Chemistry 130: Introduction to General, Organic, and Biochemistry

Fall 2019, World Campus Web Course

Course Syllabus

Instructor Contact Information

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Course Overview

This course is a one-semester college level introductory chemistry course covering the fundamental principles of general, organic, and biochemistry. Three credits, fulfills the General Education (GN) requirements.

Course topics include dimensional analysis, atomic structure and periodicity, chemical bonding, molecular structure, states of matter and intermolecular forces, basic gas laws, solutions and solubility, acids, bases and equilibrium, reaction stoichiometry and thermodynamics. In addition, fundamentals of organic nomenclature, properties of main organic functional groups, and structure and function of biological macromolecules will be discussed. The course will emphasize chemistry in environmental and health-related contexts.

Who should take this course?

CHEM 130 is intended for students in programs that do not require the more theoretical and mathematically oriented general chemistry course sequence, CHEM 110/112. It will satisfy the CHEM 101 academic requirement for majors such as:*

- B.S.N. General Nursing Option in the College of Nursing
- Kinesiology (Applied Exercise Health, Fitness Studies, or PHETE options), and Biobehavioral Health in the College of Health and Human Development
- Landscape Contracting, Turfgrass Science, Agriculture Science, and Animal Sciences (Business Management option) in the College of Agricultural Sciences

*This is not a comprehensive list.

This course is a suitable prerequisite for the CHEM 202/203 organic chemistry course sequence; however, it is not appropriate for medical school preparation and will not serve as a prerequisite for the CHEM 210/212 organic chemistry course sequence. Students majoring in chemistry and other majors within the Colleges of Science and Engineering, as well as students in the Movement Science option of Kinesiology or the Science option of Animal Sciences should register for the CHEM 110/112 sequence.

Prerequisites

Placement beyond the level of MATH 021 is required, and one-year high school chemistry is recommended. Please see your instructor as soon as possible if you have any questions or concerns about your preparation for CHEM 130.

Required Course Materials

1. Textbook: Ball et al, *The basics of General, Organic, and Biological Chemistry*.
Publisher: Saylor Academy, 2012, Open (Access) Textbook, link at:
http://saylordotorg.github.io/text_the-basics-of-general-organic-and-biological-chemistry/ or
https://chem.libretexts.org/Textbook_Maps/Introductory_Chemistry/Book%3A_The_Basics_of_GOB_Chemistry_(Ball_et_al.)

2. A suitable non-programmable scientific calculator (one that handles numbers in scientific notation and provides log/antilog functions). *Calculators with text-storage, graphing, or communication capabilities (such as the TI-81 used in MATH 140, cell-phone calculators, etc) will not be permitted for use on CHEM 130 exams.*

3. Webcam.

4. Photo or scanning capabilities (e.g., Adobe Scan, CamScanner, etc.)

Note: This course will require you to take exams using certain proctoring software that uses your computer's webcam or other technology to monitor and/or record your activity during exams. The proctoring software may be listening to you, monitoring your computer screen, and viewing you and your surroundings. By enrolling in this course, you consent to the use of the proctoring software, including but not limited to any audio and/or visual monitoring which may be recorded during the exam.

Important Administrative Dates

Event	Date
First day of classes	Monday, August 26th
Regular drop period ends	Saturday, August 31st
Regular add period ends	Sunday, September 1st
Late drop deadline	Friday, November 15th
Thanksgiving Holiday (no class)	November 24th – 30th
Finals week	December 16th – 20th

Administrative Help Info

- All registration issues must be resolved in our undergraduate office in 219 Whitmore.
- Stop by in person (Monday - Friday, 9 am - 5 pm) or contact Mike Joyce (814-863-3261, mjj12@psu.edu) for help.

Course Learning Objectives and Learning Goals

The overall objective of this course is for students to gain knowledge of fundamental principles in the areas of general chemistry, organic chemistry, and biochemistry. Since many of the students enrolled in this course will be majoring in environmental or health related sciences, this course will emphasize chemistry as it appears in environmental and health related contexts. The specific learning objectives are listed below:

1. General learning objectives: students will be able to

- Apply scientific reasoning and methods of inquiry to explain chemical phenomena.
- Demonstrate effective problem-solving and critical thinking skills through interpreting, analyzing, and evaluating chemical information (both qualitative and quantitative).
- Use their knowledge of general, organic and biochemistry to describe and analyze issues in health and environmental sciences.

