

Doane University

General Chemistry 2 - CHEM 126

Course Information

CHEM 126
General Chemistry 2
4 Credit Hours

Communicating With the Instructor

This course uses a "three before me" policy in regards to student to faculty communications. When questions arise during the course of this class, please remember to check these three sources for an answer before asking me to reply to your individual questions:

1. Course syllabus
2. Announcements in Blackboard
3. The "Question Center" discussion board

This policy will help you in potentially identifying answers before I can get back to you and it also helps your instructor from answering similar questions or concerns multiple times.

If you cannot find an answer to your question, please first post your question to the "Water Cooler" discussion board. Here your question can be answered to the benefit of all students by either your fellow students who know the answer to your question or the instructor. You are encouraged to answer questions from other students in the discussion forum when you know the answer to a question in order to help provide timely assistance.

If you have questions of a personal nature such as relating a personal emergency, questioning a grade on an assignment, or something else that needs to be communicated privately, you are welcome to contact the instructor via email. Please allow 24 hours for the instructor to respond to emails Monday-Friday and 48 hours on the weekend.

If you have a question about the technology being used in the course, please contact the Doane University Help Desk for assistance (contact information is listed below).

Course Catalog Description

Through lecture and lab experience, students will be exposed to and will demonstrate an understanding of the factors that determine the speed and extent of chemical reactions - kinetics, equilibria, thermodynamics, and electrochemistry.

Course Overview

This course is based around asking the question "How do different types of molecules interact with each other?" and probing the different areas in which chemistry is able to answer this question.

Course Prerequisites

For successful completion of this course it is recommended that students are familiar with General Chemistry I or its equivalent.

Course Textbook and Materials

Required
Chemistry, 4th Edition
by Julia Burdge
ISBN 9781259716188

Learning Objectives

Course Objectives

At the completion of this course students will be able to:

1. Analyze gas and solution laws and be able to contrast the effect of manipulating things like pressure and temperature on the system as a whole.
2. Decipher chemical kinetics and equilibrium to discover what influences the rates of reactions.
3. Calculate acid and base equilibrium and assess what properties cause a molecule to be classified as either an acid or a base.
4. Examine how the laws of thermodynamics apply to change in a system, from small molecule spontaneous interactions to the overall changes in the universe.
5. Determine how electric currents can be used to analyze the concentrations of solutions and examine spontaneous reactions that we can isolate into things like batteries.
6. Dissect nuclear chemistry and discover how things like isotopes and nuclear stability can be used to analyze the human body through MRI technology.
7. Evaluate how metals can be used to coordinate with different types of charged and uncharged molecules and how metals can be used in applications like conductors or semiconductors.
8. Differentiate the properties of the nonmetallic molecules and examine how they behave in different states to introduce the concept of organic chemistry.

Unit Objectives

- 1) Topic: Physical Properties of Gases and Liquids
 - a) Interpret the following gas laws: Boyle, Charles, Gay-Lussac, Avogadro's and Dalton's.
 - b) Derive the ideal gas equation and examine the effects of modulating pressure and temperature.
 - c) Analyze the colligative properties of solutions are how they change under different pressure.

- 2) Topic: Chemical Kinetics and Equilibrium
 - a) Differentiate between first and second order rate constants and how they can be experimentally determined using rate laws.
 - b) Examine the difference between classes of catalysis.
 - c) Manipulate equilibrium expressions and predict reaction directions.
- 3) Topic: Acid and Bases and their Equilibria
 - a) Calculate the acidic/basic strength of a compound based off its K_a .
 - b) Define Bronsted vs Lewis acids and what separates strong and weak bases.
 - c) Perform (online) acid base titrations and correlate how the strength effects where it reaches equilibrium,
- 4) Topic: The Free Energy and Equilibria of Entropy
 - a) Discover how the Gibbs free-Energy of a reaction can lead to spontaneous or nonspontaneous product formation.
 - b) Assess how the second and third laws of thermodynamics can be used to calculate the change in entropy in the universe.
 - c) Determine the ratio between free energy and chemical equilibrium.
 - d) Examine how equilibrium and enzymes in biological systems differ from those in stagnant chemical systems
- 5) Topic: Electrochemistry
 - a) Interpret the Nernst equation and determine how redox reactions react in respect to spontaneity under standard and nonstandard conditions.
 - b) Examine the process of electrolysis of different solutions such as molten sodium chloride, water and aqueous sodium chloride.
 - c) Differentiate between different types of batteries and how different metals can have different energy storage potentials.
- 6) Topic: Nuclear Chemistry
 - a) Examine patterns in nuclear stability.
 - b) Assess the kinetics of radioactive isotope decay and how that can be used to date compounds.
 - c) Analyze how isotopes can be used in MRI to examine different disease states.
- 7) Topic: Metal and Its Coordination Abilities
 - a) Compare how ionic and non-ionic compounds coordinate based on the properties of different transition metals.
 - b) Evaluate how metals can undergo ligand exchange to alter which groups are bound to the metal center.

