

Syllabus

CHE*K122 General Chemistry II
Three Rivers Community College
Norwich, CT 06360

Instructor: Michael P. Carta, M.S.
Professor of Chemistry

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Office hours: M 1:00-2:00 p.m.
T 2:00-3:00 p.m.
R 11:00 a.m.-12:00 p.m.

Course Description: CHE* K122 - General Chemistry II
4 CREDIT HOURS

Prerequisites: CHE K121 with a "C" or better; MAT* K186 with "C" grade or better.*

This course includes further study of the principles, theories, and laws of chemistry. Topics include thermo-chemistry, kinetics, chemical equilibrium, oxidation reduction and electro-chemistry, introduction to organic and nuclear chemistry, and the chemistry of the elements and their compounds. Three-hour lecture; one three-hour laboratory period. CHE* K121 - General Chemistry I and II are ordinarily both taken for transfer credit.

Lecture (CRN 33355): MW 9:30-10:45 a.m. Room D128

Lab (CRN 33356): W 1:30-4:25 p.m. Room B222

Text: *Chemistry The Central Science*, 14th ed., Brown, LeMay, et.al. Pearson.

Mastering Chemistry Course ID: **MCCARTA25975**

Lab Manual: *CHE 122 General Chemistry II Laboratory Exercises*, 3rd ed., Carta. Academx.

Other Required Materials: Chemical safety goggles, scientific calculator.

Learning Portfolio: All students are required to maintain an online learning portfolio in Digication that uses the college template.

General Course Objectives:

- To provide students with a solid understanding of the fundamental concepts of chemistry.
- To encourage students to apply problem-solving skills toward chemical calculations.
- To educate students in the language and nomenclature of chemistry.
- To help students relate chemical concepts to practical applications.

Disabilities Notice:

If you have a disability that may affect your progress in this course, please meet with a Disability Service Provider (DSP) as soon as possible. Please note that accommodations cannot be provided until you provide written authorization from a DSP.

College Disabilities Service Providers	
Matt Liscum, Counselor (860) 215-9265 Room A113	<ul style="list-style-type: none"> • Learning Disabilities • ADD/ADHD • Autism Spectrum • Mental Health Disabilities
Elizabeth Willcox, Advisor (860) 215-9289 Room A113	<ul style="list-style-type: none"> • Medical Disabilities • Mobility Disabilities • Sensory Disability

Board of Regents for Higher Education and Connecticut State Colleges and Universities Policy Regarding Sexual Misconduct Reporting, Support Services and Processes Policy:

Public Act No. 14-11: An Act Concerning Sexual Assault, Stalking and Intimate Partner Violence on Campus:

“The Board of Regents for Higher Education (BOR) in conjunction with the Connecticut State Colleges and Universities (CSCU) is committed to insuring that each member of every BOR governed college and university community has the opportunity to participate fully in the process of education free from acts of sexual misconduct, intimate partner violence and stalking.”

Title IX Statement of Policy:

“Title IX of the Education Amendments Act of 1972 protects students, employees, applicants for admission and employment, and other persons from all forms of sex discrimination, including discrimination based on gender identity or failure to conform to stereotypical notions of masculinity or femininity. All students are protected by Title IX, regardless of their sex, sexual orientation, gender identity, part or full-time status, disability, race, or national origin, in all aspects of educational programs and activities.” Please Report Student Incidents to: Maria Krug, Title IX Coordinator, Three Rivers Community College, 574 New London Turnpike Norwich, CT 06360 Room C131, (860) 215-9208, mkrug@trcc.commnet.edu

Non-discrimination policy:

Three Rivers Community College does not discriminate on the basis of race, color, religious creed, age, sex, national origin, marital status, ancestry, present or past history of mental disorder, learning disability or physical disability, sexual orientation, gender identity and expression, or genetic information in its programs and activities. In addition, the College does not discriminate in employment on the basis of veteran status or criminal record.

