

Introductory Chemistry (CEM131)

John Ireland, Ph.D. – Winter 2018

Contact and Course Information

Lecture Times:	M/W 9:00 – 10:30 AM	Email:	irelandjohn@jccmi.edu
Lab Times:	M/W 10:30 AM - 12:30 PM	Office:	McDivitt 136A
Website:	http://docireland.org	Office Hours:	M: 2:30 – 4:30 T: None W: 2:30 – 4:30 R: 10:00-11:00/2:00-4:00 F: 10:00-11:30/3:30-4:30

Course Description (as per JCC Catalog)

Fills requirement for some non-science majors. Provides background for CEM 141 for those with no recent high school chemistry. Fundamental principles of chemistry such as states of matter, simple atomic and molecular structure, and the periodic classification of elements. The study of water emphasizes the properties of solutions and acid-base relations. Course includes a laboratory component.

Prerequisites: ENG 085* and MAT 031* or higher

Textbook and Materials

Textbook: Chemistry, Structures of Life by Karen C. Timberlake (4th Edition) ISBN: 978-0-321-75089-1

Textbook Zero: This text is available in a digital format from several sources, including: amazon.com (Kindle) audible.com (Audiobook) barnesandnoble.com (NOOK Book). You can also check with the JCC bookstore or your local library regarding possible digital formats.

Laboratory Manual: Chemistry 131 Lab Manual (in JCC Bookstore)

Calculator: You will need a scientific calculator for the course, it may be programmable but may not be internet-capable (i.e. no Cell Phone Calculators)

Course GEO

GEO 4: Demonstrate Scientific Reasoning

Course Assessment Criteria

Grading Scale for the Course

100 – 90.0	4.0
89.9 – 85.0	3.5
84.9 – 80.0	3.0
79.9 – 75.0	2.5
74.9 – 70.0	2.0
69.9 – 65.0	1.5
64.9 – 60.0	1.0
59.9 – 55.0	0.5
54.9 – 0.00	0.0

Course Assessments

Unit Exams (4)	300
Daily Quizzes (23)	~200
Labs (12)	~110
<u>Final Exam</u>	<u>100</u>
Total	~710 PTS

Percentage is a percentage of the total number of points
All grades are rounded to three significant digits.

Course Learning Objectives

1. The student will be able to use the metric system for measurement and convert between different simple and compound units through calculation.
2. The student will be able to use the basic periodic properties of the Periodic Table to determine trends in characteristics for elements found on the Periodic Table.
3. The student will be able to calculate heat transfer between compounds or states using the basic equations of Thermodynamics.
4. The student will be able to describe a given element in terms of basic atomic and subatomic structure with discussion of implication to Periodicity.
5. The student will be able to describe and work through the basic types of radioactive decay in mathematical and chemical terms.
6. The student will be able to differentiate the basic types of chemical bonds (ionic, covalent, and hydrogen) and how they arise from the periodic properties of the elements.
7. The student will be able to differentiate the basic types of intermolecular forces and determine which are relevant to simple compounds.
8. The student will be able to discern the basic molecular geometry of a simple compound based on VESPR theory concepts.
9. The student will be able to use molecular shape and bond types to determine whether a simple compound is polar or nonpolar.
10. The student will be able to effectively convert values between the concepts of number of atoms, mass, and moles.
11. The student will be able to balance chemical equations and use them to solve stoichiometric problems.
12. The student will be able to use the basic Gas Laws as part of a solution to stoichiometric problems.
13. The student will be able to use the common mathematical descriptions of concentration (i.e. molarity) to describe solubility and solve stoichiometric problems.
14. The student will be able to construct an Equilibrium Constant for a chemical reaction and use it to mathematically describe a chemical system.
15. The student will be able to use Le Chatelier's Principle to predict the behavior of an equilibrium in response to perturbation.
16. The student will be able to differentiate between the common theories of acid/base formation (including strengths and weaknesses), and how they apply to common chemical systems.
17. The student will be able to mathematically determine the pH (and/or pOH) of a solution based on the concepts of chemical equilibrium and the mathematical definition of pH.
18. The student will be able to describe the actions of a buffer in mechanistic terms.

Course Policies

Course Communication

I maintain server space to host materials for my courses. The website (<http://docireland.org>) is where I will publish all notices for the course, post materials needed, and link copies of the podcasts and PowerPoint files. This is my personal space and the materials are produced with my personal equipment. The materials are intended for your personal use in the class only.