2. In the areas of general chemistry, students will be able to

- Perform dimensional analysis to convert between different measurements, particularly as applied to health-related situations.
- Describe the structure of an atom, explain how elements are arranged in the periodic table, and understand the periodic trends in atomic properties.
- Name and identify ionic and molecular compounds (either binary or containing polyatomic ions), draw Lewis structures of molecular compounds, use VSEPR theory to predict molecular shapes, classify whether a molecule is polar, and describe the attractive forces in molecular compounds.
- Apply basic gas laws, especially in regard to the human respiratory system.
- Identify the solute and solvent in a solution, describe the effect of temperature, pressure, and intermolecular forces on the solubility, identify solutes as electrolytes or nonelectrolytes, and describe how solute concentrations affect the properties of a solution.
- Balance and classify basic chemical reactions, use balanced equations to determine relationships between reactants and products, determine the limiting reactant, theoretical yield, and percent yield of a reaction.
- Describe how free energy changes are different for spontaneous and non-spontaneous reactions, and explain how variables such as temperature and pressure affect the rate of a reaction.
- Identify common acids and bases, and apply the concepts of pH, acids, bases and buffers to problems involving systems of the human body.

3. In the area of organic chemistry, students will be able to:

- Describe how condensed structural formulas and skeletal structures differ.
- Classify hydrocarbons as alkanes, alkenes, alkynes, or aromatics
- Name and draw the major organic functional groups (alcohols, thiols, aldehydes, ketones, acids and acid derivatives, amines, amino acids).
- Apply the concepts of molecular geometry, polarity, and intermolecular forces to describe properties of organic molecules.
- Describe, draw, and identify constitutional, geometric, and stereoisomers.

4. In the area of biochemistry, students will be able to:

- Identify basic structural elements of carbohydrates, lipids, proteins (peptides), and nucleic acids.
- Understand the structural properties and biological activities of the four major groups of biological macromolecules.

Grading Summary

Grades will be determined by your examinations, Knowledge Check Quiz scores, homework scores, and Piazza participation. There will also be a limited opportunity to earn bonus points. Detailed information about these assignments is provided below. The assignments are weighted as follows:

	Assignments	Percentage
Examinations		
	Exam 1	15%
	Exam 2	15%
	Exam 3	15%
	Final Exam	25%
Other Assignments		
	Knowledge Check Quizzes	13%
	Homework	11%
	Piazza Participation	6%
	Total	**100%**

Students should contact their instructor if any score discrepancies are discovered.

The course point requirements for each letter grade are listed below:

Letter Grade	Percentage
A	92% - 100%
A-	89% - 92%
B+	86% - 89%
B	82% - 86%
B-	79% - 82%
C+	76% - 79%
C	68% - 76%
D	56% - 68%
F	0% - 56%

Grades will be rounded to the nearest point. The requirements for each letter grade may be relaxed to favor you at the end of the semester, a decision we will decide based on class averages. If everyone has a final grade in the A range then everyone will receive an A. My goal is for you to succeed in this class!

Late Drop: Late drop deadline is Friday November 15 (after midterm exam 3). Students who late-drop will receive WN designations on their transcripts.

Deferred Grade: Deferred grades are granted only in special circumstances when, for reasons beyond a student's control, a student is prevented from completing a course within the prescribed time. It is the student's obligation to request a deferred grade, and to take a comprehensive final exam before the University-set deadlines.

Midterm and Final Examinations

There will be three midterm examinations during the semester and a comprehensive final examination during the final exam period. Midterm exam dates and times are listed below. Each exam will be administered through a proctoring service called Examity® (more information below). Dates and times for midterm exams are flexible; you may sign up to take each exam on either Thursday, Friday, or Saturday of each exam week.