The following person has been designated to handle inquiries regarding the non-discrimination policies: Ken Saad, Equity and Diversity Officer, Three Rivers Community College, 574 New London Turnpike Norwich, CT 06360, (860) 215-9319, KSaad@trcc.commnet.edu

Academic Integrity:

Academic integrity is essential to a useful education. Failure to act with academic integrity severely limits a person's ability to succeed in the classroom and beyond. Furthermore, academic dishonesty erodes the legitimacy of every degree awarded by the College. In this class and in the course of your academic career, present only your own best work; clearly document the sources of the material you use from others; and act at all times with honor.

Academic and Classroom Misconduct:

The instructor has primary responsibility for control over classroom and laboratory behavior and maintenance of academic integrity, and can request the temporary removal or exclusion from the classroom or laboratory of any student engaged in conduct that violates the general rules and regulations of the institution, or any student engaged in conduct deemed hazardous in the laboratory. Extended or permanent exclusion from lecture or laboratory activities or further disciplinary action can only be effected through appropriate procedures of the institution. Plagiarism, cheating on quizzes or tests, or any form of academic dishonesty is strictly prohibited. Students guilty of academic dishonesty directly or indirectly will receive a zero for the exercise or quiz or test and may receive an "F" grade for the course in addition to other possible disciplinary sanctions which maybe imposed through the regular institutional procedures. Any student that believes that he or she has been erroneously accused may appeal the case through the appropriate institutional procedures if their grade was affected.

Class Attendance Policy:

Attendance of all lecture and laboratory periods is required. Attendance is taken at each class meeting, usually at the start of class. Students should make every effort to arrive on time. However, if you are late for class it is your responsibility to notify me so you are not marked absent. An explanation of the cause of any absence should be provided prior to the next class meeting (or in advance if it applies).

Course Withdrawal:

- Course withdrawals are recommended if you cannot complete the course and are accepted up until the week before classes end.
- Specific deadline dates are posted in the academic calendar and are strictly enforced.
- A grade of "W" will be assigned after you formally withdraw.
- If you stop attending classes without withdrawing, a grade of "W" will not be automatically assigned. Neglecting to withdraw may result in a grade of "F".
- It is strongly advised that you speak with your instructor before withdrawing. Instructor signature is not required to withdraw.

Revisions to the Syllabus:

Students are responsible for learning all of the course objectives and material discussed in lecture and lab. The instructor reserves the right to revise the objectives or academic schedule contained in this syllabus as necessary.

Make-Ups:

Make-ups are granted only if a test is missed due to extenuating circumstances such as illness, bereavement, work commitment, travel emergency, or other condition beyond the control of the student. Students must contact the instructor as soon as possible, prior to the next class meeting to explain the absence and arrange for a make-up. Labs can only be made up during the same week if another instructor can accommodate the student.

NOTE: Students with documented testing accommodations should schedule tests well in advance to ensure seat availability.

- Testing Center: Room A117. Phone 860-215-9061. Email: testing@threeivers.edu
- Students can also schedule make-ups via the school website, under student services/placement testing.

Cell phones and other electronic devices: Electronic devices must be silenced at all times. Under no circumstances are phones to be answered in class. When there are extenuating circumstances requiring a student to be available by phone, the student must notify the instructor prior to class, so that together they can arrive at an agreement. *A cell phone is not permitted as a substitute for a calculator on exams.*

Grade Determination:

4 Unit Tests.....75% of grade

2 Lab Tests plus 11 lab reports.....25% of grade

How it breaks down:

4 unit tests: 400 possible points $\times 0.75 = 300$

2 lab tests: 200 possible points

11 lab reports: 200 possible points

400 possible points $\times 0.25 = 100$

Total possible points = 400*

**Up to six extra credit points may be earned by completing online homework assignments in MasteringChemistry.*

Grade Scale:

