

Postgraduate Diploma

Physics and Chemistry Teacher Training in High School Education





Postgraduate Diploma

Physics and Chemistry Teacher Training in High School Education

- » Modality: online
- » Duration: 6 months
- » Certificate: TECH Global University
- » Credits: 18 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: www.techtute.com/us/education/postgraduate-diploma/postgraduate-diploma-physics-chemistry-teacher-training-high-school-education

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01

Introduction

One of the great challenges for teachers of physics and chemistry is to transfer to the high school students the passion for these subjects and their application in daily life. A challenge that entails a deep knowledge not only of this field, but also of the most captivating methodologies. This is why TECH provides the teaching professional with a program that delves into the design, planning, and development of teaching programs and the use of the most effective pedagogical resources. All this, in 100% online mode and with teaching material that you can access comfortably at any time of the day, from an electronic device with Internet connection.



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*Thanks to this Postgraduate Diploma
you will become an excellent
professional in the teaching of Physics
and Chemistry in High School Education"*

The electromagnetic spectrum, lasers, fission, and fusion processes, or advances in food and health are due to the areas of physics and chemistry. Knowing, therefore, not only the basic concepts, but going a step further and observing their direct application are key to productive and engaging learning for high school students.

The mission of attracting and captivating the young student in High School Education is much simpler through the application of the most innovative methodologies in accordance with the subject matter being taught. For that reason, TECH has designed this Postgraduate Diploma in Physics and Chemistry Teacher Training in High School Education.

A program that will take the high school students over 6 months to delve into the main content to be addressed in this subject, therefore the syllabus design of the same, the programs and teaching units, and the many digital resources available to teach these specialties.

This extensive syllabus is completed by video summaries of each topic, detailed videos, specialized readings and case studies that can be easily accessed from any electronic device with an Internet connection.

In this way, TECH offers an excellent opportunity to progress professionally in the education sector through a university program in accordance with current times and compatible with the most demanding responsibilities.

This **Postgraduate Diploma in Physics and Chemistry Teacher Training in High School Education** contains the most complete and up-to-date educational program on the market. The most important features include:

- ♦ The development of case studies presented by experts in High School Education
- ♦ The graphic, schematic, and eminently practical contents of the program provide practical information on those disciplines that are essential for the 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 work
- ♦ Content that is accessible from any fixed or portable device with an Internet connection



Bring to your subject new teaching-learning approaches in Physics and Chemistry for High School Education students"

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With the Relearning system, used by TECH, you will be able to reduce the number of hours you need to study and consolidate the new concepts in a much easier way"

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

The 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 immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby students must try to solve the different professional practice situations that arise throughout the program. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

Create teaching experiments with your high school students to make learning Physics and Chemistry more attractive.

You have at your disposal multimedia pills that will allow you to delve into the main evaluation systems in high school and vocational education.



02 Objectives

The teaching professionals who enter this program will obtain the necessary knowledge to be able to develop their teaching work successfully. For this purpose, TECH offers the most advanced syllabus on methodology, teaching and the role of the teacher in a High School Education classroom. In addition, you will be accompanied in this learning process by a team specialized in the educational sector.



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Bring to your subject new teaching-learning approaches in Physics and Chemistry for High School Education students”



General Objectives

- Introduce students to the world of teaching, from a broad perspective that provides them with the necessary skills for the performance of their work
- Know the new tools and technologies applied to teaching
- Show the different options and ways the teacher can work in their post
- Promote the acquisition of communication and knowledge transmission skills and abilities
- Encourage continuing training for students



This is a program that will show you the most effective ICT resources for teaching Physics and Chemistry to young high school students"





Specific Objectives

Module 1. Complements for the Disciplinary Formation in Physics and Chemistry

- ♦ Define a chronological line from the Ancient Age to the Contemporary Age
- ♦ Know the most important events of the different historical periods
- ♦ Mention some of the names of the most prominent professors of chemistry in the 19th century
- ♦ Explain the origin and classification of the elements
- ♦ Understand the importance of teaching history in Science
- ♦ Show a proposal to introduce the historical approach in the classroom within the teaching of science

Module 2. Syllabus Design of Physics and Chemistry

- ♦ Define the concept of syllabus
- ♦ Detail the elements that make up the syllabus
- ♦ Explain the concept of syllabus design
- ♦ Describe the levels of concreteness of the syllabus
- ♦ Explain the different models of syllabus
- ♦ Determine the aspects that should be taken into account in the elaboration of a teaching program