Attendance and Participation

The school has a vested interest in making sure you are attending the classes in order to help you be successful. In light of this we, as instructors, must report your participation on a number of occasions throughout the semester. You will be reported as a **V** for *Verified* (meaning you are attending, participating and in addition passing), as an **H** for *Help* (meaning you are attending and participating, but not passing), or as **Q** for *Quit* (meaning you are no longer attending and/or participating in class). There are several reasons you may be listed as a **Q**, which I will address in a moment, but it is important to note that *once you have been dropped from a class by an instructor you cannot be put back into the class without the instructor's signature.*

Reasons for Being Assigned a Q

- Failure to attend class within the first week without contacting the instructor.
- Failure to attend class for greater than three (3) sessions without contacting the instructor.
- Failure to take two (2) Unit Exams
- Failure to take five (5) Daily Quizzes
- Failure to complete three (3) Laboratory Exercises

These conditions will result in an automatic Q during the next HQV reporting period and your dismissal from the course. If you fail to participate after the final HQV reporting period (1 week after midterm) you will not be automatically dropped from the course but will receive a grade of 0.0 (E) for failing to participate in the course.

Electronic Devices and Classroom Courtesy

All students have a right to the same classroom experience and opportunity to learn. Any disruptive behavior in my class will result in *your immediate removal and loss of all points possible on that day* (daily quiz, lab, unit exam, etc.). This includes the use of cell phones and other electronic devices. You are welcome to tape my classes for *your future personal use only* and use a laptop or tablet for scholarly pursuits but any use of devices that I deem distracting (yes, I am the one who decides) will be dealt with immediately.

Academic Integrity and Honesty

The following is the text from the JCC Catalog and Policy Statements about Academic Honesty.

Any students found cheating and/or plagiarizing will receive a grade of 0.0 for the assessment. A second offense will result in a grade of 0.0 for the course. ALL INCIDENTS WILL BE REPORTED TO THE ACADEMIC DEAN

Faculty members who suspect a student of academic dishonesty may penalize the student by taking appropriate action up to and including assigning a failing grade for the paper, project, report, exam, or the course itself. Instructors must document all instances of academic dishonesty beyond those of a very minor nature, in writing to the Office of the Academic Deans using the attached form.

Students, who are suspected of cheating during a course exam or course placement in the testing lab, will be questioned and reported to the appropriate faculty member or Executive Dean of Students. The proctors are not to stop the exam but report the questionable behavior. As in other instances, the faculty will determine the penalty and appropriate action. If the student is suspected of cheating on course placement, the Executive Dean of Students is to be contacted and will determine the next steps.

The Office of the Academic Deans will record and track students who have been reported as having cheated. If the same student has a second incident, the dean will enact sanctions appropriate to level of infraction. The sanction will be selected in consultation with the involved faculty. The Dean can administer consequences up to and including suspension.

Definitions:

Academic Honesty: Is defined as ethical behavior that includes student production of their own work and not representing others' work as their own, by cheating or by helping others to do so.

Plagiarism: Is defined as the failure to give credit for the use of material from outside sources. Plagiarism includes but is not limited to:

- Submitting other's work as your own
- Using data, quotations, or paraphrases from other sources without adequate documentation
- Self-plagiarism – is the reuse of significant, identical or nearly identical portions of one's own work without acknowledging that one is doing so or without citing this original work

Cheating: Is defined as obtaining answers/material from an outside source without authorization. Cheating includes, but is not limited to:

- Plagiarizing in any form
- Using notes/books without authorization
- Copying
- Submitting others' work as your own or submitting your work for others
- Altering graded work
- Falsifying data
- Exhibiting other behaviors generally considered unethical

<http://www.jccmi.edu/policies>

Incomplete Policy

The following is the text from the JCC Catalog and Policy Statements about an Incomplete.

Students may receive an "I" if, at least 90 percent (or as otherwise designated within the course syllabus) of the coursework is completed with an average grade of 2.0 to meet the objectives as specified in the course syllabus. The student shall complete appropriate documentation and follow defined procedures to request an incomplete grade considered. The course objectives are to be satisfactorily completed during the next semester or within a shorter period of time as determined by the instructor. The instructor and student shall work together to determine when the work is to be completed taking into consideration any extenuating circumstances which may cause the one semester to be extended; however, a due date is required. If the student does not complete the course within the designated period, the Registrar will replace the "I" grade with the earned grade as originally assigned by the instructor.