Exam	Date
Midterm Exam 1	Available Thurs. Sept. 19 through Sat. Sept. 21
Midterm Exam 2	Available Thurs. Oct. 17 through Sat. Oct. 19
Midterm Exam 3	Available Thurs. Nov. 14 through Sat. Nov. 16
Comprehensive Final Exam	Available Thurs. Dec. 19 through Sat. Dec. 21

Make-up Exam: A student having a legitimate excuse for missing any of the three scheduled midterms will be provided with a single make-up exam. **This cumulative make-up exam will cover the material from all three midterms**. It is your responsibility to obtain permission from your instructor to take this exam. The make-up exam will be provided only to students with valid excuses (family emergency, illness, university-scheduled activities, etc.).

Examity® Information: In this class you will take your tests remotely and they will be proctored by a service called Examity®. A Student Quick-Guide will be provided on how to use Examity®. Please log in as soon as possible to set up your profile. You will not be able to schedule exams until your profile is complete. **Exams must be scheduled at least 24 hours in advance to avoid late fees.**

Examity® system requirements are:

- Desktop computer or laptop (not tablet)
- Webcam and microphone (built-in or external)—test your webcam at www.testmycam.com
- Connection to network with sufficient internet speed: at least 2 Mbps download speed and 2 Mbps upload—test internet speed at www.speedtest.net
- Operating systems: Windows XP–Windows 10, Mac OS X 10.8 (Mountain Lion)–10.11 (El Capitan)
- Browser with pop-up blocker disabled: Google Chrome v39 or later, Mozilla Firefox v34 or later, Internet Explorer v8 or later, Microsoft Edge, Apple Safari v6 or later.

If you have any questions or concerns, contact Examity's technical support team 24/7 via email at support@examity.com or phone at (855) 392-6489. Additional information about Examity is provided at the end of this document.

Lectures and Course Content

Most course content is delivered in the form of weekly lessons. Each week you will have two lessons to complete (or one lesson on exam weeks). These lessons are available on Canvas and consist of a series of lecture videos that are accompanied by written lecture notes. After viewing these materials you'll be asked to complete a Knowledge Check Quiz that is based on the lesson.

Three versions of the lecture slides are provided with each lesson. "Slides without solutions" are lecture slides without any solutions to example/practice problems; you're encouraged to take notes using this

version of the slides. A copy of the slides with solutions is also provided. The third version of the lecture slides contains written notes below each slide explaining the content from that slide.

Knowledge Check Quizzes

After finishing each lesson you'll be asked to complete a Knowledge Check Quiz. You'll receive three attempts on each quiz, and only your highest score will count. The quiz questions will change from one attempt to the next. You're encouraged to ask for help if you have questions about the quiz questions; posting your questions on Piazza is encouraged.

Knowledge Check Quizzes are due on Sunday of each week. Knowledge Check Quizzes will open two weeks before they are due. The Knowledge Check Quizzes account for 13% of the total course grade. At the end of the semester your two lowest Knowledge Check scores will be dropped.

Homework Assignments

Homework is designed to help you develop basic skills and understand and apply your understanding of concepts presented in class. Doing all assigned problems is essential to success in this course. Homework assignments can be accessed from the Canvas page. You're encouraged to work with your peers on homework assignments, and you're welcome to ask for help on Piazza, but your submitted work must be your own. *Homework is due at 11:59pm each Wednesday and should be submitted on our Canvas page as a scanned PDF or DOCX file.* There are no homework assignments in the weeks following exams.

Each homework assignment is scored out of 10 possible points (not equivalent to course points). On some occasions homework will be graded solely based on completion and effort. On other occasions, however, one randomly selected problem from the homework assignment will be graded for 5 points based on correctness. On those occasions, completing the rest of the homework assignment is worth an additional 5 points, graded based on completeness and effort.

The homework scores will be totaled twice during the semester (after exam 2 and at the end of the semester). You must earn at least 75% of the available homework points during each period to earn full course points for that period. No extra credit results from accumulating more than 75% of the points during that period. There will be no make-up opportunities for homework due to the built-in excess of points.