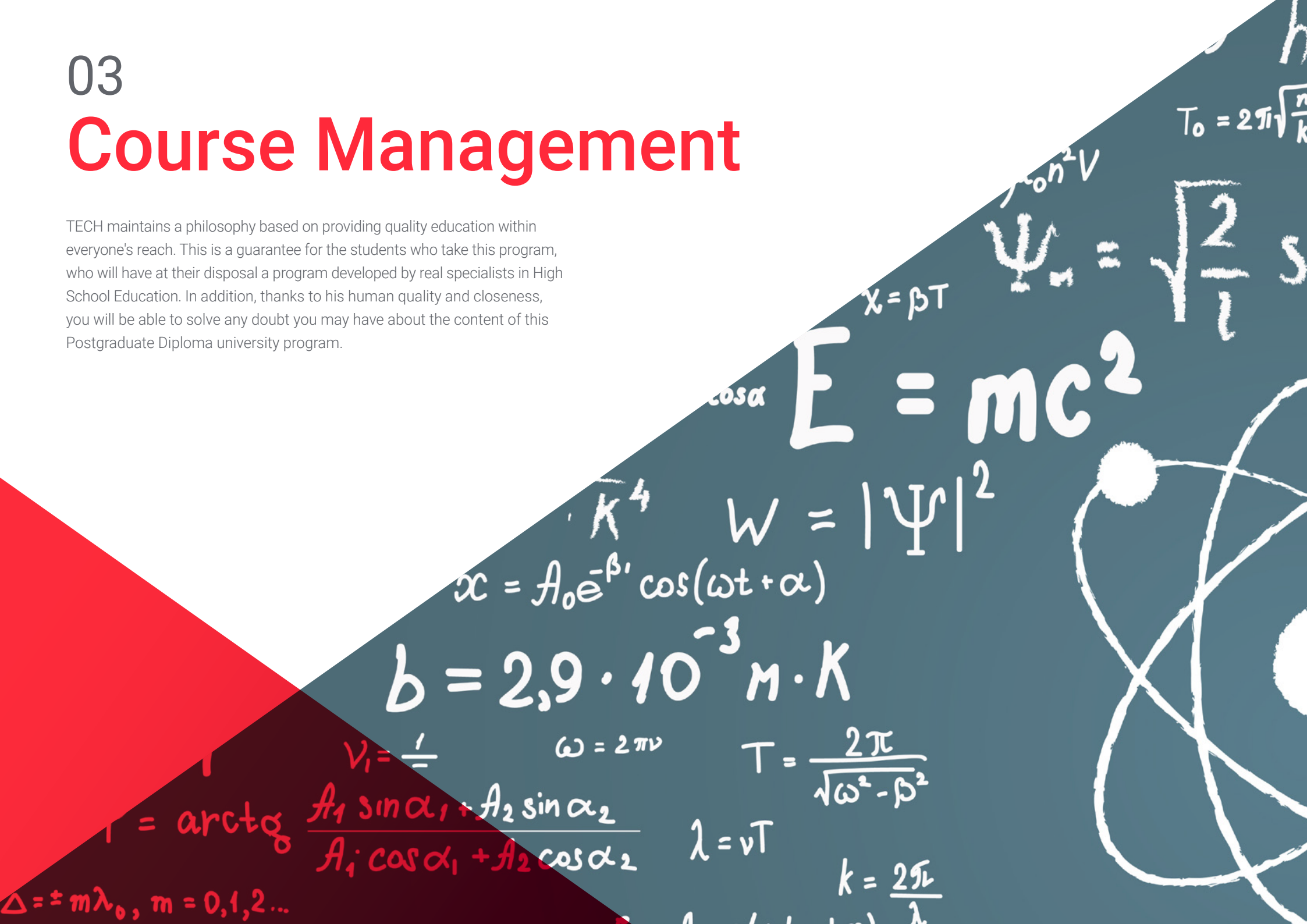
Module 3. Physics and Chemistry Teaching

- ♦ Understand the origin and evolution of didactics
- ♦ Different definitions of the concept of didactics
- ♦ Propose a classification of didactics

03

Course Management

TECH maintains a philosophy based on providing quality education within everyone's reach. This is a guarantee for the students who take this program, who will have at their disposal a program developed by real specialists in High School Education. In addition, thanks to his human quality and closeness, you will be able to solve any doubt you may have about the content of this Postgraduate Diploma university program.





