS can detect a pretty wide range of mistakes and give you useful feedback about them, and you will certainly move through the system, even if you make many small mistakes all the time. But the system does reward being careful, so -- take your time and get it right. You'll be rewarded with needing to spend less time.

In Learning Mode you'll also have access to learning resources. You can ask ALEKS to show you how to solve any problem you're given, in every detail. (ALEKS will then ask you to solve another, similar but not identical, problem on your own.) There are hyperlinks in these Explanations that will take you to the ALEKSPaedia, a built-in "encyclopedia" of general chemistry that has more general and background knowledge you may need. The Explanation will also tell you where in your textbook you can find more help. Use these resources! They're designed to give you just the right help you need at just the right moment, without wasting your time.

\* Finally, after each round of learning, you'll be re-assessed, to make sure you retained what you learned. You're not going to like this, of course. Nobody does. But being re-assessed is very important for your long-term success. First, because you really do want to be sure you haven't forgotten anything. But also because practicing solving problems on your own, without any help or hints, cements knowledge and mastery in your memory. Research in cognitive science clearly proves this, and you may understand it already from your own experience: a "practice exam" can be essential in driving home what you know (and don't know).

An unfortunate but absolutely necessary aspect of this re-assessment is that you can lose credit for topics which you have forgotten. If this happens -- or rather WHEN it happens, since it will almost certainly happen to all of you, and more than once -- then you will have to restudy the topics in Learning Mode and re-gain credit for them. That's more work, of course, so the lesson

here is: learn topics thoroughly the first time, so you can demonstrate your mastery of them any time, on any re-assessment, for the rest of the course.

(ALEKS also has a Review feature, where you can do a little extra work on topics that feel a little shaky. In fact, ALEKS will even suggest which topics you should review, based on its data and your own record.

A judicious use of the Review feature will make it much less likely you have to re-study many topics.)

### **Grading Your Work In ALEKS.**

ALEKS will be worth 100 points

Professor Hosmane is going to grade your work in ALEKS in three equal parts:

- \* Ready for Chem 210?: you'll be expected to come into 210 with genuine mastery of a wide range of topics from high school math and science (makes sense, right?). Your first objective is to find out which topics you really never mastered, or have forgotten through lack of recent practice, and to recover them prior to the deadline for the first objective, called "Ready for Chem 210?". Look in your Gradebook in the ALEKS learning mode to see your score, and make sure that is 100 percent prior to June 23, 2014.
- \* Intermediate Objectives: you'll be expected to reach certain "mileposts" in your mastery of the entire curriculum at certain dates. ALEKS will keep track of this, and report it to your instructor, who will assign a portion of your grade based on whether or not you reached the milestone. The purpose of this is, frankly, to keep you working regularly. We know it's human nature to procrastinate if given the chance. Check the Gradebook for your score on this metric.
- \* Final mastery: the remainder of your grade will be determined just by your overall level of mastery at the end of the class -- how many topics ALEKS says you've mastered. The purpose of this is, first, to give you credit for mastery whenever it is achieved, even if its achieved well after the initial deadline. It is also to give you a strong motive for restoring topics to your mastery list that you may lose on re-assessment. We don't want you forgetting what you learned in Week 1 by the time you get to Week 10. That would result in a sad experience on the final exam. Look at the numerator on the fraction above the ALEKS pie for your score here.

## **Tips And Tricks.**

- \* Don't cram your ALEKS work into one giant all-night session right before the deadline. Not just because it isn't good for you in the long term. It won't work well even in the short term! What happens is that after about an hour and a half you're going to get tired, and you're going to start making mistakes. What happens then? ALEKS gives you more work to do! Because it looks like your mastery is fading. If you work in marathon sessions, you can easily end up putting in twice as many total hours as someone who breaks his work up into shorter, more frequent sessions, so that he has a well-rested mind throughout. Log in every day and do at least a little work, 30 to 90 minutes is best.
- \* Try to solve each new problem yourself before reading the Explanation. You may get it completely wrong, but by trying to solve it yourself, you will be much more aware of what exactly is confusing to you -- which steps or concepts. Then when you do read the Explanation, it will have much more impact. You know how when you get a new phone or device, you FIRST start trying to make it do things, and only read the instructions after you get frustrated? Like that.

