

# Postgraduate Certificate Chemistry Applied to Environmental Management



## Postgraduate Certificate Chemistry Applied to Environmental Management

- » Modality: online
- » Duration: 12 weeks
- » Certificate: TECH Global University
- » Credits: 12 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/engineering/postgraduate-certificate/chemistry-applied-environmental-management](http://www.techtute.com/us/engineering/postgraduate-certificate/chemistry-applied-environmental-management)

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# 01

# Introduction

There is no branch of science that is as extensive and specific as chemistry and that, at the same time, is as closely related as other disciplines. Everything that surrounds human beings, including them, has to do with chemistry and the functions they can perform. Today's professional must be in accordance with the new demands of the industry, and in the environmental sector it is very often necessary to carry out projects in which approaches and procedures based on ethics and social commitment are applied. For this reason, it is necessary to acquire technical knowledge in the field of environmental technologies and sustainability. This is how study programs such as this one arise, essential for the professional development of workers in the industrial sector who wish to deepen their knowledge in this area. With a completely online modality and 12 weeks of duration, based on the most innovative Relearning methodology.





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*Acquire an improve knowledge  
in Fundamentals of Chemistry  
in 12 weeks and 100% online"*

In the production industry, knowledge of chemistry is essential to carry out processes and transform raw materials. Chemistry is so important that it could be said to be essential to the functioning of everything in daily life. Although it is not seen that way, it is practically impossible to enumerate the uses that are made of it, it is therefore important to know about it and to know how to apply it intelligently, in sectors such as industry in order to move into the future.

Systematically studying the composition, properties and activity of organic and inorganic substances and various elementary forms of matter, is what chemistry is all about and with the constant technological advances in humanity, these must go hand in hand, so it is essential to know in depth the fundamentals of chemistry to take advantage of all the benefits for society and to build new proposals in line with sustainability and environmental protection.

This Postgraduate Certificate requires a deep analysis of everything related to Chemistry Applied to Environmental Management, including the application of knowledge in the resolution of real problems, taking into account the presentation of data and their results. Relating the behavior of industrial and environmental systems to their chemical properties.

All this in a convenient online format, which allows the professional to assume the course load at their own pace and in complete freedom of how, where and when to learn. From the first day of the program, all the content is available in the virtual classroom, both for consultation from any device with an internet connection and for downloading, which greatly facilitates the work of study.

This **Postgraduate Certificate in Chemistry Applied to Environmental Management** contains the most complete and up-to-date program on the market. The most important features include:

- ♦ The development of case studies presented by experts in Chemical Engineering
- ♦ The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- ♦ Practical exercises where the self-assessment process can be carried out to improve learning
- ♦ Its special emphasis on innovative methodologies
- ♦ Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ♦ Content that is accessible from any fixed or portable device with an Internet connection



*Improve your knowledge in relation to all the chemical processes that affect living beings and their environment, in relation to the productive processes of the industry"*



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*Add this Postgraduate Certificate to your CV and make your professional profile stand out with a specialized certification”*

The program's teaching staff includes professionals from the sector who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide an immersion education programmed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professional must try to solve the different professional practice situations that are presented throughout the academic course. For this purpose, the student will be assisted by an innovative interactive video system created by renowned experts.

*Understand the most advanced principles of pollution control and environmental chemical technology.*

*Learn at your own pace with the best content selected by experts completely online.*



# 02 Objectives

This refresher program aims to provide today's professional, related to industrial processes, with all the most advanced knowledge about Chemistry Fundamentals, adapted to today's society, the new market demands in terms of sustainability and uses of technology to carry out the processes. For this, TECH has selected the most actualized content, combining theory with the practical knowledge necessary for the assimilation of the information.