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TECH has assembled an excellent team of professionals with extensive experience in the education sector to guide you, at all times, so that you can obtain optimal learning"

Management



Dr. Barboyón Combey, Laura

- ♦ Teacher of Primary Education and Postgraduate Studies
- ♦ Teacher in Postgraduate University Studies of High School Teacher Formation
- ♦ Teacher of Primary Education in several schools
- ♦ Doctor in Education from the University of Valencia
- ♦ Master's Degree in Psychopedagogy from the University of Valencia
- ♦ Degree in Primary School Education with a major in English Teaching from the Catholic University of Valencia San Vicente Mártir



04

Structure and Content

The syllabus of this university program has been prepared by a large team of professionals with extensive experience in the education sector. In this way, the students will have access to a syllabus structured in 3 modules that will lead them to know the most appropriate contents to be taught in High School Education, the methodology and teaching to be applied. All this, in addition, without investing a large amount of study hours, thanks to the Relearning system, used by TECH in all its programs.



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The case studies shown in this program will lead you to be able to integrate this methodology and teaching in your daily classes"

Module 1. Complements for the Disciplinary Formation in Physics and Chemistry

- 1.1. History of Chemistry
 - 1.1.1. Starting from the Beginning: Antiquity
 - 1.1.2. From the Middle Ages to the Renaissance and the Modern Age
 - 1.1.3. 19th Century Chemistry Teachers and the Chemical Industry
 - 1.1.4. Classification of the Elements
 - 1.1.5. What does History Tell Teachers?
 - 1.1.6. History of Science in the Classroom
 - 1.1.7. Classroom Proposal: The Development of Atomic Theory
- 1.2. History of Physics
 - 1.2.1. Classical Antiquity
 - 1.2.2. The Medieval
 - 1.2.3. From the Renaissance to the Baroque
 - 1.2.4. Enlightenment
 - 1.2.5. Liberalism
 - 1.2.6. The Present Era
 - 1.2.7. Role of the History of Physics in the Teaching of Physics
 - 1.2.8. Example of Activities with a Historical Approach
 - 1.2.9. Conclusions and Future Perspectives of Teaching through History
- 1.3. Physics and Chemistry in Technology and Society
 - 1.3.1. Is Science Necessary?
 - 1.3.2. Physics and its Advances for Society: The Electromagnetic Spectrum, Laser, and Fission and Fusion Processes
 - 1.3.3. Physics, Chemistry and Nanotechnology
 - 1.3.4. Chemistry in Food and Health
- 1.4. Impact of Physics and Chemistry on the Environment
 - 1.4.1. Environmental Health
 - 1.4.2. General Concepts about Contaminants
 - 1.4.3. Water Pollution
 - 1.4.4. Soil Pollution
 - 1.4.5. Atmospheric Pollution
 - 1.4.6. Waste Analysis
 - 1.4.7. Carbon Cycle
 - 1.4.8. Climate Change



- 1.5. Chemical Process, Risk, Green Chemistry, Biomass
 - 1.5.1. Chemical Process
 - 1.5.2. Green Chemistry
 - 1.5.3. Global Objectives of Sustainable Chemistry
 - 1.5.4. Example of Biomass
- 1.6. Everyday Situations for Physics and Chemistry: Problem Solving Examples
 - 1.6.1. The Origins, Historical Review
 - 1.6.2. Disconnection between Science and Everyday Life
 - 1.6.3. Development of Everyday Situations in the Context of Physics and Chemistry
 - 1.6.4. Elaboration and Sequencing of Sessions Based on the Development of Everyday Science in the Classroom
 - 1.6.5. Resources to be Used in the Application of Everyday Science
 - 1.6.6. Teaching through Problems
 - 1.6.7. Solving Everyday Chemistry Problems
 - 1.6.8. Solving Everyday Physics Problems
- 1.7. Educational and Cultural Value of Physics and Chemistry
 - 1.7.1. Science in ESO from the Perspective of Scientific Literacy
 - 1.7.2. Chemistry in the High School: for a Chemistry in Context, Historical Evolution
 - 1.7.3. Physics in the High School: For a More Attractive Physics
- 1.8. The laboratory of Physics and Chemistry
 - 1.8.1. Instruments and Laboratory Equipment
 - 1.8.2. Measurement of Experimental Quantities and Calculation of Errors
 - 1.8.3. Treatment of Experimental Results
 - 1.8.4. Magnitudes, Units and Symbols
 - 1.8.5. The Use of Sensors and Automatic Data Acquisition Equipment in Practical Work
 - 1.8.6. Examples of Laboratory Practices Using Sensors
 - 1.8.7. The Virtual Laboratory in Physics and Chemistry
- 1.9. Design of Didactic Experiments
 - 1.9.1. Critical Analysis of the Usual Laboratory Practices
 - 1.9.2. Laboratory Practices as Research
 - 1.9.3. An illustrative Example: The Study of the Fall of Bodies

