Syllabus for Chemistry 116: Introduction to College Chemistry

Summer 2020, Section A70: Web-based course
June 8 to July 3 (four-week course)

Instructor:

Dr. Matthew Nee
e-mail: matthew.nee@wku.edu
KTH 4045
Phone: (270) 745-0114

Virtual Office Hours:

M, 3:00-4:00 PM
W, 10:00-11:00 AM
Or by appointment (send an email – it is easy to set up a Zoom conference)

Blackboard web site:

http://blackboard.wku.edu

Textbook:

All CHEM 116 and 120 courses are covered by "first-day access" to Sapling Learning Online: Do not purchase a sapling enrollment in our course (see details below) The OpenStax textbook *Chemistry* (2nd Edition) is required, and is available online at no charge. See their website (https://openstaxcollege.org/textbooks/chemistry) for details. The whole package (Sapling Access and textbook info) is bundled together automatically as part of your registration for the course.

Other required Items:

Calculator
Reliable Internet access

Co- or pre-requisite:

MATH 116 or higher (either with, or before CHEM 116).

Course Description:

This course functions both as a preparatory course for CHEM 120 (College Chemistry I) and as a standalone course for certain majors and for general education credit. It does not count toward a major or minor in chemistry. The course will cover chapters 1-3 and sections of chapters 4 and 5 of the text. This course will be conducted entirely through electronic means: there will be no formal meeting times, and all assignments and exams will be online or administered remotely.

After completing this course, students will have a better appreciation for and understanding of the basic principles of chemistry, including standards of measurement, properties of matter, atomic theory and the periodic table, chemical nomenclature, chemical reactions and equations, solution properties, and the basic properties of gases. Students completing this course should have a better probability of success in CHEM 120, if taken. This course fulfills part of the E-NS (Non-lab Natural Science) general education requirement. It will help students attain the general education goal and objective of obtaining an

understanding of the scientific method and a working knowledge of natural science and its relevance in their lives.

Department General Education Objectives:

Students who complete CHEM 116 will be able to:

1. Apply the fundamental scientific accomplishments related to chemistry and chemical interactions.
2. Understand structure-property relationship of chemical compounds and use foundational materials to develop critical thinking and problem solving skills.
3. Explore the fundamental questions regarding the nature of matter and its transformations such as acid-base reactions, redox reactions, and gas laws.
4. Understand the scientific method, making scientific predictions, hypotheses, and theories relate to public importance.

Overview of Course Material:

CHEM 116 serves as an introduction to science at the university level. While some topics will necessarily involve some degree of memorization, (nomenclature, for example), much of the course will require students to think about and apply concepts learned to new situations. In other words, it is not enough to recite, for example, the steps in the scientific method. In addition, you will be required to use it (and other class concepts) to draw conclusions about situations you may not have seen before. The successful student will learn to think critically and will learn how to solve problems and to think like a scientist. Through this course, students will acquire knowledge about the theories, concepts, and principles of chemistry that explain observations and make predictions. The exams and assignments throughout the semester are designed to improve student abilities to understand and apply these concepts. The course is divided into eight conceptual modules. Each module will focus on a different set of concepts, and will develop different skills. A full set of learning objectives for each module is posted on Blackboard.

In the first module (M1), you will learn about the scientific method, an approach we will use implicitly throughout the course to solve problems. You will evaluate what chemistry is, and how it connects many disciplines together to be the "central science." M1 will also introduce (or re-introduce) you to SI measurements and their scientific notation and prefixes.

Atoms and their structure will be introduced in M2. You will be able to identify the names and symbols of the majority of the elements in the periodic table, and to classify at least some of their properties based on their position within the table. You will learn chemical nomenclature: you will be able to name any binary molecular or binary ionic compound, and will learn the names, formulas, and charges of 40 different polyatomic ions. By the end of M2, you will correctly use them to name compounds, including acids and hydrates. Nomenclature will be used throughout the course, as chemical formulas are the words of the chemical language.

We will explore measurements in chemistry further in M3. Upon successful completion of that module, you will be able to convert between SI units and customary (English) units of measure, including derived units like volume and density. This skill will enable you to solve a large number of problems in general chemistry. You will appreciate the distinction between accuracy and precision, and you will be able to use significant figures to encode the accuracy of your measurements into the numbers themselves.

