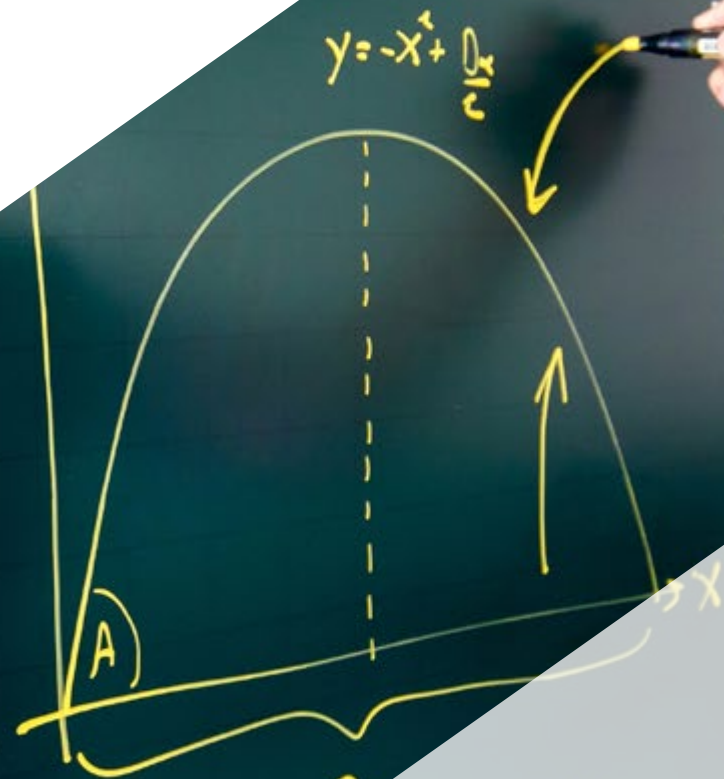


# Postgraduate Certificate Problem-Based Learning in Mathematics

$$\frac{\sin^2 A}{29}$$



Thm If  $f$  is continuous on a closed interval  $[a, b]$  there is a maximum and a minimum value of  $f$  on the open interval  $(a, b)$ .



## Postgraduate Certificate Problem-Based Learning in Mathematics

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Global University
- » Credits: 5 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/education/postgraduate-certificate/problem-based-learning-mathematics](http://www.techtute.com/us/education/postgraduate-certificate/problem-based-learning-mathematics)

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# 01

# Introduction

Currently, there is a methodological renovation that takes "experiential" learning as a starting point, where students are involved in solving a problem in a situation that can happen in their real environment. The students' involvement is maximum and they acquire knowledge in a much more natural way. Therefore, Problem-Based Learning has become very popular in the educational world, and its use in the field of Mathematics is very appropriate. This is the reason for the creation of this program, which provides teachers with the most advanced syllabus on the planning, development and application of PBL in the classroom. All of this, in addition, with advanced multimedia content 100% online, which is easily accessible from any electronic device with an internet connection.





“

*Discover with TECH how to bring Problem Based Learning to your Mathematics lessons and apply it successfully at different educational levels”*

The new educational systems seek innovation in learning processes, moving away from the master class to bet on the active participation of students, encouraging discovery, research or problem solving. And it is in this last method where positive results have been achieved in the field of Mathematics.

Problem-Based Learning leads the students to get involved in the search for a solution to a situation posed by the teacher in the classroom and that may be familiar to them because it happens in a real and close context. Bringing this methodology successfully to the classroom is the main objective of this Postgraduate Certificate created by TECH for teaching professionals who wish to improve their didactics.

An advanced program consisting of a syllabus developed by an excellent team of professionals with a teaching vocation and experts in teaching methodologies. In this way, graduates will have access to content that will allow them to learn about the characteristics, pros and cons of PBL, as well as how to apply it in their lessons.

They will also have access to attractive multimedia content, with specialized readings and practical examples that they will be able to transfer directly to their daily work in the classroom. You will also have access to this material at any time of the day, from an electronic device with an Internet connection.

An unique opportunity to progress in the world of teaching through an advanced university program that is flexible and compatible with the most demanding responsibilities. With no classroom attendance or classes with fixed schedules, students have the freedom to self-manage their study time and combine it with their work and personal activities.