The grade of "I" is not awarded to students who did not attend, seldom attended, or to those who simply are not pleased with their final grades. Students receiving an "I" submit only the remaining work that had not been completed at the end of the semester. Students do not redo work that had already been graded. (<http://www.jccmi.edu/policies>)

Extra Credit and Missed Work

There is no extra credit available, per department policy, and no make-up/late work. Any deviation from this is solely at my discretion. **If I do make an exception to any policies in the course they will be communicated in written (email) form for future reference.**

Course Assessments

Unit Exams

There are four (4) Unit Exams, covering two (2) chapters in the text. These exams are comprehensive for the material in the unit and may also require skills, information or techniques learned in previous units (to a lesser extent). The exams are a mixture of various testing styles but will always include a set of problems to test your ability to quantitatively work with the information in the chapters. **Each Unit Exam is worth one hundred (100) points and I count the highest three (3) towards your final grade.**

Daily Quizzes

There are approximately twenty-three (23) Daily Quizzes, each covering a mixture of material covered in the last class and the reading assigned for class that day. You may use any **handwritten notes** for the Daily Quizzes (not copies of the PowerPoint files) but be warned, they are only ten (10) minutes and failure to prepare will result in a low score. **Each Daily Quiz is worth ten (10) points. The number of total quizzes may change but there will still be three (3) dropped scores.**

Lab Reports

There are 13 Lab Reports, each covering a day's activity in the lab. The lab reports will allow me to assess both your understanding of the material and your technical ability in the lab. The reports will be graded for correctness and completeness. Depending on the lab a measure of error will be accounted for in the lab grade. **Each Lab Report is worth ten (10) points and all but the lowest will count towards your final grade.**

Final Exam

There is a course-wide final exam for the CEM131 course. **The exam will be an ACS (American Chemical Society) standardized national exam and therefore no notes will be allowed.** Every student in the course will be judged by the same rubric for the course. The Final Exam is worth one hundred (100) points and counts towards your final grade.

Grade Normalizations

All Unit Exams and the Final Exam will be subject to a grade normalization (what many of you call a curve). **The extent of the normalization will be the least (non-negative) value of the following conditions.**

- The points needed to bring the class median to 74%
- The points needed to bring the highest score to 100%

No normalization will be applied to Daily Quizzes or Lab Reports.

Use of Notes and Study Guides

I have gone back and forth on these topics throughout my teaching career and have decided on the following policy. **No study guides will be provided.** I know this sounds harsh, but the policy is from my years of experience and my expectations for work you will be required to do in the future. I find that the use of study guides consistently lead to students expecting the test to be specifically off the study guide which is not what the exams are about.

Students can use any handwritten notes (not PowerPoint slides copied with notes on them) for the Daily Quizzes. **For the Unit Exams you will not be allowed notes or notecards**

Subjects Needed for CEM132

The following was written by Dr. Visser, the professor for CEM132, and should serve as a guide for those of you hoping to continue in this course sequence.

Students are expected to study and learn *everything* from a class, but it is even more important when a class is the first in a two-semester sequence (CEM 132 may be titled "Organic and Biochemistry," but it's all based on the principles of general chemistry covered in 131). And of course, there is always the problem of students cramming for a test and then "dumping" what they've learned to make room for the new material, since once you've been tested on something, you don't need to worry about it anymore, right? Wrong!!! There are several topics from general chemistry that are absolutely critical to the understanding of organic and biochemistry. In order to set yourself up for doing as well as you can in CEM 132, make sure you thoroughly understand the following topics (what's going on and what effect these things have on molecules, etc.) as they are covered in class.