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*Your professional goals become achievable with TECH's specialized programs. Start your path to success now"*



## General Objectives

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- ♦ Study the fundamentals of chemistry, elements and compounds
- ♦ Know the laws applied in the environment of chemistry and industry
- ♦ Deepen in the organic and inorganic functions and their different reactions
- ♦ Understand the productive processes of industry and their relationship with the fundamentals of chemistry
- ♦ Delve into environmental chemistry and its interrelation with production processes
- ♦ Acquire the most advanced knowledge on the environmental behavior of pollutants and the appropriate treatments to be applied in each case
- ♦ Study mass and energy balance and its relationship with chemical processes

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*A professional in the chemical industry who likes to innovate must be in constant training to take on new responsibilities and evolve”*





## Specific Objectives

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- ♦ Master the basic principles of general chemistry, organic chemistry and inorganic chemistry
- ♦ Apply knowledge in solving real problems
- ♦ Manage the basic laws that regulate reactions: kinetics and equilibrium
- ♦ Present and interpret data and results
- ♦ Acquiring the basic knowledge and application of environmental technologies and sustainability
- ♦ Apply the principles of chemical and environmental technology in the prevention of air and water pollution, as well as in waste treatment
- ♦ Relate the behavior of industrial and environmental systems to their chemical properties
- ♦ Carry out projects that apply approaches and procedures based on ethics and social and environmental commitment

03

# Structure and Content

TECH is a pioneer in the implementation of *Relearning* as a study methodology, it has been recognized as an efficient method to understand and memorize knowledge, so it is a breakthrough in the current university system focused on professionals who want to continue preparing academically. This, together with the program design and content, facilitate student learning, providing them with the most transcendental concepts to make the most of their careers.







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*The design of this program will allow you to advance in an adequate way and understand all the most useful concepts for your career”*

## Module 1. Chemical Fundamentals

- 1.1. Inorganic formulation and nomenclature
  - 1.1.1. Introduction and fundamental Concepts
  - 1.1.2. Components
  - 1.1.3. Single Ions
  - 1.1.4. Compounds
    - 1.1.4.1. Binary compounds
    - 1.1.4.2. Ternary and quaternary compounds
- 1.2. Fundamentals of chemistry
  - 1.2.1. Chemical elements and compounds
  - 1.2.2. Mole and calculation of molecular masses
  - 1.2.3. General laws of chemistry
  - 1.2.4. Solutions
  - 1.2.5. Gases
    - 1.2.5.1. Laws governing the behavior of ideal gases
    - 1.2.5.2. Van der Waals' equation for real gases
- 1.3. Atomic structure and the periodic system
  - 1.3.1. Atom Structure
  - 1.3.2. Atomic Models
  - 1.3.3. Periodic System
  - 1.3.4. Properties of the periodic system
- 1.4. Chemical bonding
  - 1.4.1. Types of bonds
    - 1.4.1.1. Ionic bonding
    - 1.4.1.2. Covalent bonding
    - 1.4.1.3. Metallic bonding
  - 1.4.2. Properties of bonds
  - 1.4.3. Bonds between covalent molecules
  - 1.4.4. Properties of substances
- 1.5. Chemical thermodynamics
  - 1.5.1. Thermochemical equations
  - 1.5.2. Heat of reaction
  - 1.5.3. First Principle of Thermodynamics
  - 1.5.4. Enthalpy
  - 1.5.5. Laws of thermochemistry
  - 1.5.6. Heat of reaction and binding energy
  - 1.5.7. Free energy and chemical equilibrium
- 1.6. Chemical kinetics
  - 1.6.1. Reaction rate
  - 1.6.2. Kinetic equations
    - 1.6.2.1. Reaction order
  - 1.6.3. Influence of temperature and catalysts
  - 1.6.4. Reaction mechanisms
- 1.7. Chemical equilibrium.precipitation reactions
  - 1.7.1. Equilibrium expressions
    - 1.7.1.1. Equilibrium constant
  - 1.7.2. Precipitation Reactions
  - 1.7.3. Dissolution, solubility and concentration
  - 1.7.4. Factors affecting precipitation
- 1.8. Acid-base reactions
  - 1.8.1. Dissociation constant
  - 1.8.2. Concept of pH
    - 1.8.2.1. Calculation of pH in different solutions
  - 1.8.3. Acid-base titrations
  - 1.8.4. Buffer solutions
  - 1.8.5. Polyprotic acids



