

University of Arkansas - Fort Smith
CURRICULUM COMMITTEE PROPOSAL
TO
MODIFY COURSE(S)
CHEM 10003/10001 Chemical Principles/Lab

DATE OF MEETING: November 19, 2025

COURSE(S)

Course(s) to be Modified:
CHEM 10003 Chemical Principles,
CHEM 10001 Chemical Principles Lab

ANTICIPATED CATALOG FOR CHANGES: Fall 2025

ORIGINATION

College: College of Arts and Sciences

Department: Physical Sciences

Sponsoring faculty author(s): Dr. Jordan Mader

Other contributing faculty author(s): Dr. David Burkey, Dr. Marty Campbell, Dr. Jeremy Durchman, Dr. Archana Mishra, Professor Ponni Murali, Dr. Rahul Yadav

Department Chair/Program Director: Dr. Marty Campbell

Associate Dean and/or Dean: Dr. Toni Alexander

I. DOCUMENTATION OF NEED

The Mathematics department stopped offering MATH 0304 (4 hours). Thus, we must update our prerequisite for CHEM 1303 and CHEM 1301 from MATH 0304 or higher-level math or exemption by placement score to a co- or prerequisite of MATH 1403 (3 hours) with drill (MATH 0301 or 0302, 1 or 2 hours) or higher-level math or exemption by placement score. This will allow greater flexibility in scheduling and progress toward degree completion by switching to a pre- or co-requisite.

II. AVAILABILITY OF RESOURCES AND QUALIFIED PERSONNEL

A. Faculty

1. Current Faculty meet the teaching needs
2. Specific Needs – N/A

B. Physical Resources

1. Currently Available resources meet the teaching needs
2. Needs - N/A

C. Library Resources

1. Currently Available resources meet the teaching needs
2. Needs – N/A

III. IMPACT ON OTHER CURRICULUM OFFERINGS

Since Math is no longer offering MATH 0304, students are already being placed in MATH 11003/MATH 03071/MATH 03072, so there should be no impact on the math department, other than shifting students into the MATH 11003 sections as has already been occurring.

This should not impact students applying to the Nursing, Radiography, or Dental Hygiene programs or students using these courses as a lab science gen ed core curriculum requirement because this has effectively been in practice for two years.

V. INFORMATION FOR COURSE(S) TO BE MODIFIED

	At Present	After Modification
Course Code	CHEM 10003	CHEM 10003
Title	Chemical Principles	Chemical Principles
Number of Credit Hours	3	3
Number and Types of Contact Hours	3 lecture	3 lecture
Prerequisite(s)	MATH 0304 - Beginning And Intermediate Algebra or higher level MATH or exemption by placement	
Prerequisite(s) or corequisite(s)		MATH 11003 College Algebra or higher-level math or exemption by placement score.
Corequisite(s)		
Repeated and Number of Times		
List any additional fee charges		
Final/Initial Catalog	2024-2025	Spring 2026
Term(s) course will be offered (spring only, fall and spring, fall only, etc.)	Fall, Spring, Summer	Fall, Spring, Summer
Catalog Description	Covers the fundamental principles of chemistry as well as he mathematical manipulations required to solve chemistry problems. (ACTS: CHEM 1004; must have CHEM 1303/CHEM 1301)	Covers the fundamental principles of chemistry as well as the mathematical manipulations required to solve chemistry problems. (ACTS: CHEM 1004; must have CHEM 10003/CHEM 10001)
Impact on Other Curriculum Offerings		

List courses for which this course is a prerequisite.	CHEM 1403 (as an option)	CHEM 14103 (as an option)
List courses for which this course is a pre/corequisite.	CHEM 1301	CHEM 10001
List courses for which this course is a corequisite.		
List majors/minors in which this course is required.	Dental Hygiene, Nursing, Radiography	Dental Hygiene, Nursing, Radiography
List majors/minors in which this course may be an elective.	Any degree that requires a lab science gen ed core curriculum	Any degree that requires a lab science gen ed core curriculum
Registrar Notes		
List the following information as needed- • courses no longer taught but a current student may have on their transcript: MATH 0304 • placement score requirements for ACT, SAT, and Accuplacer: use current placement scores for this course		

University of Arkansas - Fort Smith
5210 Grand Avenue
P. O. Box 3649
Fort Smith, AR 72913-3649
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General Syllabus

CHEM 10003 Chemical Principles

Credit Hours: 3 Lecture Hours: 3 Laboratory or other types of Hours: 0

Prerequisite(s) or Corequisite(s): **MATH 11003 or higher-level math or exemption by placement score.**

Corequisite(s):

Effective Catalog: **2025 - 2026**

I. Course Information

A. Catalog Description (*Please limit to 60 words.*)

Covers the fundamental principles of chemistry as well as the mathematical manipulations required to solve chemistry problems. (ACTS: CHEM 1004; must have CHEM 10003/CHEM 10001)

B. Additional Information - None

II. Student Learning Outcomes

A. Subject Matter

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

1. Use the concepts of precision and accuracy in measurement with the metric system.
2. Describe the structure of atoms and explain how the structure determines the reactivity of elements.
3. Describe the structure of molecules and explain how the structure determines the reactivity of molecules.
4. Describe and explain the bonding of atoms to each other.
5. Define the physical states of matter in terms of structure and describe the influence energy has on these states.
6. Solve mathematical relationships involving the pressure, volume, temperature, and molar quantity of gases.
7. Identify and write formulae for covalent and ionic compounds.