Chemical reactions are central to chemistry; you will learn the basics in M4. You will be able to translate between English words and a chemical equation, the sentences of the chemical language. You will understand the advantage of using moles, and will be able to convert among mass, number of atoms or molecules, and number of moles of a compound. This will be the first step in stoichiometry, which is covered in M5. You will extend the mole concept to make predictions about the yield of any chemical reaction, given the balanced chemical equation and the amounts of reactants, a fundamental task for any chemical process. You will be able to calculate a yield in moles, grams, or liters given moles, grams, or liters of reactants for any reaction.

Many reactions proceed in solutions, which are covered in M6. Here, you will learn what ionic compounds are soluble in water, and how to classify the concentration of a solution. Both of these skills will be used further in M7, after which you will be able to predict the products of certain types of reactions based solely on the reactants. In some chemical reactions, a reactant or product will be a gas. In M8, you will explore the basic properties of gases. You will use the relationships connecting pressure, volume, temperature, and number of moles to predict changes to the state of the gas. Naturally, you will need some time to combine all of these ideas to predict the yield of any reaction. Ultimately, you will be able to write a balanced chemical equation based on the reactants only (predicting gas products), then determine the reactant-limited yield based on that equation.

Expectations:

As the instructor of the course, you can expect me to:

- Prepare, post, and maintain lectures and other course materials on the Blackboard site
- Prepare, direct, and evaluate student progress on homework assignments
- Be available for student questions and concerns during office hours or as arranged
- Provide suggestions regarding study habits, tutoring, etc. when requested
- Grade all assessments fairly and report the results to you within a reasonable time
- Help students get more involved in the chemistry department if desired

As a student in this class, you are expected to:

- Spend a ***minimum*** of 30 to 35 hours per week reviewing lectures and doing assigned reading and practice problems, most of which is spent on practice problems
- Have daily access to Blackboard and Sapling – this is a requirement for this course
- Read the textbook (in addition to the material being presented in lecture)
- Do any suggested end-of-chapter exercises in the textbook
- Complete the homework assignments posted on Blackboard and Sapling
- Pass the quiz at the end of each module ***before moving on to the next module***
- Make and keep appointments for exams at a certified testing center on the days required
- Ask questions if you are having trouble

Participation:

You must keep up with the lecture slides, adhering to the recommended schedule. Failure to do so will not leave you sufficient time to get "caught up" at the end of the term. The single greatest pitfall made by summer and online students is the delusion that you will have time to master material "later." THIS COURSE IS ONLY 4 WEEKS LONG – YOU CANNOT AFFORD TO LOSE ANY TIME. Participation on the Sapling assignments is required for student success. Compared to many other courses, chemistry requires a considerable amount of practice outside of lectures, more so than reading. Successfully

completing the Sapling assignments once will give you credit for the assignment, but you must practice them repeatedly to ensure mastery. While reading and absorbing the text is an important task for learning the concepts and terminology of chemistry, the quizzes and exams will also demand that you can work problems like those presented in the homework; both aspects are critical to a full understanding of the material. The best way to succeed is to do all of these things.

Blackboard:

This course will make extensive use of **Blackboard** (http://blackboard.wku.edu), an online environment that is used by Western Kentucky University for teaching purposes. By registering for this course, you have obtained access to the course information available on Blackboard. Blackboard can be accessed from any computer (on or off campus) with an internet connection. For computer lab **locations and hours**, see https://www.wku.edu/it/labs/locations_hours.php.

Information available on Blackboard includes this syllabus, supplemental information (like lists of required atoms and polyatomic ions), lectures, quizzes, practice exams, and a record of student grades. You are responsible for notifying the instructor of any recording errors. The grades for each assignment will be posted, but, because of limitations in the Blackboard system, your overall grade at any given time should be calculated separately, using the grading system outlined below. **Graded HW assignments will be handled through the Sapling system (see below), not on Blackboard.** All questions or problems regarding the general functionality of the Blackboard environment should be directed to the Help Desk (270-745-7000) and not the professor. If you have circumstances that would make the use of an online course component difficult, this course may not be appropriate for you.

The lectures and text are two complementary aspects of this course, but neither substitutes for your own efforts. Although you may have my slides, you must work the exercises during the lecture videos and ask questions via email for the pieces to truly fit together. Problem solving sessions during videos are critical to success in any class, and if you attempt to rely solely on the slides, without pausing to work examples, you will not perform as well as you could if you used all available resources.