All homework assignments will be submitted electronically using the appropriate Canvas page. In order to upload your work you'll need to either scan it or take a high quality photograph of it (we suggest taking a photo with a phone). You may be asked to resubmit your assignment if the image quality of your scanned work is insufficient. **You must upload your work as a single PDF or DOCX file in order for Canvas to accept it.** One way to do this is to use an Android or iOS app that saves photographs on your phone as PDF files. You can find many such apps by searching for scanning apps on the Google Play Store or Apple App Store. "CamScanner" is a popular app that was used by students in previous semesters. Alternatively, you can copy and paste an image of your homework into a Microsoft Word document and save it as a DOCX file.

Piazza

Piazza is an internet forum/chatroom for asking and answering questions about the course. The questions and answers that are posted on Piazza will be monitored by the LAs and your instructor to ensure accuracy. Please direct your questions here before e-mailing. You will be able to ask and answer anonymously if you wish. More information on enrolling and etiquette for using will be provided during the semester.

Piazza is important for establishing a community within this course, and to promote its use, regular participation in Piazza will account for 6% of your course grade. During each exam period you need to ask and/or answer ten questions in order to receive full participation credit on Piazza.

Questions about homework, Knowledge Check Quizzes, and other course content are welcome and encouraged. Our goal is for Piazza to become a community in which you are comfortable asking questions and interacting with your peers.

Examity Fees for Cancellation and Re-scheduling

Within the Examity fee structure there are two instances that can result in a $3.00 on-demand charge to the institution or the student. The first is if a student cancels a scheduled exam within 24 hours of the exam date and time, and the second is if a student schedules or reschedules an exam within 24 hours of the exam date and time.

To better understand these fees we have defined Cancelled Exam, Scheduled Exam, and Rescheduled exam below:

Cancelled Exam – An exam is considered cancelled if the student cancels the exam and does not take any additional action to reschedule.
Scheduled Exam – This is any exam that the student schedules that does not currently show up as a scheduled exam.
Rescheduled Exam – If a student needs to change the date or time of an exam then this is considered a rescheduled exam and not a cancellation.
No-Show – If a student schedules an exam and then does not show up to take the exam this is classified as a no-show and the normal exam costs will be charged (please see the Examity web site for costs associated with proctored exams.

The on-demand fees associated with cancelled exams, scheduled exams, and rescheduled exams are determined per the following scenarios.

1. If a student cancels less than 24 hours in advance, the University is charged a $3 fee. (There are no fees associated with cancellations more than 24 hours in advance.)
2. If the student schedules or reschedules less than 24 hours in advance, the student will incur a $3.00 fee that can be paid by credit card (Visa, MC, AMX, Prepaid credit card). If the student does not have a credit card, they should contact their instructor to request the test window be extended for them so that they can reschedule or schedule more than 24 hours in advance to avoid on-demand fees.

Disabilities Statement

"Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Student Disability Resources Web site: http://equity.psu.edu/student-disability-resources.

In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the documentation guidelines at: http://equity.psu.edu/student-disability-resources/applying-for-services/documentation-guidelines/documentation-guidelines) If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester."

Diversity Mission Statement

Penn State values and celebrates diversity in all of its forms. The educational environment of our college is enriched by the diversity of individuals, groups, and cultures that come together in a spirit of learning. Penn State is committed to providing equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications. Penn State will not tolerate discrimination against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, or veteran status.

Academic Integrity Statement

Penn State University instructors are asked (Senate Rule 49-20) to provide at the beginning of a course a statement to clarify the application of academic integrity criteria to that course. The **Senate Rule** includes the following:

> *Integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.*
>
> *Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.*

All Penn State (http://undergrad.psu.edu/aappm/G-9-academic-integrity.html) and Eberly College of Science academic integrity policies (http://science.psu.edu/current-students/Integrity/Policy.html) and procedures regarding ethics and honorable behavior apply to this course. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabrication of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations or other unauthorized class materials, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. In a broader context, you should be familiar with and follow the Penn State Code of Conduct and the Code of Mutual Respect and Cooperation.