This **Postgraduate Certificate in Problem-Based Learning in Mathematics** contains the most complete and up-to-date program on the market. The most important features include:

- ♦ The examination of case studies presented by experts in High School Mathematics Teaching
- ♦ The graphic, schematic and practical contents of the book provide technical and practical information on those disciplines that are essential for professional practice
- ♦ Practical exercises where self-assessment can be used 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



*Enhance your teaching work by applying the most innovative methodology and improve the concept that your students have about Mathematics”*

“Access the practical examples of PBL offered by this 100% online Postgraduate certificate whenever you want”

*With this program you will not invest a lot of study hours, the Relearning method facilitates the learning of key concepts.*

*You will see the pros and cons of using PBL by adopting the appropriate approach to improve your students' learning.*

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 the professional must try to solve the different professional practice situations that arise during the academic year. For this purpose, students will be assisted by an innovative, interactive video system created by renowned and experienced experts.



# 02

# Objectives

This Postgraduate Certificate will enable mathematics teachers to design their classroom sessions from start to finish using the Problem-Based Learning methodology. In order to achieve this objective, the students have an advanced syllabus that delves into the main characteristics and provides the techniques and resources they need to put it into practice. In addition, there are examples that will help them to apply it directly in their lessons.







“

*Inquire at your leisure into the small group teaching model promulgated by Exley and Dennick”*



## General Objectives

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- ◆ Know the different types of innovative learning methodologies in education applied to Mathematics
- ◆ Know how to apply the different types of innovative learning methodologies in education to Mathematics
- ◆ Know how to discern which is the most appropriate innovative learning method for a group of students studying mathematics in High School
- ◆ Learn to design a didactic unit using the different methodologies of innovation in mathematics education





## Specific Objectives

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- ◆ Learn what Problem-Based Learning (PBL) in mathematics is
- ◆ Know the features of PBL in mathematics
- ◆ Learn how to plan a mathematics PBL
- ◆ Learn how to design mathematics PBL
- ◆ Know what the student's role is in mathematics PBL
- ◆ Know what the teacher's role is in mathematics PBL
- ◆ Learn how to assess in mathematics PBL
- ◆ Learn how to design PBL applied to mathematics
- ◆ Know how to extrapolate a PBL example to any content of the mathematics curriculum
- ◆ Be aware of the different ICT resources for mathematics PBL



*Take the step to catch up on the latest news on the current use of Problem-Based Learning in Mathematics”*

03

# Course Management

In this Postgraduate Certificate, the students will have at their disposal a teaching team with a wide experience in the teaching sector and expert in High Capacities and new methodologies. In this way, they will obtain the most current knowledge about Problem Based Learning, its benefits and different applications in the teaching of the subject Mathematics in High School.





“

*You have a teaching team with a vocation for teaching and involved in new learning methodologies”*

## Management



### Mr. Jurado Blanco, Juan

- ♦ Secondary School Teacher and Industrial Electronics Expert
- ♦ Mathematics and Informatics teacher in Compulsory Secondary Education at Santa Teresa de Jesús School in Vilanova and Geltrú.) Spain
- ♦ Expert in High Abilities
- ♦ Industrial Technical Engineer with Specialization in Industrial Electronics



## Professors

### Dr. Sánchez García, Manuel

- ♦ Teacher of Compulsory Secondary Education
- ♦ Mathematics teacher in Compulsory Secondary Education at Santa Teresa de Jesús School in Vilanova i la Geltrú
- ♦ Vocational Training and Language Teaching
- ♦ Health Biology Specialty
- ♦ Master's Degree in Teacher Training for Compulsory Secondary and High School Education
- ♦ Degree in Biology