- 1.10. Safety Rules in the Laboratory
 - 1.10.1. Laboratory Work Habits
 - 1.10.2. Handling and Storage of Chemical Products
 - 1.10.3. Procedures to be Followed in the Event of an Accident
 - 1.10.4. Waste Disposal and Management

Module 2. Physics and Chemistry Syllabus Design

- 2.1. Curriculum and its Structure
 - 2.1.1. School Syllabus: Concept and Components
 - 2.1.2. Curriculum Design: Concept, Structure and Functional Criteria
 - 2.1.3. Levels of Syllabus Specification
 - 2.1.4. Syllabus Model
 - 2.1.5. Educational Programming as a Working Tool in the Classroom
- 2.2. Analysis of the Syllabus in Relation to the Field of Sciences
 - 2.2.1. A Review of Educational Laws
 - 2.2.2. Types of Subjects According to the LOMCE
 - 2.2.3. The Organization of Compulsory High School Education in Relation to Sciences
 - 2.2.4. The Organization of the High School in Relation to Sciences
 - 2.2.5. The Organization of the Professional Training in Relation to Sciences
- 2.3. Didactic Programming I
 - 2.3.1. The Teaching Specialty
 - 2.3.2. Regarding the Autonomy of the Centers
 - 2.3.3. Annual General Programming
 - 2.3.4. Educational Projects at the Center
 - 2.3.5. Introduction to the Didactic Programming
 - 2.3.6. General Characteristics in Programming The Context
 - 2.3.7. Syllabus Elements: The Stage Objectives
 - 2.3.8. Science Contents in ESO
 - 2.3.9. Science Contents in High School

- 2.4. Didactic Programming II
 - 2.4.1. What is a Didactic Program: Justification, Characteristics and Functions?
 - 2.4.2. The Importance of the Context: Educational Center, Students and Social Environment
 - 2.4.3. Elements that Should be Part of Programming: Objectives, Methodology, Skills and Contents
 - 2.4.4. Skill Based Programming
 - 2.4.5. The Use of ICTs to Support Teaching Work
 - 2.4.6. Methods, Principles and Methodological Strategies
 - 2.4.7. Evaluation Criteria and Evaluable Learning Standards
- 2.5. Didactic Programming III Methodology, Design of Activities and Evaluation
 - 2.5.1. Elements that Should Be Part of Programming: The Evaluation
 - 2.5.2. Assessment Procedures, Criteria and Instruments
 - 2.5.3. Attention to Diversity
 - 2.5.4. What is to Evaluate?
 - 2.5.5. Evaluation Processes Competency-Based Assessment
 - 2.5.6. Assessment Criteria vs. Assessment Tools
- 2.6. The Didactic Unit Activities
 - 2.6.1. The Concepts and the Reality of the Student Ways of Approach
 - 2.6.2. Types of Activities
 - 2.6.3. The Temporalization
 - 2.6.4. Attention to Diversity
 - 2.6.5. The Research Model as Action
 - 2.6.6. Critical Reflection of the Teaching Activity
- 2.7. The Didactic Unit Exemplifying
 - 2.7.1. The Didactic Unit in ESO
 - 2.7.2. The Didactic Unit in High School
 - 2.7.3. Editorials and Teaching Work
- 2.8. Professional Formation
 - 2.8.1. Approach to Professional Formation as a Teacher
 - 2.8.2. Legislative Development of the Professional Formation
 - 2.8.3. Science Content in Professional Formation
 - 2.8.4. Programming in Professional Formation

