



# 南京航空航天大学

*Nanjing University of Aeronautics and Astronautics*

## Syllabus

Course No.	1900607W	College	Science	Dept.	Chemistry
Teacher	Fengming Pan				
Time	2022.12.19—2023.01.06				
Course Name	English	General Chemistry with Lab			
	Chinese	基础化学与实验			
Course credit hours	Total	Theory	Office Hour or Practice	Credits	
	70	60	10	12.0	

### Course description:

This course constitutes an introduction to inorganic and physical chemistry for science majors, engineers, and the pre-health professions. Emphasize the fundamental principles and theories of chemistry. Topics include dimensional analysis, the theories of atomic structure; the mole; stoichiometry; chemical reactions; chemical bonding; equilibrium; thermochemistry; electrochemistry; molecular structure; properties of gases, liquids, solids, and solutions.

The underlying unity of chemistry is a basic theme. Lab activities and exercises will provide opportunities for students to practice the concepts learned in class. These activities are selected to provide illustration and reinforcement of course topics, and include: building atomic models and identifying elements, atomic charge, and atomic mass; investigating atomic structure and isotopes; predicting how the average atomic mass of an element changes in relation to the abundance of its isotopes; building molecules and see them in 3D; balancing chemical equations, recognizing that the number of atoms of each element is conserved in a chemical reaction; translating from symbolic to molecular representations of matter; identifying the limiting reactant in a chemical reaction; predict the initial amounts of reactants given the amount of products and leftovers using the concept of limiting reactant; watch different types of molecules form a solid, liquid, or gas; add or remove heat and watch the phase change; change the temperature or volume of a container and see a pressure- temperature diagram respond in real time; relate the interaction potential to the forces between molecules; pump gas molecules to a box and see what happens as you change the volume, add or remove heat, change gravity, and pressure; measure the temperature and pressure, and discover how the properties of the gas vary in relation to each other; explore how heating and cooling different materials will add or remove energy; see how energy is transferred between objects; build your own system, with energy sources, changers, and users; track and visualize how energy flows and changes through the system.

### Requirements for courses; ability and knowledge in advance

None

**Course structure explanation:**

Make clear the necessary parts, optional parts, distribution of hours. Courses with experiments or practice are expected to explain credit hours needed, content, scheme and functions.

**Tentative Schedule**

**Module 1**

- Introduction & Syllabus
- Lecture 1 - Keys to the Study of Chemistry (Chapter 1)
- Lecture 2 - Components of Matter: Atoms, Molecules, and Ions
- Lecture 3 - Compounds: Formulas, Names, Masses (Chapter 2)
- Lecture 4 - Stoichiometry: Molar Mass and Chemical Formulas
- Lab 1 - Atoms, Isotopes, and Atomic Mass

**Module 2**

- Lecture 5 - Stoichiometry of Formulas and Equations (Chapter 3)
- Lecture 6 - Water as a Solvent and Ionic Reactions (Chapter 4)
- Lecture 7 - Precipitation and Acid-Base Reactions (Chapter 4)
- Lecture 8 - Redox Reactions and the Equilibrium State
- Lab 2 - Chemical Reactions

**Module 3**

- Lecture 9 – Gas Pressure and Gas Laws (Chapter 5)
- Lecture 10 – The Kinetic-Molecular Theory (Chapter 5)
- Lecture 11 – Gas Laws and Earth's Atmosphere
- **Mid-Term Exam: Chapters 1-5**
- Lab 3 – States of Matter, Gas Properties, and Ideal Gas Law

**Module 4**

- Lecture 12 – Thermochemistry and Energy Conversion (Chapter 6)
- Lecture 13 – Enthalpy Changes and Calorimetry (Chapter 6)
- Lecture 14 – Thermochemical Equations and Hess's Law (Chapter 6)
- Lecture 15 – Models of Chemical Bonding (Chapter 9)
- Lab 4 – Energy Forms and Changes

**Module 5**

- Lecture 16 – Molecular Structures (Chapter 10)
- Lecture 17 – The VSEPR Model (Chapter 10)
- Lecture 18 – Theories of Covalent Bonding (Chapter 11)
- Lecture 19 – Review & Problem Session
- **FINAL EXAM**

Recap of the course

**Teaching methods (Lectures, practice, etc)**

The course will be developed with such methods as lectures, discussion, lab research.

#### Forms of evaluation and requirements

Structure of the final grade (including presence, class performance), focus of exam, forms of exam(test, interview, final report, etc)

#### Grade Scale

Assignments and examinations will be graded according to the following grade scale

A	93-100	B-	80-82	D+	67-69
A-	90-92	C+	77-79	D	63-66
B+	87-89	C	73-76	D-	60-62
B	83-86	C-	70-72	F	0-59

Grades are not rounded up or curved.

Students are expected to maintain high standards of academic honesty. Specifically, unless otherwise directed by the professor, students may not consult other students, books, notes, electronic devices or any other source, on examinations. Failure to abide by this may result in a zero on the examination, or even failure in the course.

Textbook	Name	Publisher	Author	Year	Price
	Chemistry, The Molecular Nature of Matter and Change, 6th edition	McGraw-Hill	Martin S. Silberberg	2012	
References	Name	Publisher	Author	Year	Price
	Other reading materials will be provided through your student center				