- Melting & boiling substances vs. decomposition of a molecule
- Covalent bonding/making molecules (octet rule, distribution of atoms around the central atom)
- Molecular structures/shapes (linear, tetrahedral, etc.)
- Polar vs. Non-polar molecules (what makes them polar or non-polar; how polarity alters a molecule's physical characteristics, etc.)
- Intermolecular bonds (London dispersion forces, hydrogen bonds, ionic bonds, etc.)
- Equilibrium reactions/Le Chatelier's principle (what happens when you add more of a substance to one side or the other of a balanced system)
- Acids & Bases (what *types* of compounds act as acids & bases; what makes something a strong vs. a weak acid or base; what buffers are and how they work)

Course Schedule (subject to change with notification)

Class Date	Lesson	Chapter(s)	Lab (by Week)
1/15	Syllabus/Chemistry and Measurement	1	NO LAB – FIRST WEEK
1/17	Chemistry and Measurement	1	
1/22	Measurement/Energy and Matter	1/2	Lab 1
1/24	Energy and Matter	2	
1/29	Energy and Matter	2	Lab 2
1/31	EXAM 1		
2/5	Atoms and Elements	3	Lab 3
2/7	Atoms and Elements	3	
2/12	Nuclear Chemistry	4	Lab 4
2/14	Nuclear Chemistry	4	
2/19	Nuclear Chemistry	4	Lab 5
2/21	EXAM 2		
2/26	Compounds and their Bonds	5	Lab 6
2/28	Compounds and Their Bonds	5	
3/5	Chemical Reactions	5	Lab 7
3/7	Chemical Reactions	6	
3/12	SPRING BREAK		
3/14	SPRING BREAK		
3/19	Chemical Reactions	6	Lab 8
3/21	EXAM 3		
3/26	Gases	7	Lab 9
3/28	Gases	7	
4/2	Gases/Solutions	7/8	Lab 10
4/4	Solutions	8	
4/9	Solutions	8	Lab 11
4/11	EXAM 4		
4/16	Reaction Rates and Equilibrium	9	Lab 12
4/18	Reaction Rates and Equilibrium	9	
4/23	Equilibrium/Acids	9/10	Lab 13
4/25	Acids and Bases	10	
4/30	FINAL EXAM (CUMULATIVE)		NO LAB - FINALS

Learning Contract

I, _____ (print your name), have been given a copy of the syllabus/policies for Introductory Chemistry (CEM131) taught by Professor John Ireland, during the Fall 2017 term at Jackson College. The following conditions for the class were explained to me during class.

- This class has daily, open, hand-written notes quizzes over the assigned reading and previous class's materials. The quizzes occur during the first ten (10) minutes of class and missing a quiz results in a grade of zero (0). Quiz times may be shortened if the class has finished the quiz, this does not mean additional time will be given to students who arrive late.
- Copies of the PowerPoints are provided in an electronic archive for the course, but hardcopies of these slides are not allowed to be used for the quizzes.
- There are no make-up labs, daily quizzes, or exams in the class. Periodic absences are accounted for in the dropped grade policy for the course.
- While the occasional absence or tardiness in this class can be absorbed by dropped grades, the student is still responsible for the missed information and any schedule changes that occur during their absence.
- Lab attendance is required for the course. Failure to attend three (3) labs will result in the automatic failure (with a grade of 0) of the course.
- Only reasonable accommodations, properly registered and reported by the Center for Student Success (CSS) will be honored in the class, no other changes to class protocol are to be assumed.
- A preliminary schedule for the class was given to the class in the syllabus, but it is possible that dates may change. Any major assessment (exams, lab quizzes, or formal lab) day changes will be done with at least seven (7) days notice to the class. This does not pertain to daily quizzes.
- Absences are not judged as excused or unexcused. The student is assumed to be an adult and capable of prioritizing their lives and class, so no consideration will be given for early/late testing due to absences for personal reasons (i.e. vacations during term). The performance of governmental service (military, jury duty, etc.) is the exception to this rule and will require documentation.
- Only scheduled vacations, and/or announced closures, of Jackson College are observed by the class.
- Medical leave is subject to the dropped scores policy, and occasional absences for such will be handled through that policy. If extensive medical concerns occur, it is the responsibility of the student to seek a withdrawal for medical reasons, or an incomplete (if appropriate).
- The audio recording of the lectures is permitted for personal use, as are still images of materials or specimens. However, no video recording or public sharing of class materials is allowed.

These conditions and all assessment criteria/policies of the class were explained during the first meeting of the class. I have been given a minimum of thirty-six (36) hours to review the materials outside class and email any questions to the professor. I agree to abide by the requirements of the course as outlined in the syllabus and other materials provided.

Signature: _____ Date: _____