- c) Decipher Band Theory of conductivity and how it can be used to generate different conductors and semiconductors.
- 8) Topic: Nonmetallic Elements and Organic Chemistry
- a) Catalog properties of nonmetals such as hydrogen, carbon, nitrogen, phosphorus, oxygen, sulfur and the halogens.
 - b) Classify different types of organic compounds and look at what distinguishes constitutional vs stereoisomers.
 - c) Classify double bond resonance and interpret the charge distribution in the various resonance forms.

Course Requirements

Attendance Policy

You should plan to work on this course every day. This means that you absolutely must have a reliable and consistent internet connection throughout the duration of the course. This also strongly suggests that you should not plan to take any vacations during this course. This is a condensed, fast-paced, course and it would be extremely difficult to catch up after a prolonged absence.

Online Course

This is an online course and therefore there will not be any face-to-face class sessions. All assignments and course interactions will utilize internet technologies.

Computer Requirements

This course requires that you have access to a computer that can access the internet. You will need to have access to, and be able to use, the following software packages:

- A web browser (Chrome or Mozilla Firefox)
- Adobe Acrobat Reader (free)
- Adobe Flash Player (free)
- Microsoft Word

You are responsible for having a reliable computer and internet connection throughout the course. Your computer should come with a camera and/or you need to have a camera on your phone (for self-introductions, presentations, digital meetings, and other activities).

Email and Internet

You must have an active Doane University e-mail account and access to the Internet. *All instructor correspondence will be sent to your Doane University e-mail account.* Please plan on checking your Doane account regularly for course related messages.

This course uses Blackboard for the facilitation of communications between faculty and students, submission of assignments, and posting of grades. The Blackboard Course Site can be accessed at <http://bb2.doane.edu>

Campus Network or Blackboard Outage

When access to Blackboard is not available for an extended period of time (greater than one entire evening - 6pm till 11pm) you can reasonably expect that the due date for assignments will be changed to the next day (assignment still due by midnight).

Attendance/Participation

Preparation for class means reading the assigned readings & reviewing all information required for that week. *Attendance* in an online course means logging into the Blackboard and on a regular basis and *participating* in the all of activities that are posted in the course.

Studying and Preparation Time

The course requires you to spend time preparing and completing assignments. A three-credit course requires 144 hours of student work. Therefore expect to spend approximately 18 hours a week preparing for and actively participating in this 8-week course.

Late Work Policy

ALL assignments must be finished and turned in to complete the course. Unless the instructor is notified BEFORE the assignment is due and provides an opportunity for the student to submit an alternate assignment, **late assignments will not be accepted.**

Technological issues are not considered acceptable excuses for late work. Always backup your work and have a plan for submitting assignments even in the case of computer problems or lost Internet access.

Students are required to complete 75% of the course material in order to receive credit for the course. If students who fall more than two weeks behind, they cannot meet this requirement and will receive a withdrawal (W) for the course if this occurs within the first three weeks of the course. If this happens after the third week students will receive an F for the course.

Submitting Assignments

All assignments, unless otherwise announced by the instructor, **MUST** be submitted via Blackboard. Each assignment will have a designated place to submit the assignment.

Drop and Add dates

If you feel it is necessary to withdraw from the course, please contact your advisor for full details on the types of withdrawals that are available and their procedures.

Subject to change notice

All material, assignments, and deadlines are subject to change with prior notice. It is your responsibility to stay in touch with your instructor, review the course site regularly, or communicate with other students, to adjust as needed if assignments or due dates change.