Grading:

The nature of each assignment, including the means by which it will be evaluated, is described in this syllabus. General participation will be evaluated liberally, but at the discretion of the instructor. You do not have to be right all the time to get the full participation points. Poor effort, poor attitude, or an unwillingness to participate on Sapling homework or problem solving activities, however, will result in a reduced participation score. Course grades will be assigned using the following point scale.

Homework grade (8; 40 pts each)	320 pts
General Participation (Sapling, Blackboard, etc.)	20 pts
End of Unit Quizzes (8)	80 pts
Periodic Review Quizzes (3)	30 pts
Midterms (3)	300 pts
Final Exam	250 pts
Total	1000 pts

The following grade scale will apply at a minimum (see below):

A = 90-100% (900-1000)
B = 80-90% (800-899)
C = 70-80% (700-799)
D = 60-70% (600-699)
F = Below 60% (< 600)

These minima may be adjusted **DOWN** but not up. In other words, if you earn 900 points, you are guaranteed an A, but it may be the case that 890 points becomes the cutoff instead.

Audits: No audits will be allowed for this course.

Online Homework:

Doing the HW is the best way you have to study, and to determine if you understand the material. Statistically, those students who do not put appropriate time into the HW assignments perform poorest in the class overall – not taking homework seriously is one of the easiest ways to fail this course. A total of eight, for-credit homework assignments (one for each module, worth 40 points each) will be available online through Sapling during the semester. With the exception of the first few, each graded homework set will be available for approximately one week before it is due. It is your responsibility to keep up with the homework schedule and submit each homework set when it is due as indicated on the schedule. All assignments are due at 11:55 pm on the listed due date, unless otherwise noted. ***No late homework or excuses will be accepted. Computer difficulties are not an acceptable excuse either.*** It is your responsibility to ensure access to online materials, and to stay up to date with deadlines, even if changes are made to them during the semester.

You must follow these instructions to register for your Sapling account:

1. Go to the Sapling website (http://saplinglearning.com) and click on US Higher Ed at the top right.
2. a. If you already have a Sapling Learning account, log in, then skip to step 3.

   b. If you have a Facebook account, you can use it to quickly create a Sapling Learning account. Click "Create an Account", then "Create my account through Facebook". You will be prompted to log into Facebook if you aren't already. Choose a username and password, then click "Link Account". You can then skip to step 3.

   c. Otherwise, click "Create an Account". Supply the requested information and click "Create My Account". Check your email (and spam filter) for a message from Sapling Learning and click on the link provided in that email.

3. Once you are logged in, under "Enroll in a new course," you should see Courses at Western Kentucky University. Click to expand this list and see courses arranged by subject. Click on a subject to see the terms that courses are available.
4. Click on the term to expand the menu further (note that Semester 1 refers to the first course in a sequence and not necessarily the first term of the school year).
5. Once the menus are fully expanded, you'll see a link to a specific course. If this is indeed the course you'd like to register for, click the link.
6. Enter the key code (no caps!): **carbon**

7. DO NOT PAY for Sapling access. Use the code provided above to gain access to the course.
8. The following link includes more detailed instructions on how to register for your course: https://community.macmillan.com/docs/DOC-5972-sapling-learning-registering-for-courses.

Once you have registered and enrolled, you can log in at any time to complete or review your homework assignments. During sign up - and throughout the term - if you have any technical problems or grading issues, send an email to support@saplinglearning.com explaining the issue. The Sapling support team is almost always more able (and quicker) to resolve issues than your instructor.

Additional Homework:

While the online HW is a good way to help you master the material, additional practice will always be needed. Each module has a paper assignment required as well. These assignments are not collected or graded, but it is highly unlikely that you will pass the course simply by working the Sapling assignments. These additional assignments have complete solutions available, but because they are not graded, there is no point to viewing the solutions until you believe that you have the answer correct. If you cannot immediately see how to work a problem, instead of looking at the solutions, consult the many example problems in the textbook to find a similar problem. You may find that certain topics demand even more practice – you should use the problems in the back of each chapter of the text to help you there, or seek additional problems online or by consulting with the instructor.