Module 3. Physics and Chemistry Teaching

- 3.1. General Didactics and Science Didactics
 - 3.1.1. Origin and Evolution of Didactics
 - 3.1.2. Definition of Didactics
 - 3.1.3. Internal Classification of Didactics
 - 3.1.4. Learning to Teach Science: Science Didactics
 - 3.1.5. Objects of Study of Science Didactics
- 3.2. Learning Theories Applied to the Specialty of Physics and Chemistry
 - 3.2.1. Scientific Constructivism
 - 3.2.2. From Data to Concepts
 - 3.2.3. The Construction Processes of the Scientific Process
 - 3.2.4. Previous Ideas
 - 3.2.5. Alternative Conceptions
 - 3.2.6. Specific Difficulties in the Learning of Chemistry
 - 3.2.7. Specific Difficulties in the Learning of Physics
- 3.3. Learning Techniques and Strategies in Physics and Chemistry. Stages
 - 3.3.1. What Are Learning Strategies?
 - 3.3.2. Thinking Phases and Corresponding Strategies
 - 3.3.3. Conditioning or Supporting Strategies
 - 3.3.4. Acquisitive Stage Receptive Stage: Strategies for Information Acquisition and Selection
 - 3.3.5. Acquisitive Stage Reflective Phase: Strategies of Knowledge Organization and Comprehension
 - 3.3.6. Acquisitive Stage Retentive Stage: Memorization Strategies for the Storage and Retrieval of Knowledge
 - 3.3.7. Reactive Stage Extensive-Creative Phase: Inventive and Creative Strategies
 - 3.3.8. Reactive Stage Extensive-Reactive Phase: Strategies for Knowledge Transfer
 - 3.3.9. Reactive Stage Symbolic Expressive Phase: Strategies for Oral and Written Expression



- 3.4. Teaching Methodologies Models
 - 3.4.1. Didactic Models
 - 3.4.2. Traditional Model
 - 3.4.3. Discovery Teaching Model
 - 3.4.4. Expository Teaching Model
 - 3.4.5. Cognitive Conflict Teaching Model
 - 3.4.6. Guided Research Model
 - 3.4.7. Problem-Based Learning (PBL)
- 3.5. Activities for Learning the Subject Problem Solving and STS Approach
 - 3.5.1. Problem Definition
 - 3.5.2. Types of Problems
 - 3.5.3. Formal Thinking and Concrete Thinking
 - 3.5.4. How to Assist Students in Learning through Problems?
 - 3.5.5. How to Improve the Approach to Exercises?
 - 3.5.6. STS in Education
 - 3.5.7. Structure and Contents of Curricular Projects and Courses with an STS Approach
 - 3.5.8. The Role of the Teacher in STS Education
 - 3.5.9. Teaching-Learning Strategies in STS Education
 - 3.5.10. Contextualization of Some Activities
- 3.6. Didactic Resources
 - 3.6.1. .Why Perform Practical Work?
 - 3.6.2. Types of Practical Work
 - 3.6.3. Perceptual, Illustrative and Interpretative Experiences
 - 3.6.4. Practical Exercises: Method and Technique Learning and Theory illustration
 - 3.6.5. Investigations: Building Knowledge, Understanding the Processes of Science and Learning to Investigate
 - 3.6.6. The Textbook, the Material par Excellence
 - 3.6.7. Evaluating Curricular Materials, an Essential Requirement
 - 3.6.8. School Excursion as a Didactic Resource
 - 3.6.9. Initiatives for the Dissemination of Educational and Informative Experiences in Science

