



# Chemistry – Course Curriculum Plan

**Programme Duration: 36 Weeks**



# Programme Overview

The PEFA Academy A Level Chemistry programme is designed to provide students with a comprehensive understanding of physical, inorganic, and organic chemistry while developing practical laboratory skills, analytical thinking, and scientific problem-solving abilities.



# Curriculum Standards & Learning Approach

The curriculum is structured around internationally recognised A Level Chemistry standards and adapted to suit PEFA Academy's teaching methodology. The programme focuses on enabling students to:

**Understand fundamental chemical principles and theories**

**Apply chemistry concepts to practical and real-world situations**

**Develop experimental and investigative skills**

**Interpret chemical data and scientific evidence**

**Build strong analytical and problem-solving abilities**

**Prepare effectively for advanced-level examinations**

## Programme Duration

**36 Weeks**

## Learning Approach

- Live Online Classes
- Recorded Lessons
- Interactive Discussions
- Practical Chemistry Exercises
- Laboratory Demonstrations and Simulations
- A Level Examination-Style Questions
- Weekly Assignments
- Topic-Based Assessments
- Mock Examinations
- Past Question Practice
- Tutor Support Sessions



# Curriculum Structure

MODULES 1–3

## MODULE 1: ATOMIC STRUCTURE AND STOICHIOMETRY

**Duration: Weeks 1–4**  
**Topics Covered**

- Structure of the atom
- Protons, neutrons and electrons
- Isotopes
- Relative atomic mass
- Mole concept
- Empirical and molecular formulae
- Chemical equations
- Ionic equations
- Limiting reagents
- Percentage yield and atom economy

### Learning Objectives

By the end of this module, students should be able to:

- Explain atomic structure and isotopes
- Calculate relative atomic masses
- Apply mole calculations confidently
- Determine empirical and molecular formulae
- Solve stoichiometric problems accurately

### Assessment

- Topic quizzes
- Numerical problem-solving exercises
- Examination-style questions

## MODULE 3: STATES OF MATTER AND ENERGETICS

**Duration: Weeks 9–12**  
**Topics Covered**

- Ideal gases
- Gas laws
- Ideal gas equation
- Crystal structures
- Enthalpy changes
- Exothermic and endothermic reactions
- Bond energies
- Hess's Law
- Energy cycles

### Learning Objectives

Students should be able to:

- Apply gas laws in calculations
- Use the ideal gas equation correctly
- Calculate enthalpy changes
- Construct and interpret Hess cycles
- Explain energy transfers in chemical reactions

### Assessment

- Calculation exercises
- Laboratory activities
- Topic tests

## MODULE 2: CHEMICAL BONDING AND MOLECULAR STRUCTURE

**Duration: Weeks 5–8**  
**Topics Covered**

- Ionic bonding
- Covalent bonding
- Metallic bonding
- Coordinate bonding
- Bond energy
- Bond length
- Electronegativity
- Intermolecular forces
- Hydrogen bonding
- Dot-and-cross diagrams
- Molecular shapes (VSEPR Theory)

### Learning Objectives

Students should be able to:

- Explain different types of chemical bonding
- Predict molecular shapes and bond angles
- Compare intermolecular forces
- Explain physical properties based on bonding
- Draw and interpret dot-and-cross diagrams

### Assessment

- Bonding exercises
- Molecular shape assignments
- Examination-style questions



# Curriculum Structure

## MODULE 4: ELECTROCHEMISTRY, EQUILIBRIA AND ACIDS & BASES

Duration: Weeks 13–16

### Topics Covered

- Oxidation and reduction
- Oxidation numbers
- Redox reactions
- Dynamic equilibrium
- Le Chatelier's Principle
- Equilibrium constants
- Acids and bases
- Strong and weak acids
- Strong and weak bases
- pH and neutralisation
- Acid-base titrations

### Learning Objectives

Students should be able to:

- Identify redox reactions
- Calculate oxidation numbers
- Predict equilibrium shifts
- Explain acid-base reactions
- Interpret titration curves

### Assessment

- Redox exercises
- Equilibrium calculations
- Practical assessments

## MODULE 5: REACTION KINETICS

Duration: Weeks 17–18

### Topics Covered

- Rate of reaction
- Collision theory
- Activation energy
- Boltzmann distribution
- Catalysts and catalysis

### Learning Objectives

Students should be able to:

- Explain factors affecting reaction rates
- Interpret kinetic data
- Describe catalytic processes
- Apply collision theory

### Assessment

- Data analysis exercises
- Topic-based assessments

## MODULE 6: PERIODICITY AND GROUP CHEMISTRY

Duration: Weeks 19–23

### Topics Covered

- Periodic trends
- Periodic table relationships
- Group chemistry
- Reactivity trends
- Nitrogen chemistry
- Sulfur chemistry
- Environmental chemistry

