

Spring 2020

## **CHEM 126-002: General Chemistry II**

Christopher DeSantis

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## Chemistry 126

### Spring 2020 Course Syllabus

[NJIT Academic Integrity Code](#): All Students should be aware that the Department of Chemistry & Environmental Science (CES) takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

### COURSE INFORMATION

Course Description: Chem 126

Number of Credits: 3

Prerequisites: A C or higher in Math 110 or equivalent

Course-Section and Instructors

Course-Section	Instructor
Chem 126: 002,004,010, 012, 016	Dr. Chris DeSantis

Section	Days and Times
002	Thursday: 8:30AM - 9:50AM Tiernan 108 Thursday: 1:00PM - 2:20PM Tiernan Lecture Hall 1
004	Thursday: 1:00PM - 2:20PM Tiernan Lecture Hall 1 Friday: 1:00PM - 2:20PM Tiernan 108
010	Wednesday: 8:30AM - 9:50AM Tiernan Lecture Hall 1 Wednesday: 10:00AM - 11:20AM FMH 110
012	Wednesday: 8:30AM - 9:50AM Tiernan Lecture Hall 1 Thursday: 2:30PM - 3:50PM Tiernan 108
016	Tuesday: 10:00AM - 11:20AM Tiernan 111 Thursday: 10:00AM - 11:20AM Tiernan 111

Email: [christopher.a.desantis@njit.edu](mailto:christopher.a.desantis@njit.edu)

Office: Tiernan Hall B006 (basement)

Office Hours: Tiernan 110

Tuesday: 1PM-2PM

Friday: 2:30PM-4PM

Also by appointment

**Webpage:** The course website is available through Moodle, which can be accessed via the njit.edu. Please email me immediately if you cannot access the class site. All materials including lecture summaries, any PowerPoint slides, and

other documents will be posted on the class site. Please check the site frequently for new materials and announcements. All grades for this course will be posted to Moodle on a regular basis. You are responsible for all updates posted to Moodle, and if you find any mistakes in content or grading, or you need help accessing these materials, please contact your instructor as soon as possible.

**Required Textbook:**

Title	Chemistry, A Molecular Approach
Author	Nivaldo J. Tro
Edition	Fifth
Publisher	Pearson
ISBN #	ISBN-13: 978-0134874371

**University-wide Withdrawal Date:** The last day to withdraw with a W is Monday April 6, 2020. It will be strictly enforced.

**Learning Outcomes:**

1. Define Reaction Rate, relate reaction rate to stoichiometry and determine order of a reaction
2. Describe the factors affecting reaction rate
3. Use kinetic data to write reasonable reaction mechanisms
4. Explain equilibrium and equilibrium constants
5. Understand the concept of equilibrium constant and the reaction quotient, Q
6. Use equilibrium constant to determine the direction of reaction and product yield in the context of various chemical reactions
7. Use Le Chatelier's principle to determine direction of reaction
8. Understand different definitions of acids and bases
9. Explain the autoionization of water and the concept of pH to discuss acid/base strength
10. Define and perform calculations relating to acid and base dissociation constant
11. Explain the concept of buffer solution and their importance
12. Perform calculations to show the efficiency of buffer solutions
13. Interpret equilibrium constants  $K_{sp}$  and discuss solubility of sparingly soluble salts
14. Interpret titration curves and calculate the pH of the solution during titration of strong and weak acids versus base
15. Understand and explain energy transformations in chemical reactions
16. Explain entropy, Gibbs free and the second and third law of thermodynamics.
17. Determine whether a reaction is spontaneous
18. Calculate thermodynamic parameters  $\Delta G$ ,  $\Delta S$ ,  $\Delta H$  and relate the equilibrium constant to these parameters
19. Balance redox reaction and write oxidation and reduction half-reaction
20. Calculate the cell potential for a redox reaction in a galvanic cell
21. Relate cell potential to thermodynamic parameters and determine the direction of spontaneity
22. Use Faraday's law to determine the amount of material deposited during electroplating
23. Explain electrolysis and overvoltage
24. Differentiate between chemical reaction and nuclear reaction
25. Balance nuclear equations and describe the particle emitted during the process
26. Predict the type of emission from unstable nuclides
27. Use mass-energy relationship to calculate the energy released during nuclear processes
28. Distinguish between nuclear fission and fusion
29. Describe the applications of nuclear reactions in energy production
30. Name simple organic compounds and the basic functional groups
31. Write reactions of alkanes, alkenes and alkynes

**POLICIES**

All CES students must familiarize themselves with, and adhere to, all official university-wide student policies. CES takes these policies very seriously and enforces them strictly. In addition, obtaining course materials such as past exams or solutions to homework and/or class assignments from external sources constitutes as cheating. The official Student's Solutions Guide is exempt. Posting of course materials on external websites without the approval of the instructor violates intellectual property laws and hence strictly forbidden. Any student caught cheating on homework will be assessed a penalty of 20 points, in addition to a grade of zero for the given homework assignment.