- 3.7. ICT Teaching Resources Applied to the Teaching of Physics and Chemistry
 - 3.7.1. ICT
 - 3.7.2. The Diversity of ICT for the Teaching of Physics and Chemistry
 - 3.7.3. What Can Be Expected from the Use of ICT in Physics and Chemistry Courses?
 - 3.7.4. What is Meant by Learning Physics and Chemistry through ICT?
 - 3.7.5. Which ICT to be Chosen for Each Occasion?
- 3.8. General Aspects of Assessment in High School Teaching and Professional Formation
 - 3.8.1. Evaluation: Concept and Basic Characteristics
 - 3.8.2. Why Evaluate?
 - 3.8.3. What to Assess?
 - 3.8.4. Evaluation Systems
 - 3.8.5. Types of Evaluations
 - 3.8.6. Educational Performance: Satisfactory vs. Sufficient
 - 3.8.7. Evaluation and Grading Criteria and Evaluable Learning Standards
 - 3.8.8. Evaluation Sessions
- 3.9. The Evaluation of the Learning in the Subjects of the Specialty of Physics and Chemistry
 - 3.9.1. Introduction to the Learning Evaluation Techniques and Instruments in Experimental Sciences
 - 3.9.2. Observation Techniques and Instruments
 - 3.9.3. Dialogues/Interviews
 - 3.9.4. Review of Class Work
 - 3.9.5. Tests
 - 3.9.6. Surveys/Questionnaires
 - 3.9.7. The Evaluation of Learning in the Subjects Assigned to the Specialty of Physics and Chemistry in ESO, High School and Professional Formation
- 3.10. Teachers in the Classroom: How to Create an Appropriate Place for Teaching-Learning?
 - 3.10.1. The Good Development of the Classroom
 - 3.10.2. The Motivating Teacher
 - 3.10.3. Coexistence and Education in Values and Virtues
 - 3.10.4. Knowledge of the Didactics of Experimental Sciences
 - 3.10.5. Physics and Chemistry Teaching as a Research Activity





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Do you want to program a brilliant didactic unit for your Vocational Training students? This program provides you with tools and examples that will help you in your day-to-day work"

05

Methodology

This training program offers 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.





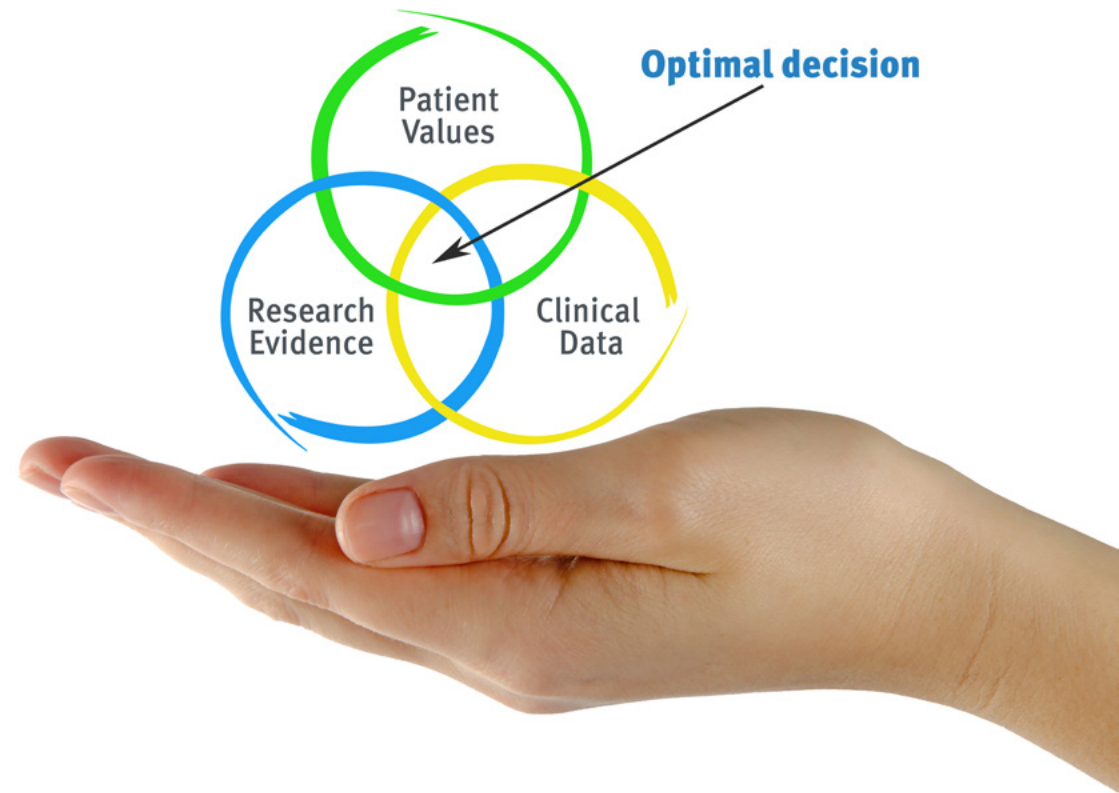
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Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

At TECH Education School we use the Case Method

In a given situation, what should a professional do? Throughout the program students will be presented with multiple simulated cases based on real situations, where they will have to investigate, establish hypotheses and, finally, resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method.