Academic Integrity

Doane University expects and requires all its students to act with honesty and integrity, and respect the rights of others in carrying out all academic assignments. Academic dishonesty, the act of knowingly and willingly attempting or assisting others to gain academic success by dishonest means, is manifested in various measures. Gehring, et al, (1986) suggests that four categories of academic dishonesty exist¹:

- a. Cheating
- b. Fabrication
- c. Facilitating academic dishonesty
- d. Plagiarism

For more information on academic integrity, please visit the website:

<http://catalog.doane.edu/content.php?catoid=4&navoid=191>

Course Grading

Grades, Grading Scale, Feedback

Assignment of letter grades is based on a percentage of points earned. The letter grade will correspond with the following percentages achieved. All course requirements must be completed before a grade is assigned.

A	100 – 90
B	89 – 80
C	79 – 70
D	69 – 60
E	59 and below

Module Schedule/Grading Scheme

- Basic Formula Worksheet/Video Worksheet (15% of total grade)
 - Each week you'll either be assigned basic formula worksheets or a Video Worksheet which will guide the student through the introductory level information for each module. Worksheets are designed to highlight major formulas or concepts you will need to understand in each chapter as well as serve personal notes which the student can refer directly back to.
- McGraw Hill Connect (15% of total grade)
 - Connect is a series of questions (either multiple choice or fill in the blank) based on the information covered in the assigned chapters. These questions can be accessed by clicking on the assignment link; you will be taken to the McGraw Hill website to complete. By the end of this assignment, all chapters for the week should be read.
- Quizzes (15% of total grade)
 - Quizzes will cover concepts from the assigned readings. There will be a mix of basic concepts and deeper thinking questions.
- Online-Lab (15% of total grade)
 - Online labs are designed to be a fun and "hands on" way to observe the

concepts taught within the chapters. Each week there will be a different lab assigned as well as a series of questions that ask you to think deeper about the lab.

- Discussion Board (10% of total grade)
 - These discussion boards are designed to ask more deep thinking questions which may or may not have a correct answer.
- Interactive Advanced Concept Presentation (20% of total grade)
 - These presentations are designed to allow students the opportunity to take on the mantle of the instructor. Each presentation will be around 5-10 minutes and use information from the chapter and involve some sort of experiment that you will need to assemble and explain. If needed, supplementary materials (i.e. journal articles) that show examples of the concepts will be included. Students will be expected record videos of themselves talking through the material covered in the assignment. Feel free to use PowerPoint or any other means to convey your point.
- Final Exam (10% of total grade)
 - Students will complete a final exam based on all the information covered in the class

Feedback: Please allow 3-5 days for feedback on assignments. This timeframe is dependent upon the level of detail that I provide and the number of students in the course. I expect you to read my feedback and make changes if needed. If you do not know how to look at feedback using the My Grades tool in Blackboard, please notify me immediately.

How to Succeed in this Course

- Check your Doane email regularly
- Log in to the course web site daily
- Communicate with your instructor
- Create a study schedule so that you don't fall behind on assignments

Accessibility Statement

In compliance with the Rehabilitation Act of 1973, Section 504, and the Americans with Disabilities Act of 1990, professional disability specialists and support staff at Doane University facilitate a comprehensive range of academic support services and accommodations for qualified students with disabilities. Doane University staff coordinate

transition from high schools and community colleges, in-service training for faculty and staff, resolution of accessibility issues, community outreach, and collaboration between all Doane University regarding disability policies, procedures, and accommodations.

Student Conduct Statement

Students are required to adhere to the behavior standards listed in **Doane University Policy Manual**

Appropriate classroom behavior is defined by the instructor. This includes the number and length of individual messages online. Course discussion messages should remain focused on the assigned discussion topics. Students must maintain a cordial atmosphere and use tact in expressing differences of opinion. Inappropriate discussion board messages may be deleted if an instructor feels it is necessary. Students will be notified privately that their posting was inappropriate.

Student access to the course Send Email feature may be limited or removed if an instructor feels that students are sending inappropriate electronic messages to other students in the course.

Technical Support Contact Information

For technical assistance 24 hours a day, 7 days a week, please contact the Doane University Technology Office Help Desk:

Phone: 402-826-8411
Email: helpdesk@doane.edu
Web: <http://www.doane.edu>

Syllabus Disclaimer

The instructor views the course syllabus as an educational contract between the instructor and students. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. The instructor reserves the right to make changes to the syllabus as deemed necessary. Students will be notified in a timely manner of any syllabus changes face-to-face, via email or in the course site Announcements. Please remember to check your Doane University email and the course site Announcements often.