Students are encouraged to seek help from their Instructors during office hours.

**Grading Policy:** The final grade in this course will be determined by a point total based on the following:

Homework (Basic HW: 60 + Regular HW 100) points	160
Class Participation (140 recitation + 50 lecture)	190
Common Exam I	125
Common Exam II	125
Common Exam III	125
Final Exam	275
Total points	1000

Your final letter grade in this course will be based on the following tentative curve:

A	>835	C	600-659
B+	775-834	D	550-599
B	710-774	F	< 550
C+	660-709		

You must maintain an average of 35%, which is 228 points in the common exams and finals to be considered for a grade of D or higher. You will receive an F even if you have adequate point total without this requirement.

**Attendance Policy:** Attendance at classes will be recorded and is **mandatory**. Each class is a learning experience that cannot be replicated through simply “getting the notes.” Attendance will be taken verbally or by iclick. Students are permitted one unexcused absence per semester. Absences for unavoidable legitimate reasons will be permitted upon presentation of appropriate supporting documentation to the Dean of Students.

**Lecture:** An I-clicker and calculator are required for all lectures. If your iclicker malfunctions, you are required to inform the instructor, either in person or via e-mail the **same day**. Failure to notify the instructor will result in loss of points for that day. If you are in class, but using a cell phone in any way, using a computer, or listening to music you will not get credit for that day's attendance. If you are cheating (having a second iclicker) you and the person for whom you are cheating will get 0 for the entire semester. There are ways to check! So, be honest.

**Recitation (In class worksheets):** You are expected to come prepared to each class period by reviewing the textbook/slides in moodle. During each class period, the instructor will ask questions and/or be given a worksheet to solve. The worksheets are collected at the end of the recitation and graded. **Students who did not succeed in completing the worksheet during the recitation have one week's time to complete the worksheets during office hours.** Students who miss a class for a valid reason must still make up the worksheet to get credit.

**Homework Policy:** There are two types of homework: Basic and Regular.

**Basic Homework, worth 60 points:** It is recommended that you do the basic HW for the chapter before coming to the lecture. This homework is intended as a preparation for your participation in class. Getting > 70% in the basic homework before the lecture, will ensure you have the foundation necessary to understand what is being taught in class.

**Regular homework, worth 100 points:** This homework is to test your understanding of the material being taught. This homework will build on the classroom content and enhance your understanding of the material. This homework will also be good preparation for the common exams.

All homework is very important. However, it is important that you aim to get > 90% in the basic and >70% in the regular HW to help you pass this class.

Each homework assignment has its due date. In addition, Moodle has a calendar with due dates. **ALL HOMEWORK MUST BE DONE ON TIME.** There is no credit for late homework. DO NOT WAIT TO THE LAST MINUTE TO DO YOUR HOMEWORK. ONLINE SYSTEMS ARE NOT 100% RELIABLE AND UNEXPECTED EVENTS MAY OCCUR. IN GENERAL, THERE IS NO LATE HOMEWORK AND MOODLE BEING DOWN IS NOT A VALID EXCUSE. PLAN TO FINISH YOUR HOMEWORK AT LEAST ONE DAY BEFORE IT IS DUE.

**Exams:** There will be three midterm exams held in class during the semester and one comprehensive final exam. **Each student is required to bring a photo ID and a non-programmable calculator to an exam and**

this will be used to confirm a student's identity during the exam period. The following exam periods are tentative and therefore possibly subject to change:

Common Exam I	Monday 4:30 - 5:45pm - 2/17/20
Common Exam II	Monday 4:30 - 5:45pm - 3/23/20
Common Exam III	Monday 4:30 - 5:45pm - 4/20/20
Final Exam Period	May 8 <sup>th</sup> to 14 <sup>th</sup>

The final exam will test your knowledge of all the course material taught in the entire course.

**TEST GRADING ERROR.** Tests are returned in recitations following the test. If you believe there is an error, you have until the Thursday following the test to submit a test for regrading. You must write a very brief description of the problem on the back of the test. (The answer key is provided in Moodle in the TEST INFORMATION book. You should always learn from your mistakes and go over the answer key.)

ALL ERRORS NEED TO BE BROUGHT TO THE INSTRUCTOR'S ATTENTION WHEN THEY OCCUR. DO NOT WAIT UNTIL THE END OF THE SEMESTER

**Makeup Exam Policy:** There will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event that a student has a legitimate reason for missing a quiz or exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the CES Department Office/Instructor that the exam will be missed. One cumulative make-up examination will be permitted at the end of the semester if there is an acceptable and substantial reason. A grade of zero will be given for a second missed examination independent of reason. Tentative date of the makeup exam is May 1<sup>st</sup> at 7.00 am.

**Cellular Phones:** All cellular phones and other electronic devices must be switched off during all class times. Such devices must be stowed in bags during exams or quizzes.

