# Doane University

## General Chemistry 2 - CHEM 126

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# Course Information

Chem 126
General Chemistry 2
Spring Term 2017(March 13th – May 7th)
4 Credit Hours

# Instructor Information

***Ken Capps***
Doane University

# Contact Information

Email Address: ken.capps@doane.edu

# 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 me via email. Please allow 24 hours for me 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 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, Avogadros and Daltons.
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 conductively 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 seperates 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 everyday. 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-pace, 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 Gmail 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 or Missed Assignments**
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 his/her assignment late, points may be taken off for a late assignment.

**Rewrites**
Students may submit their assignments ahead of their due date for review by the instructor as long as the assignment is provided a minimum of three days prior to the course due date. The instructor will provide feedback on the assignment for consideration by the student.

**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 exist[1]:

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 - DUE Tuesday by 11:59 pm (CST) (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 - DUE Wednesday by 11:59 pm (CST) (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. I like to think of this as the "bread and butter" of the course. These questions can be accessed by clicking on the assignment link; you will be taken to the McGraw Hill website to complete. Each student will have 2 chances to answer each questions (the first time being for full points and the second time for half of the points). By the end of this assignment, all chapters for the week should be read.

- Quizzes - DUE Thursday by 11:59 pm (CST) (15% of total grade)
    - Quizzes will cover concepts from the assigned readings. They will consist of

30-40 questions. There will be a mix of basic concepts and deeper thinking questions.

- Online-Lab - DUE Friday by 11:59 pm (CST) (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 - Group response due Thursday by 11:59 pm (CST), peer response due Saturday by 11:59 pm (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 - Due Saturday at 11:59 pm (CST) (20% of total grade)
    - These presentations are designed to allow students the opportunity to take on the mantel 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 - Due Sunday at 11:59 pm (CST) (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.