### Learning Objectives

Students should be able to:

- Explain periodic trends
- Predict chemical properties
- Compare reactivity patterns
- Understand environmental impacts of chemical compounds

### Assessment

- Structured questions
- Practical exercises



# Curriculum Structure

## MODULE 7: INTRODUCTION TO ORGANIC CHEMISTRY

**Duration: Weeks 24–26**

### Topics Covered

- Functional groups
- Organic nomenclature
- Organic reaction types
- Organic mechanisms
- Structural isomerism
- Stereoisomerism

### Learning Objectives

Students should be able to:

- Identify functional groups
- Name organic compounds systematically
- Explain reaction mechanisms
- Recognise different forms of isomerism

### Assessment

- Organic chemistry worksheets
- Mechanism exercises

## MODULE 8: HYDROCARBONS AND HALOGENOALKANES

**Duration: Weeks 27–29**

### Topics Covered

- Alkanes
- Alkenes
- Cracking
- Polymerisation
- Free radical substitution
- Electrophilic addition
- Halogenoalkanes
- Nucleophilic substitution
- Elimination reactions

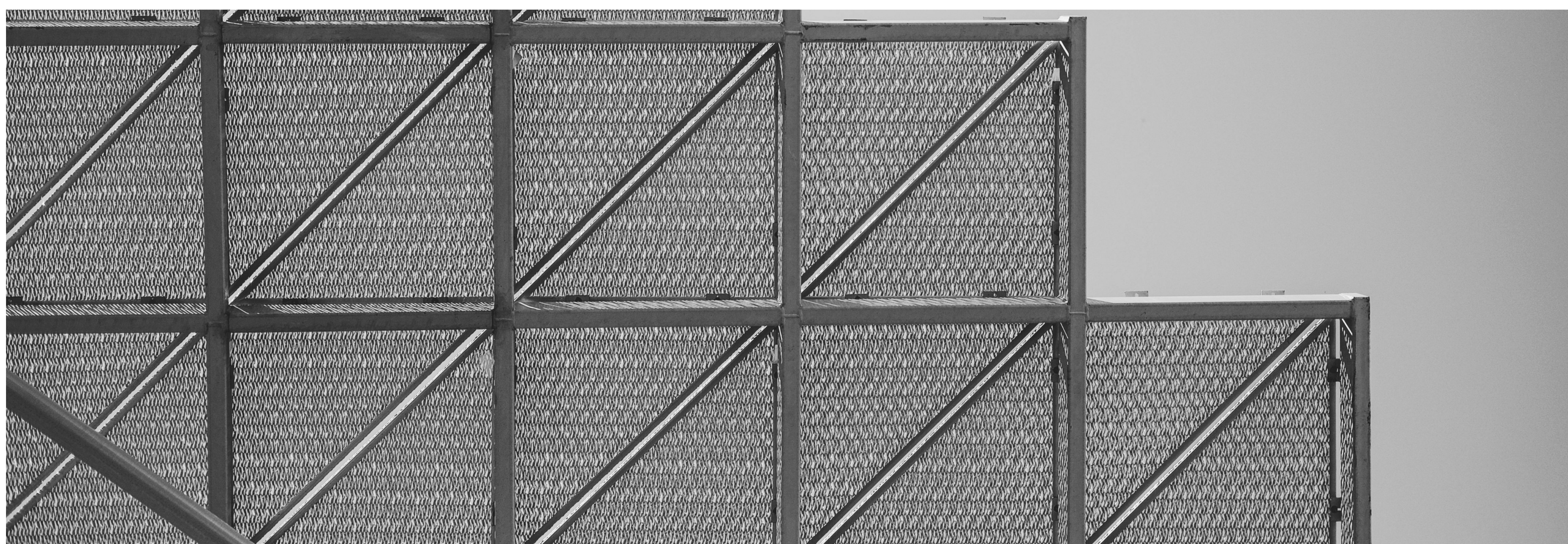
### Learning Objectives

Students should be able to:

- Describe reactions of hydrocarbons
- Explain organic reaction mechanisms
- Predict products of organic reactions

### Assessment

- Reaction pathway exercises
- Examination-style questions



# Curriculum Structure

## MODULE 9: OXYGENATED ORGANIC COMPOUNDS

**Duration: Weeks 30–33**

### Topics Covered

- Alcohols
- Aldehydes
- Ketones
- Carboxylic acids
- Esters

### Learning Objectives

Students should be able to:

- Describe preparation methods
- Explain characteristic reactions
- Distinguish between compound classes
- Apply organic synthesis techniques