A ≥ 94

B+ 87-89

C+ 77-79

D+ 67-69

A- 90-93

B 84-86

C 74-76

D 64-66

B- 80-83

C- 70-73

D- 60-63

F ≤ 59

Course Objectives: CHE*K122- General Chemistry II

1. The student will learn about the factors which affect the rate of chemical reaction.
2. The student will be able to write a rate law.
3. The student will understand the meaning of reaction order.
4. The student will learn how to calculate the half-life for a reactant.
5. The student will be able to understand the meaning of activation energy.
6. The student will learn about different types of catalysts and how they function.
7. The student will be able to calculate the instantaneous and the average reaction rate.
8. The student will be able to understand the concept of reaction mechanism.
9. The student will be able to define enzymes and understand basic enzyme catalysis.
10. The student will be able to define chemical equilibrium.
11. The student will learn how to write an equilibrium expression.
12. The student will learn how to interpret the equilibrium constant.
13. The student will be able to understand the relationship between kinetics and equilibrium.
14. The student will learn how to calculate equilibrium concentrations of reactants and products.
15. The student will understand LeChatelier's principle and factors which affect equilibrium.
16. The student will learn the definitions of acids and bases.
17. The student will learn how to determine the strength of acids and bases.
18. The student will be able to define pH and calculate the pH of acid or base solutions.
19. The student will be able to understand weak acids and the acid ionization constant.
20. The student will learn how to calculate the pH of a weak acid or base solution.
21. The student will be able to understand the concept of Lewis acids and bases.
22. The student will learn how to determine the acid-base properties of salts.
23. The student will be able to understand how titrations are used to quantitate acids and bases.
24. The student will learn how acid-base indicators are used.
25. The student will be able to define a buffer and learn how buffers work.
26. The student will learn how to use the Henderson-Hasselbalch equation.
27. The student will be able to understand the concept of solubility equilibria.
28. The student will learn the definition of the solubility product, K_{sp} .
29. The student will be able to understand the common ion effect.
30. The student will be able to understand the laws of thermodynamics.
31. The student will be able to differentiate spontaneous from nonspontaneous processes.
32. The student will be able to define entropy.
33. The student will be able to understand the concept of free energy.
34. The student will learn how to predict spontaneity based on the free energy change, ΔG .
35. The student will learn about the relationship between the equilibrium constant and free energy.
36. The student will be able to understand the relationship between enthalpy, entropy and free energy.
37. The student will be able to understand how equilibrium and free energy are central to living systems.
38. The student will learn how to balance redox equations.
39. The student will be able to understand the basics of galvanic cells.
40. The student will learn the significance of standard reduction potentials.
41. The student will be able to write half-cell reactions.
42. The student will be able to understand the thermodynamics of redox reactions.
43. The student will be able to define the Faraday constant.
44. The student will learn how to use the Nernst equation.

45. The student will be able to understand how batteries work.
46. The student will learn how an electrolytic cell works.
47. The student will be able to understand corrosion of metals.
48. The student will learn the basics of atmospheric chemistry.
49. The student will be able to understand the phenomenon of acid rain.
50. The student will be able to understand the greenhouse effect.
51. The student will be able to understand various aspects of environmental chemistry including smog.
52. The student will learn the definition of a coordination compound.
53. The student will be able to define coordination number, ligand, and chelating agent.
54. The student will learn the basic nomenclature of coordination compounds.
55. The student will be able to understand the bonding in coordination complexes.
56. The student will learn how coordination chemistry applies to biological systems.
57. The student will learn the basic nomenclature of organic compounds.
58. The student will be able to distinguish between types of organic compounds.
59. The student will be able to define and differentiate between geometric, optical and constitutional isomers.
60. The student will be able to predict the physical and chemical properties of various organic compounds.
61. The student will be able to differentiate between the different types of nuclear particles.
62. The student will be able to understand the fundamentals of nuclear reactions.
63. The student will be able to understand the basis of nuclear stability.
64. The student will be able to write and balance nuclear equations.
65. The student will learn the definition of nuclear binding energy.
66. The student will be able to understand natural radioactivity and half-life of radioactive decay.
67. The student will be able to understand the concept of nuclear transmutation.
68. The student will be able to understand the concept of nuclear fission.
69. The student will learn how radioactive isotopes are used in biology and medicine.
70. The student will learn about the chemistry of metals and nonmetals in greater detail.