With TECH, educators can experience a learning methodology that is shaking the foundations of traditional universities around the world.



It is a technique that develops critical skills and prepares educators to make decisions, defend their arguments, and contrast opinions.

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Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method”

The effectiveness of the method is justified by four fundamental achievements:

1. Educators who follow this method not only grasp concepts, but also develop their mental capacity, by evaluating real situations and applying their knowledge.
2. The learning process is solidly focused on practical skills that allow educators to better integrate the knowledge into daily practice.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life teaching.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



Relearning Methodology

At TECH we enhance the case method with the best 100% online teaching methodology available: Relearning.

Our University is the first in the world to combine case studies with a 100% online learning system based on repetition, combining a minimum of 8 different elements in each lesson, which represent a real revolution with respect to simply studying and analyzing cases.

Educators will learn through real cases and by solving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.



At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

With this methodology we have trained more than 85,000 educators with unprecedented success in all specialties. 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 specialization, developing a critical mindset,
defending arguments, and contrasting opinions:
a direct equation to success.*

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.

The overall score obtained by our learning system is 8.01, according to the highest international standards.



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



Study Material

All teaching material is produced by the specialist educators who teach the course, specifically for the course, so that the teaching content is really 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.



Educational Techniques and Procedures on Video

TECH introduces students to the latest techniques, with the latest educational advances, and to the forefront of Education. All this, first-hand, with the maximum rigor, explained and detailed for your assimilation and understanding. And best of all, you can watch them as many times as you want.



Interactive Summaries

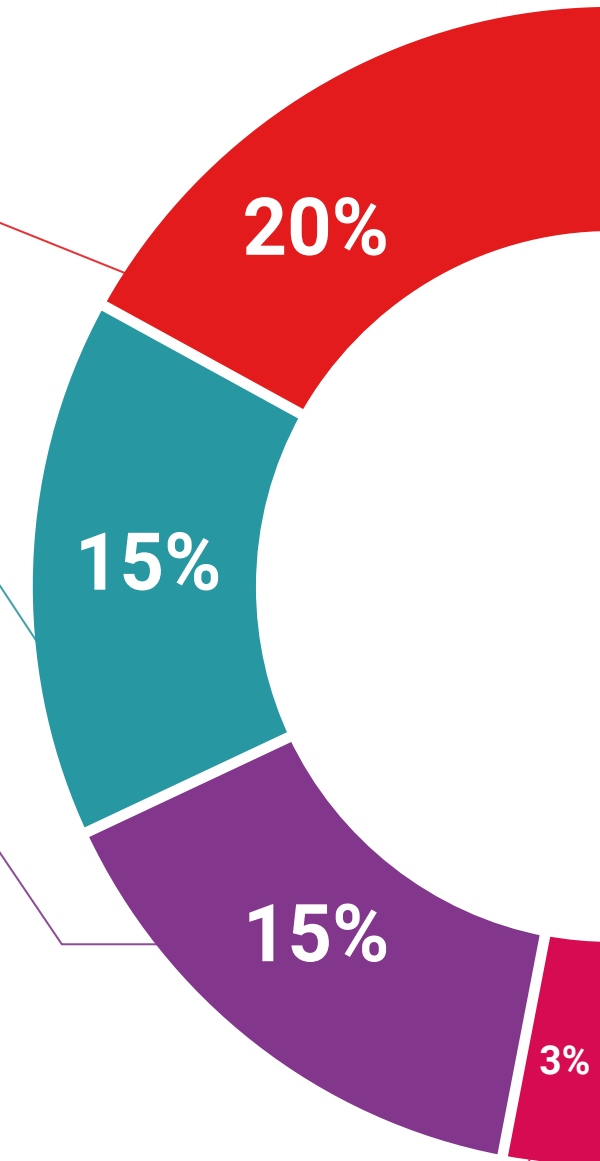
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