### Assessment

- Organic reaction exercises
- Practical assessments

## MODULE 10: NITROGEN COMPOUNDS, ANALYTICAL TECHNIQUES AND REVISION

**Duration: Weeks 34–36**

### Topics Covered

- Amines
- Nitriles
- Organic synthesis
- Infrared spectroscopy
- Mass spectrometry
- Practical skills review
- Examination preparation

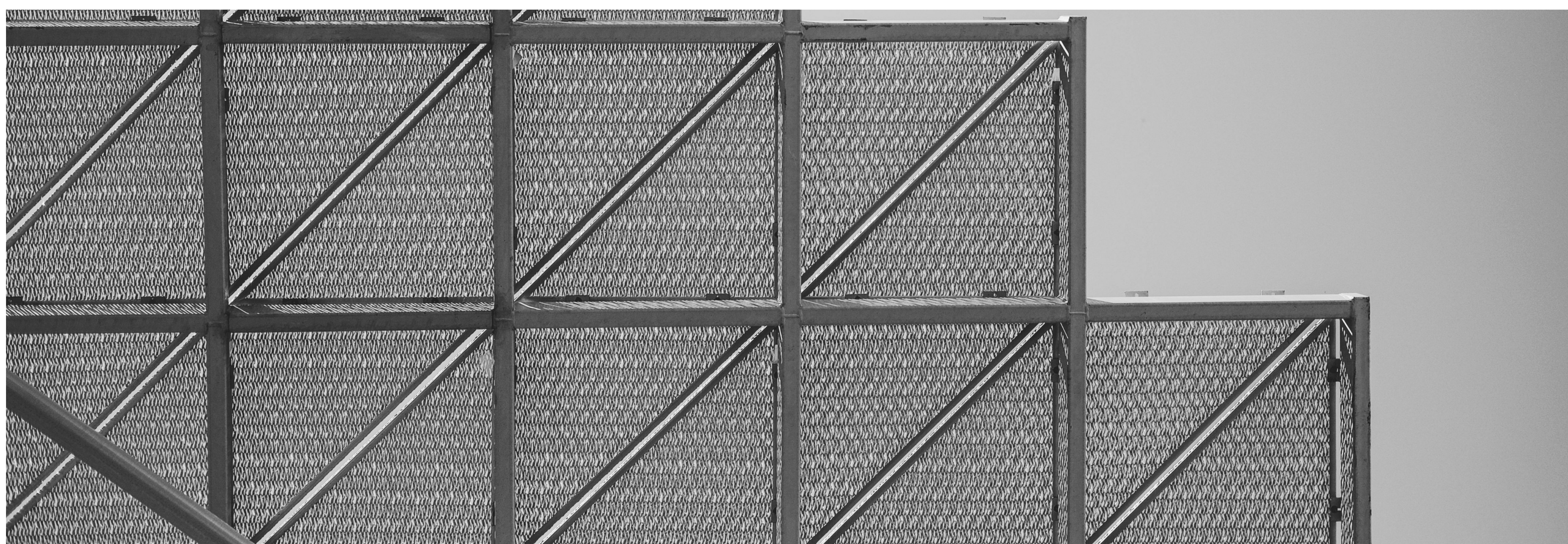
### Learning Objectives

Students should be able to:

- Explain nitrogen compound chemistry
- Interpret spectra
- Design synthesis routes
- Apply practical and analytical skills

### Assessment

- Mock examinations
- Past paper practice
- Final module assessment



# Assessment Framework

## Continuous Assessment

Students will be assessed through:

- Weekly assignments
- Topic quizzes
- Laboratory reports
- Practical exercises
- Mid-module assessments
- End-of-module assessments

## Term Assessments

Students will complete:

- Timed examination questions
- Structured assessments
- Practical evaluations
- Performance reviews

## Final Examination Preparation

The final phase of the programme will focus on:

- Past paper practice
- Examination technique development
- Revision sessions
- Mock examinations
- Weak-area improvement exercises



# Teaching Methodology & Programme Outcome

## Teaching Methodology

PEFA Academy will adopt a practical and student-focused approach by combining:

- Interactive lectures
- Laboratory demonstrations
- Practical investigations
- Problem-solving exercises
- Group discussions
- Scientific analysis activities
- Examination preparation techniques

## Programme Outcome

At the completion of this programme, students should be able to:

- Understand core chemical principles and theories
- Apply chemistry concepts confidently
- Conduct and interpret practical investigations
- Analyse scientific data effectively
- Solve advanced-level chemistry examination questions successfully
- Develop a strong foundation for further studies in chemistry, medicine, engineering, pharmacy, environmental science, and related disciplines