- 1.9. Oxidation-reduction reactions. Electrolysis
  - 1.9.1. Adjustment of redox reactions
  - 1.9.2. Gram equivalent and titrations in redox processes
  - 1.9.3. Electrolysis
    - 1.9.3.1. Faraday's laws
  - 1.9.4. Electrode potentials
    - 1.9.4.1. Effect of concentrations
  - 1.9.5. Evolution of a redox system
- 1.10. Introduction to organic chemistry
  - 1.10.1. Organic functions
  - 1.10.2. Formulation and nomenclature
  - 1.10.3. Isomerism
  - 1.10.4. Organic reactions

## Module 2. Fundamentals of Chemical and Environmental Technology

- 2.1. Mass and energy balance without chemical reaction
  - 2.1.1. Principle of conservation of matter
  - 2.1.2. Classification of processes
  - 2.1.3. General equation of the energy balance
  - 2.1.4. Closed systems
  - 2.1.5. Open systems
- 2.2. Mass and energy balance with chemical reaction
  - 2.2.1. Basic Concepts
  - 2.2.2. Combustion reactions
  - 2.2.3. Heats of formation and combustion
  - 2.2.4. General equation of the energy balance with temperature different from the standard temperature
- 2.3. Chemical reactors. Matter transfer. Adsorption
  - 2.3.1. Design of chemical reactors
  - 2.3.2. Classification of chemical reactors
  - 2.3.3. Matter transfer operations
  - 2.3.4. Adsorption processes
- 2.4. Environmental chemistry
  - 2.4.1. Chemistry of the atmosphere
  - 2.4.2. Soil Chemistry
  - 2.4.3. Chemistry of the hydrosphere
- 2.5. Pollution control. Environmental Impact
  - 2.5.1. Environmental behavior of pollutants
  - 2.5.2. Environmental risk assessment
  - 2.5.3. Strategies for pollution control and prevention
  - 2.5.4. Environmental Legislation
- 2.6. Wastewater Treatment
  - 2.6.1. Characterization of wastewater
  - 2.6.2. Pretreatment
  - 2.6.3. Primary treatments
  - 2.6.4. Secondary treatments
  - 2.6.5. Tertiary treatments
- 2.7. Municipal solid waste
  - 2.7.1. Classification of municipal solid waste
  - 2.7.2. Collection and transport
  - 2.7.3. Treatments applicable to municipal solid waste
- 2.8. Industrial Waste
  - 2.8.1. Classification of industrial waste
  - 2.8.2. Industrial waste management
  - 2.8.3. Minimization of industrial waste
  - 2.8.4. Impact of industrial waste
- 2.9. Thermal treatment of waste
  - 2.9.1. Incineration
  - 2.9.2. Gasification
  - 2.9.3. Pyrolysis
  - 2.9.4. Other Options
- 2.10. Control of gaseous emissions
  - 2.10.1. Gaseous pollutant elimination techniques
  - 2.10.2. Particulate capture techniques
  - 2.10.3. Cleaning of flue gases from the electricity industry
  - 2.10.4. Regulations and documentary control

04

# Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.





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*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

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*At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world”*



*You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.*





*The student will learn to solve complex situations in real business environments through collaborative activities and real cases.*

### A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

**“** *Our program prepares you to face new challenges in uncertain environments and achieve success in your career”*

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

## Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

*In 2019, we obtained the best learning results of all online universities in the world.*

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.





In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

*Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



This program offers the best educational material, prepared with professionals in mind:



### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



### Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



### Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





**Case Studies**

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.



**Interactive Summaries**

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



**Testing & Retesting**

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



05

# Certificate

The Postgraduate Certificate in Chemistry Applied to Environmental Management guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.







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*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork”*

This program will allow you to obtain your **Postgraduate Certificate in Chemistry Applied to Environmental Management** endorsed by **TECH Global University**, the world's largest online university.

**TECH Global University** is an official European University publicly recognized by the Government of Andorra ([official bulletin](#)). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Chemistry Applied to Environmental Management**

Modality: **online**

Duration: **12 weeks**

Accreditation: **12 ECTS**





future

health confidence people

education information tutors

guarantee accreditation teaching

institutions technology learning

community commitment

**tech** global  
university

personalized service innovation

knowledge present

online training

development language

virtual classroom

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