

**CHEM 42 Course Outline as of Fall 2021****CATALOG INFORMATION**

Dept and Nbr: CHEM 42 Title: INTRO GEN CHEM

Full Title: Introductory General Chemistry

Last Reviewed: 2/7/2022

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	4.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	4.00	Lab Scheduled	3.00	6	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	6.00		Contact Total	105.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 210.00

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly: CHEM 55

**Catalog Description:**

A basic introduction to fundamental laws and principles of the composition of matter, physical and chemical changes, atomic and molecular structure, chemical equilibria, intermolecular forces, solutions, and qualitative and quantitative theory and techniques. This course is a pre-requisite for Chemistry 3A.

**Prerequisites/Corequisites:**

Course Completion of MATH 154 or MATH 155 or higher (MATH) or two years of high school algebra or equivalent; OR AB705 placement into [Math Tier 3 or higher](https://assessment.santarosa.edu/math-placement-calculations)

**Recommended Preparation:**

Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:****Schedule of Classes Information:**

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Recommended: Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Transfer Credit: CSU;UC.

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>		Effective:	Inactive:
	C	Natural Sciences	Fall 2005	
<b>CSU GE:</b>	<b>Transfer Area</b>		Effective:	Inactive:
	B1	Physical Science	Fall 2005	
	B3	Laboratory Activity		
<b>IGETC:</b>	<b>Transfer Area</b>		Effective:	Inactive:
	5A	Physical Sciences	Spring 2007	
	5C	Fulfills Lab Requirement		
<b>CSU Transfer:</b>	Transferable	Effective:	Fall 2005	Inactive:
<b>UC Transfer:</b>	Transferable	Effective:	Fall 2006	Inactive:

### **CID:**

CID Descriptor:CHEM 101      Introduction to Chemistry  
SRJC Equivalent Course(s):      CHEM42

### **Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Analyze basic quantitative problems in chemistry, and apply them to real life situations.
2. Correlate macroscopic properties of matter with its structure and behavior at the atomic scale.
3. Communicate effectively using common chemical conventions and notation.
4. Evaluate available information to plan, perform and interpret basic laboratory experiments.

### **Objectives:**

Upon completion of this course, the student will be able to:

1. Solve problems involving fundamental processes in chemistry, including basic atomic theory, structure and bonding, chemical reactions, equilibrium, and the various forms of matter.
2. Demonstrate a basic understanding of the above fundamental processes in chemistry and how the scientific method was used to develop the theories behind these processes.
3. Interpret and utilize the vocabulary and nomenclature that is specific to a basic level of general chemistry.

4. Follow fundamental safety procedures in a laboratory environment.
5. Perform simple chemical experiments and associated calculations efficiently and accurately.
6. Use fundamental processes in chemistry to investigate phenomena in the applied sciences.
7. Arrange, sort, and graphically represent chemical data.

## **Topics and Scope:**

- I. Atomic theory
  - A. Physical and chemical properties of matter
  - B. The scientific method and development of atomic theory
  - C. Structure of the atom
  - D. Nucleons
  - E. Nuclear chemistry
  - F. The periodic table
- II. Laboratory measurements
  - A. SI/metric system units
  - B. Significant figures
  - C. Unit conversions
- III. Chemical bonding and molecular structure
  - A. Ions and ionic compounds
  - B. Covalent bonding
  - C. Lewis dot structures
  - D. Molecular geometry (up to  $SN_4$ )
  - E. Molecular polarity
- IV. Stoichiometry
  - A. Moles and molar mass
  - B. Balancing chemical equations
  - C. Yield calculations
- V. Types of Chemical reactions
- VI. Liquids and Solids
  - A. Intermolecular forces
  - B. Properties
- VII. Gases
  - A. Gas laws
  - B. Kinetic-molecular theory
- VIII. Solutions
  - A. Properties
  - B. Expressing solution concentrations
  - C. Solution calculations
- IX. Kinetics and equilibrium
  - A. Factors affecting rates of reactions
  - B. Energy Diagrams
  - C. Equilibrium
- X. Acids and bases
  - A. Definitions
  - B. pH
  - C. Hydroxide and hydronium ion concentrations
  - D. Concepts of buffers

Whenever possible, laboratory experiments that reflect real-life applications of chemistry will be chosen.

## Laboratory material

- I. Laboratory safety
- II. Laboratory techniques
- III. Maintaining a laboratory notebook and writing laboratory reports
- IV. Measurement and significant figures
- V. Analysis and interpretation of data
- VI. Quantitative experiments
- VII. Qualitative analysis
- VIII. Application of chemistry to various career fields (e.g. Environmental science, agricultural chemistry, enology)

### Assignment:

1. Reading (averaging 1 chapter/30-50 pages per week)
2. Reading and pre-lab questions for laboratory exercises (10-15)
3. Laboratory reports (10-15)
4. Homework assignments/study problem sets (0-15)
5. Quizzes (0-4)
6. Exams (3-5)
7. Final exam

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab reports
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Writing 20 - 35%
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**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework assignments, lab reports
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Problem solving 5 - 20%
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**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Laboratory techniques
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Skill Demonstrations 0 - 10%
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**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes, Exams and Final Exam: multiple choice, completion, calculations, short essay, problem solving
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Exams 50 - 75%
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**Other:** Includes any assessment tools that do not logically fit into the above categories.

Class and laboratory participation
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Other Category 0 - 5%
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**Representative Textbooks and Materials:**

Introductory Chemistry, 5th Ed.; Tro, Nivaldo; Pearson Prentice Hall, 2015.

Chemistry in Context, 8th Ed, ACS: McGraw Hill, 2012

Introductory Chemistry: A Foundation, 6th Ed., Zumdahl, Steven and DeCoste, Donald; Houghton-Mifflin, 2008 (classic).

**Laboratory Manuals:**

Chemistry 42 Laboratory Manual, Fall 2015 Edition, Santa Rosa Junior College Chemistry Department.

Chemical Investigations for Changing Times, Hassell, Alton and Marshall, Paula; Pearson Prentice Hall, 2010 (classic).