  That's actually an efficient way to learn, as you probably know instinctively.
- \* When you work on a new topic in Learning Mode, ALEKS will tell you how many more problems you need to get right to earn credit. The best way to long-term mastery is to NOT to work on one topic only until you get credit. Instead, stop just short, when ALEKS says you only need one more correct to gain credit. Go do something else then. Work on another topic, or work on some other course, or do a little gaming.

Then come back later and finish off the topic. Why? Cognitive science tells us memory actually needs a little time when it's not being actively used to become "consolidated" and permanent. Putting a little delay between the bulk of your learning and the final dash to to the finish line will significantly improve your retention. And

remember: ALEKS is ALL about retention. You are GOING to see that type of problem again, on an re-assessment later on, and you want to get it right every time so you don't have to re-study the topic.

#### So ALEKS Screwed Up.

You're working in ALEKS, and you are absolutely certain that ALEKS is wrong about your answer. You put the right answer in, and the system marked you wrong. This is deeply frustrating, particularly right before a deadline.

Don't smash your computer. That would be expensive. Also don't e-mail your instructor in a rage. If ALEKS has really made a mistake, there's nothing he can do about it, because he doesn't have access to the computers running ALEKS.

What you need to do is write to ALEKS Customer Support. Open your Message Center, compose a message to ALEKS Customer Support. You can use as many bad words as you like, but please be as precise as possible about your difficulty, including the date and time, your ALEKS login, and what exactly happened, so that they can zero in on the problem quickly. Check the little box at the bottom of the form that attaches the page on which you were working, for even faster results.

Your complaint will be reviewed promptly by ALEKS. People with PhDs in chemistry will look into it. If you have discovered a genuine bug in ALEKS it will be fixed pronto, usually within 12 to 24 hours, depending on when you find it, and ALEKS will apologize to you sincerely and thank you for helping them find a mistake.

Incidentally, please be sure you have a genuine complaint. ALEKS will examine your exact record in the system -- exactly what you put in, and when -- and communicate the results to your instructor as well as to you. Your instructor has access to the same complete record of what you do in ALEKS, including when you work, for how long, what you enter, how ALEKS responds, everything. It will not serve you well to complain about ALEKS when the real problem turns out to be you managed your time poorly, or were extremely careless, or did not understand some key concept in chemistry.

What do you do after you've fired off your angry e-mail to ALEKS? You have two options: first, just ask ALEKS for a new problem on the topic. Each problem is a little different, and if you haven't found a major problem, there's a strong chance the next problem won't have it, and you can complete the topic. Even if you get another "broken" problem, you can almost certainly still complete the topic, because you don't have to get every problem right to get credit in ALEKS.

Second, if the whole topic seems broken, or you're sick of it, just work on another topic. It's very rare you'll only have one topic on which you can work, and rarer still that this isn't the very last topic in a goal anyway.

## How Do I Get This Thing Working?

ALEKS runs through your Web browser, on any computer, yours or a friends or mom's, so you have access to ALEKS almost anywhere and anytime. It's designed to run as painlessly as possible, but with the huge variety of computers and browsers and set-ups out there, sometimes you may need some technical assistance to get things running, or iron some strange behaviour out.

Call ALEKS Customer Support. Your instructors can't help at all with this, but ALEKS has people who know all about computers on staff, and they will work with you to fix any technical problems as fast as possible. Your fastest response is to go to the Support website, <a href="http://support.aleks.com/">http://support.aleks.com/</a>, and describe the problem in detail. You can also try calling 714 619 7090 during the hours listed below:

http://www.aleks.com/support/contact\_support\_highered

Someone will e-mail you or call you promptly.