**How to be successful in chemistry:** Chemistry is a difficult subject and it is vital to master new material as it is presented. A successful student will 1) prepare ahead of class by reading the chapter to be discussed and formulating questions to ask in lecture 2) attend and participate in lecture by answering and asking questions and 3) work after lecture on homework and book problems. Homework is a vital part of mastering chemistry and nothing can replace practice. There are numerous resources for practice including online resources, the tutoring center, office hours, library resources, and other textbooks/workbooks. Work on problems without the solution manual open and then check answers afterwards. Feel free to email me or come visit during office hours with any questions you may have! After an exam/quiz/homework assignment is returned, correct any lapses in knowledge by working on topics that may have been answered incorrectly. Mastering chemistry takes time and practice so set aside committed time slots in your schedule to work on chemistry. Finally, always ask the "why" question when doing homework rather than simply memorizing answers.

**Academic Integrity: *Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:***

***<http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>. Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu***

## ADDITIONAL RESOURCES

**Chemistry Tutoring Center:** Located in the Central King Building, Lower Level, Rm. G12. Students can get help from peer tutors on a “walk-in” basis. There is no private tutoring available, however if the center is not too busy, you may be able to get more personal attention. In this peer tutoring model, tutors are taught to encourage interaction among students to promote learning.

Hours of operation are Monday - Friday 10:00 am - 6:00 pm. For further information please click [here](#).

**Accommodation of Disabilities:** Office of Accessibility Resources and Services (formerly known as Disability Support Services) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at 973-596-5417 or via email at [lyles@njit.edu](mailto:lyles@njit.edu). The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <http://www5.njit.edu/studentsuccess/disability-support-services/>

**Important Dates** (See: [Spring 2020 Academic Calendar](#))

Date	Day	Event
January 21, 2020	T	First Day of Classes
January 31, 2020	F	Last Day to Add/Drop Classes
March 15 - 22, 2020	Su - Su	Spring Break
April 6, 2020	M	Last Day to Withdraw
April 10, 2020	F	Good Friday, University is closed
May 5, 2020	T	Friday classes meet
May 5, 2020	T	Last Day of Classes
May 6 and 7, 2020	W-R	Reading Days
May 8 - 14, 2020	F - R	Final Exam Period

## Course Outline

This is a second part in a 2 course Chemistry sequence. This course builds on content from Chem 125. So, it is expected that the student will have reviewed Chapters 1-14 before starting this course.

Week	Outcomes	Topic	Homework
1	1,2	Chapter 15: Chemical Kinetics	Warm up Basic HW Basic HW: Review of graphing Chapter 15 Basic HW I Chapter 15 Regular HW I
2	1,2,3	Chapter 15: Chemical Kinetics	Basic HW: Unit Conversions Chapter 15 Basic HW II Chapter 15 Regular HW II
3	4,5	Chapter 16: Chemical Equilibrium	Basic HW Review: Balancing Eq Chapter 16 Basic HW I Chapter 16 Regular HW I
<b>EXAM 1: Chapters 15-16 (first Part (HW 1))</b>			

4	4,5,6,7	Chapter 16: Chemical Equilibrium	Chapter 16 Basic HW II Chapter 16 Regular HW II
5	8, 9	Chapter 17: Acids and Bases	Chapter 167Basic HW I Chapter 17 Regular HW I
6	8,9, 10	Chapter 17: Acids and Bases	Chapter 17 Basic HW II Chapter 17 Regular HW II
<b>EXAM 2: Chapters -16 (later part, HW 2) and 17</b>			
7	11, 12,13,14	Chapter 18: Aqueous Ionic Equilibrium	Chapter 18 Basic HW I Chapter 18 Regular HW I
8	15,16	Chapter 19: Free Energy and Thermodynamics	Chapter 19 Basic HW I: Review of Thermochemistry Chapter 19 Regular HW
9	17,18	Chapter 19: Free Energy and Thermodynamics	Chapter 19 Basic HW II Chapter 19 Regular HW II
10	19,20,21	Chapter 20: Electrochemistry	Chapter 20 Warm up-Oxidation States Chapter 20 Basic HW I Chapter 20 Regular HW I
<b>EXAM 3: Chapters 18-19, first part of 20</b>			
11	21, 22, 23	Chapter 20: Electrochemistry	Chapter 20 Basic HW II Chapter 20 Regular HW II
12	18, 19,20	Chapter 21: Radioactivity and Nuclear Chemistry	Chapter 21 Basic HW I Chapter 21 Regular HW I
13	21	Chapter 22: Organic Chemistry	Chapter 22 Regular HW
14	1 - 21	FINAL EXAM Review	Basic: Chapters 1-8 Basic Chapters 9-12 ACS reviews: I and II

*Updated by DeSantis - 2020  
Department of Chemistry & Environmental Sciences  
Course Syllabus, Spring 2020*