8. Write chemical equations to illustrate the basic classes of chemical reactions.
9. Work problems relating to concentration of solutions.
10. Explain the effects that different kinds of particles have on the solution process and the properties of solutions.
11. Distinguish between acids and bases in terms of physical and chemical properties.
12. Demonstrate a greater appreciation for the chemical orchestration that is physical life.

B. University Learning Outcomes

Chemical Principles enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students will identify a problem or issue and will research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, recency, and bias relevant to the problems/issues. The student will generate solutions/analysis of problems/issues evaluated and will assess and justify the solutions and/or analysis.

III. Major Course Topics

- A. Chemistry and the Scientific Method
- B. Matter and Measurement; Unit Conversions; Mathematical Manipulations
- C. Matter and Energy
- D. Atoms; Energy Sublevels and Orbitals; Nuclear Power
- E. The Atomic Nucleus
- F. Chemical Bonds
- G. Naming Ionic and Covalent Compounds
- H. Chemical Reactions and Stoichiometry
- I. Gases
- J. Liquids and Solids
- K. Oxidation and Reduction Reactions
- L. Solutions
- M. Acids and Bases
- N.** Introduction of Organic Compounds

	At Present	After Modification
Course Code	CHEM 10001	CHEM 10001
Title	Chemical Principles Laboratory	Chemical Principles Laboratory
Number of Credit Hours	1	1
Number and Types of Contact Hours	2 lab	2 lab
Prerequisite(s)	MATH 0304 - Beginning And Intermediate Algebra or higher level MATH or exemption by placement	
Prerequisite(s) or corequisite(s)	CHEM 1303 – Chemical Principles	MATH 11003 – College Algebra or higher-level math or exemption by placement score and CHEM 10003 – Chemical Principles.
Corequisite(s)		
Repeated and Number of Times		
List any additional fee charges		
Final/Initial Catalog	2024-2025	Spring 2026
Term(s) course will be offered (spring only, fall and spring, fall only, etc.)	Fall, Spring, Summer	Fall, Spring, Summer
Catalog Description	Application of the fundamental principles of chemistry as well as the collection and analysis of experimental data needed to solve chemistry problems.	Application of the fundamental principles of chemistry as well as the collection and analysis of experimental data needed to solve chemistry problems.
Impact on Other Curriculum Offerings		
List courses for which this course is a prerequisite.		
List courses for which this course is a pre/corequisite.		
List courses for which this course is a corequisite.		
List majors/minors in which this course is required.	Dental Hygiene, Nursing	Dental Hygiene, Nursing
List majors/minors in which this course may be an elective.	Any degree that requires a lab science gen ed core curriculum	Any degree that requires a lab science gen ed core curriculum
Registrar Notes		
List the following information as needed- - courses no longer taught but a current student may have on their transcript: MATH 0304 - placement score requirements for ACT, SAT, and Accuplacer: use current scores for		

this course

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General Syllabus**CHEM 10001 Chemical Principles Laboratory**

Credit Hours: 1 Lecture Hours: 0 Laboratory or other types of Hours: 2

Prerequisite(s) or Corequisite(s): MATH 11003 or higher-level math or exemption by placement score and CHEM 10003.

Effective Catalog: 2025 - 2026

I. Course Information**A. Catalog Description**

Application of the fundamental principles of chemistry as well as the collection and analysis of experimental data needed to solve chemistry problems.

B. Additional Information - None**II. Student Learning Outcomes****A. Subject Matter**

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

1. Use the concepts of precision and accuracy in measurement with the metric system.
2. Use dimensional analysis to solve a variety of mathematical problems relating to chemistry.
3. Describe the structure of atoms and explain how the structure determines the reactivity of elements.
4. Describe the structure of molecules and explain how the structure determines the reactivity of molecules.
5. Describe and explain the bonding of atoms to each other.
6. Define the physical states of matter in terms of structure, and describe the influence energy has on these states.
7. Solve mathematical relationships involving the pressure, volume, temperature, and molar quantity of gases.
8. Identify and write formulae for covalent and ionic compounds.

9. Write chemical equations to illustrate the basic classes of chemical reactions.
10. Work problems relating to concentration of solutions.
11. Explain the effects that different kinds of particles have on the solution process and the properties of solutions.
12. Distinguish between acids and bases in terms of physical and chemical properties.

B. University Learning Outcomes

Chemical Principles Laboratory enhances student abilities in the following areas:

Analytical Skills

Critical Thinking Skills: Students will identify a problem or issue and will research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, recency, and bias relevant to the problems/issues. The student will generate solutions/analysis of problems/issues evaluated and will assess and justify the solutions and/or analysis.

Communication Skills (written and oral)

Students will communicate proficiently. Students will compose coherent documents appropriate to the intended audience and effectively communicate orally in a public setting.

III. Major Course Topics

- A. Molecular Motion
- B. Chemical Reactions
- C. Energy Measurements
- D. Making Compounds
- E. Metals and Their Activities
- F. Characteristics of Nonmetals
- G. Rates of Chemical Reaction
- H. Reversible Chemical Reactions
- I. Chemical Formulas
- J. Preparation of Solutions
- K. Acidity and Basicity
- L.** Introduction of Organic Compounds