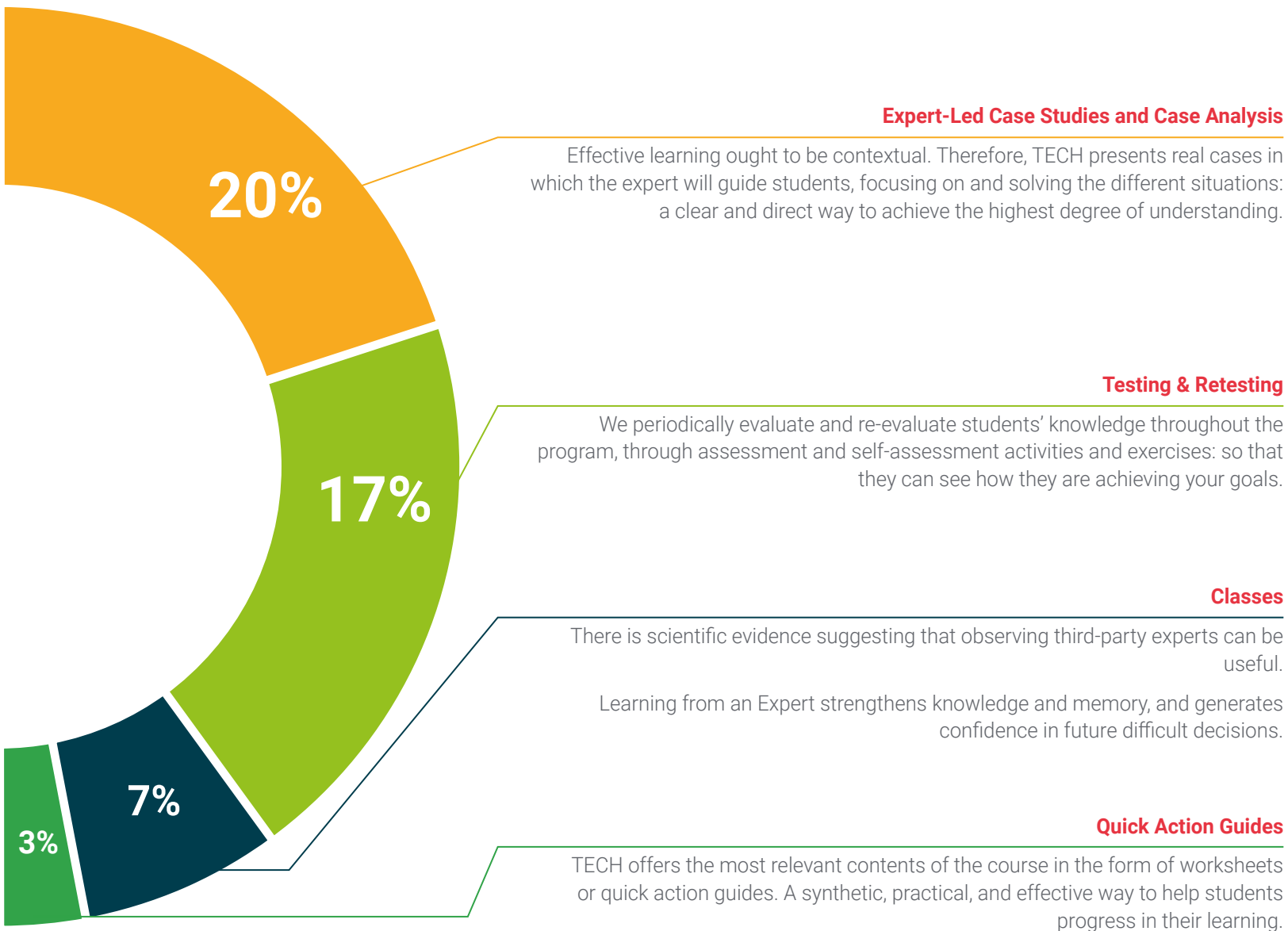
This exclusive multimedia content presentation training Exclusive system was awarded by Microsoft as a "European Success Story".



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.





06

Certificate

The Postgraduate Diploma in Physics and Chemistry Teacher Training in High School Education 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 Diploma in Physics and Chemistry Teacher Training in High School Education** 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 Diploma in Physics and Chemistry Teacher Training in High School Education**

Modality: **online**

Duration: **6 months**

Accreditation: **18 ECTS**





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