Quizzes:

Students must *pass* an online quiz associated with each module before they can move on to the next module. You may take the end-of-module quizzes up to five times before the deadline (only the highest score will be recorded), but you must pass each one before you will be able to view the lecture slides for the next module, or take the quiz for the next module. Blackboard will enforce this using its "adaptive release" mechanism. Each end-of-module quiz will be worth 10 course points. In addition to the end-of-module quizzes, there will be three cumulative-review quizzes: one after Module 3, one after Module 5, and one after Module 7. These quizzes will also need to be passed before the next module can begin. For the review quizzes, you may take the quizzes up to ten times, but if you get to five attempts without passing, you clearly need to review the older material before you move forward.

If you do not pass each quiz before the deadline, or if you exceed the maximum tries allowed, you will need to seek special arrangement from Dr. Nee to continue in the course.

Exams:

Four online exams (three midterms and a final) will be given during this course; these exams will focus on materials in lecture, homework, and the textbook for each section. Some questions will be structured similarly to the homework problems, while others will test concepts and vocabulary from the reading. Each midterm will cover roughly one week of material, and each will be worth 10% of the total course points. The final exam will be comprehensive and will be worth 25%. *A passing grade on the final exam is required to pass the course overall.* Makeup exams will be administered only for legitimate excuses with valid documentation (serious illness requiring a doctor's note, university sponsored activity, etc.), and must be requested prior to the scheduled date of the exam. Solutions to the final exam will not be made available; scores will be posted on Blackboard.

Midterm exams will be available through the Sapling course. The final exam will be given in Blackboard. For each exam, you will have a window (usually 12 hours) during which you must complete the exam. There will be a time limit on the exams as well (one hour for midterms, two hours for the final exam).
Exam Information: Makeup exams will not be given for technological reasons. You must complete the exams within the window, or make arrangements with the instructor in advance.
Tentative Exam Schedule: Schedule subject to change as necessary.

Exam 1:	Monday, June 15th
Exam 2:	Monday, June 22nd
Exam 3:	Monday, June 29th
Final Exam (cumulative):	Friday, July 3rd

University Deadlines:	Drop/add (no W)	Tuesday, June 5th
	Withdrawal deadline	Tuesday, June 24th

Virtual Office Hours and Email Policy:

Because of the online nature of this course, office hours will be conducted primarily from a distance. The means by which this is accomplished may evolve during the course, but I intend to be accessible by phone (unless otherwise noted) or by Zoom. Because of the current social distancing situation, I am unavailable to meet in person. Note that, if you are having difficulty, the more specific your questions are, the more efficient we will be in solving them. This means that you may find it useful to scan or photograph your work (or the screen, or both) to show me the specifics, and include that in the email. This will be superior to sending me an email with a cryptic message like "how do I do number 4?" I am unlikely to respond favorably to questions which indicate that you have not made full use of the available resources. *Assistance on course material is not available on test days* (except for material not included on the exam, i.e., you are already working on the next module). Email is the most certain means of contacting me. During the week, I will make a very serious effort to reply to email within 24 hours. Emails received after 7 pm on a weekday or over the weekend are unlikely to receive a reply before the next day. Plan accordingly: a lack of preparation on your part does not constitute an emergency on mine. Do not expect special treatment for your email just because an assignment is "due that day." Instead, start assignments significantly before they are due.

Academic Dishonesty:

"Following the procedures of due process, if the WKU Code of Student Conduct is violated, the responsible parties will go through the University's disciplinary process, which is intended to be a fair and educational experience. Any WKU student may be expelled, suspended, placed on probation or given a lesser sanction for one or more of the following causes: Dishonesty, such as cheating, plagiarism, misrepresenting of oneself or and organization, or knowingly furnishing false information to the University…" [From the *Undergraduate Catalog*]

For the purposes of an online course, academic dishonesty extends to all assignments. Both homework and exams must be each student's own work. Although group study is encouraged, graded assignments must be completed and submitted by each student independently. Failure to do so will result in a grade of F for the course.

Students with disabilities:

Students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Office for Student Disability Services in Downing University Center, A-200. The phone number is (270) 745-5004. Please *do not* request accommodations directly from the professor or instructor without a letter of accommodation from the Office for Student Disability Services.

Adjustments to Syllabus:

While I will make every effort to follow the policies laid forth in this syllabus, situations occasionally arise which require changes to those policies. I reserve the right to make those changes as necessary.