CHE*K122 General Chemistry II Tentative Academic Schedule FA18

33355 Lecture: MW 9:30-10:45 a.m. D128

33356 Lab: W 1:30-4:25 p.m. B222

Week 1

W-8/29

Syllabus/Chemical Kinetics Ch 14

- Lab: Safety/Protocol/Chemical Kinetics Ch 14

Week 2

M-9/03

LABOR DAY- College closed

W-9/05

Chemical Kinetics Ch 14

- Lab: Clock Reaction

week 3

M-9/10

Chemical Equilibrium Ch 15

W-9/12

Chemical Equilibrium Ch 15

- Lab: Kinetics of Sucrose Hydrolysis

week 4

M-9/17

Chemical Equilibrium Ch 15

W-9/19

Chemical Equilibrium Ch 15

- Lab: Chemical Equilibrium

week 5

M-9/24

UNIT TEST 1 (Ch 14-15)

W-9/26

Acid-Base Equilibria/Solubility Equilibria Ch 16-17

- Lab: Determination of Vitamin C in Fruit Juice

week 6

M-10/01

Acid-Base Equilibria/Solubility Equilibria Ch 16-17

W-10/03

Acid-Base Equilibria/Solubility Equilibria Ch 16-17

- Lab: pH and Buffers

week 7

M-10/08

Acid-Base Equilibria/Solubility Equilibria Ch 16-17

W-10/10

Chemical Thermodynamics Ch 19

- Lab: Aspirin: Synthesis and Melting Point

week 8

M-10/15

Unit Test 2 (Ch 16-17)

W-10/17

Chemical Thermodynamics Ch 19

- **Lab Midterm**

week 9

- M-10/22 Chemical Thermodynamics Ch 19
W-10/24 Electrochemistry Ch 20
- Lab: Thin-Layer Chromatography

week 10

- M-10/29 Electrochemistry Ch 20
W-10/31 Electrochemistry Ch 20
- Lab: K_{sp} of Calcium Hydroxide

week 11

- M-11/05 Chemistry of the Nonmetals Ch 22/Chemistry of the Environment Ch 18
W-11/07 Chemistry of the Nonmetals Ch 22/Chemistry of the Environment Ch 18
- Lab: Determination of Iron by Redox Titration

week 12

- M-11/12 **Unit Test 3 (Ch 18, 19, 20, 22)**
W-11/14 Transition Metals and Coordination Chemistry Ch 23
- Lab: Molecular Models II: Stereochemistry

week 13

- M-11/19 Transition Metals and Coordination Chemistry Ch 23
W-11/21 CLASSES NOT IN SESSION

week 14

- M-11/26 Organic Chemistry Ch 24
W-11/28 Organic Chemistry Ch 24
- Lab: Structure Elucidation I: IR and MS (handout)

week 15

- M-12/03 Organic Chemistry Ch 24
W-12/05 Nuclear Chemistry Ch 21
- Lab: Structure Elucidation II: NMR (handout)

week 16

- M-12/10 Nuclear Chemistry Ch 21
W-12/12 **Unit Test 4 (Ch 21, 23, 24)**
- **Lab Final**

Suggested End of Chapter Homework Problems

Chapter 14

2, 5, 7, 9, 11, 12, 13, 21, 23, 27, 33, 35, 43, 71.

Chapter 15

1, 3, 7, 13, 15, 19, 20, 25, 31, 35, 37, 43, 49, 51, 53, 61, 68.

Chapter 16

5, 6, 15, 17, 25, 35, 43, 51, 53, 57, 71, 73, 83.

Chapter 17

15, 17, 25, 35, 41, 43, 53, 61, 63, 69.

Chapter 18

No assigned problems

Chapter 19

10, 41, 57, 61, 63, 75, 77, 79, 83.

Chapter 20

4, 7, 10, 11, 12, 15, 19, 23, 25, 37, 51, 65.

Chapter 22

3, 6, 9, 23, 27, 65.

Chapter 21

2, 5, 8, 13, 26, 36, 38, 45, 57.

Chapter 23

5, 8, 13, 16, 19, 21, 25, 33, 37, 49.

Chapter 24

1, 3, 4, 7, 43, 44, 90, 98.