## What is ALEKS?

Assessment and **LE**arning in **K**nowledge **S**paces is a Web-based, artificially intelligent assessment and learning system. ALEKS uses adaptive questioning to quickly and accurately determine exactly what a student knows and doesn't know in a course. ALEKS then instructs the student on the topics she is most ready to learn. As a student works through a course, ALEKS periodically reassesses the student to ensure that topics learned are also retained. ALEKS courses are very complete in their topic coverage and ALEKS avoids multiple-choice questions. A student who shows a high level of mastery of an ALEKS course will be successful in the actual course she is taking.

ALEKS also provides the advantages of one-on-one instruction, 24/7, from virtually any Web-based computer for a fraction of the cost of a human tutor.

## Do I need to purchase access? What does it cost?

You need to purchase an ALEKS Access Code. You can purchase an access code bundled with your textbook at the bookstore (at a discount) or you can purchase ALEKS online with a credit card.

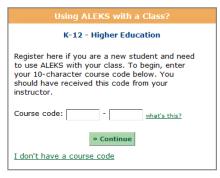
If you cannot purchase ALEKS right away, you can use the temporary access code (see step 5) that will allow you to work up to 2 weeks, then you will be prompted to pay in order to continue.

## How do I log-in?

- 1) Go to www.aleks.com
- 2) Click on SIGN UP NOW!



3) Enter Course Code: LHU3U-P34QX



4) Confirm you'rein the right course.

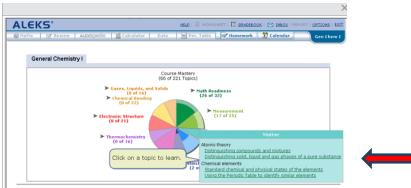
#### Confirm Enrollment Information

You are about to register to use ALEKS in the following course. Please check the course details carefully. If the information is correct, click "Continue." If the information is incorrect, click "modify" to enter another course code.

Course: Chem 210 - Summer 2014 (College)
Subject: General Chemistry (First Semester)
Instructor: Prof. Hosmane
School: Northern Illinois University (modify)

\*\*Continue\*

- 5) You will now be prompted to enter your access code. If you do not have the code from the bookstore (that came bundled with your book), you can purchase at this step. If you cannot purchase now, but want to get working in ALEKS immediately, you can use this temporary access code: 3031C-53A16-7B0BE-0C8EE.
- 6) Fill out the student information webpage (make sure to use your NIU Z-ID).
- 7) Take the Initial Assessment
  - You will be asked to solve about 20-30 problems (this will take you anywhere from 30 to 90 minutes at any time you can logout and log back on, it will keep your place).
  - You'll get no help atall, nor should you try to find any. The idea is to find out whereyou should start learning, and you want ALEKS to get that just right. If you get your friend the chem grad student to help you, or do a lotof googling, you'll just end up with learning that is way too hard andfrustrating, because you'll be missing important pre-requisites. If you don't take the assessment seriously, you'll just end up wastingtime on material you already know.
  - The assessment is over the entire first-year material, so you can expect to get problems you have no idea how to solve. Don't worryabout that. This is a placement test, not a final exam. You're notgoing to be graded on it, and there's no reward for doing better or penalty for doing worse.
- 8) Learning Mode
  - After the assessment, you will see your ALEKS "pie." This shows you what you already know, what you're ready to learn, and what topics you'll eventually need to learn, and by what dates.
  - You can begin working on topics by scrolling over your pie slices, available topics will be hyperlinked and you can begin!



## Having technical issues with accessing ALEKS?

DON'T BUG PROFESSOR HOSMANE, contact tech support at ALEKS, they are very helpful, accessible and prompt!

Phone: (714) 619-7090

**Email:** contact us at http://support.aleks.com

Hours (Eastern Standard) Sunday, 4:00 PM to 1:00 AM

Monday - Thursday, 7:00 AM to 1:00 AM

Friday, 7:00 AM to 9:00 PM