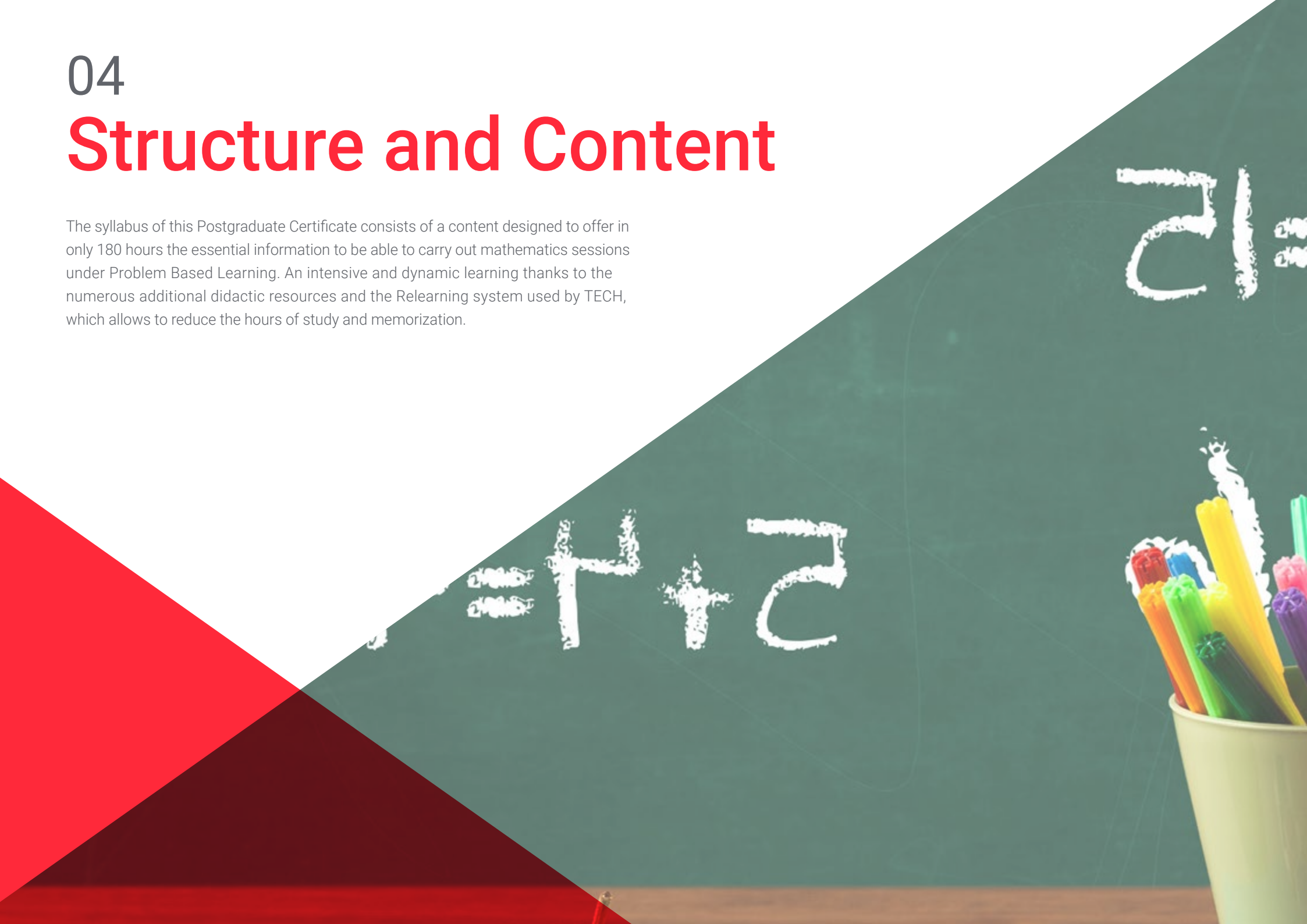
### Dr. De la Serna, Juan Moisés

- ♦ Psychologist and Writer expert in Neurosciences
- ♦ Writer specializing in Psychology and Neurosciences
- ♦ Author of the Open Chair in Psychology and Neurosciences
- ♦ Scientific disseminator
- ♦ PhD in Psychology
- ♦ Degree in Psychology. University of Seville
- ♦ Master's Degree in Neurosciences and Behavioral Biology Pablo de Olavide University, Seville
- ♦ Expert in Teaching Methodology. La Salle University
- ♦ University Specialist in Clinical Hypnosis, Hypnotherapy. National University of Distance Education - UNED
- ♦ Diploma in Social Graduate, Human Resources Management, Personnel Administration. University of Seville
- ♦ Expert in Project Management, Administration and Business Management
- ♦ Federation of Services U.G.T
- ♦ Trainer of Trainers. Official College of Psychologists of Andalusia

04

# Structure and Content

The syllabus of this Postgraduate Certificate consists of a content designed to offer in only 180 hours the essential information to be able to carry out mathematics sessions under Problem Based Learning. An intensive and dynamic learning thanks to the numerous additional didactic resources and the Relearning system used by TECH, which allows to reduce the hours of study and memorization.





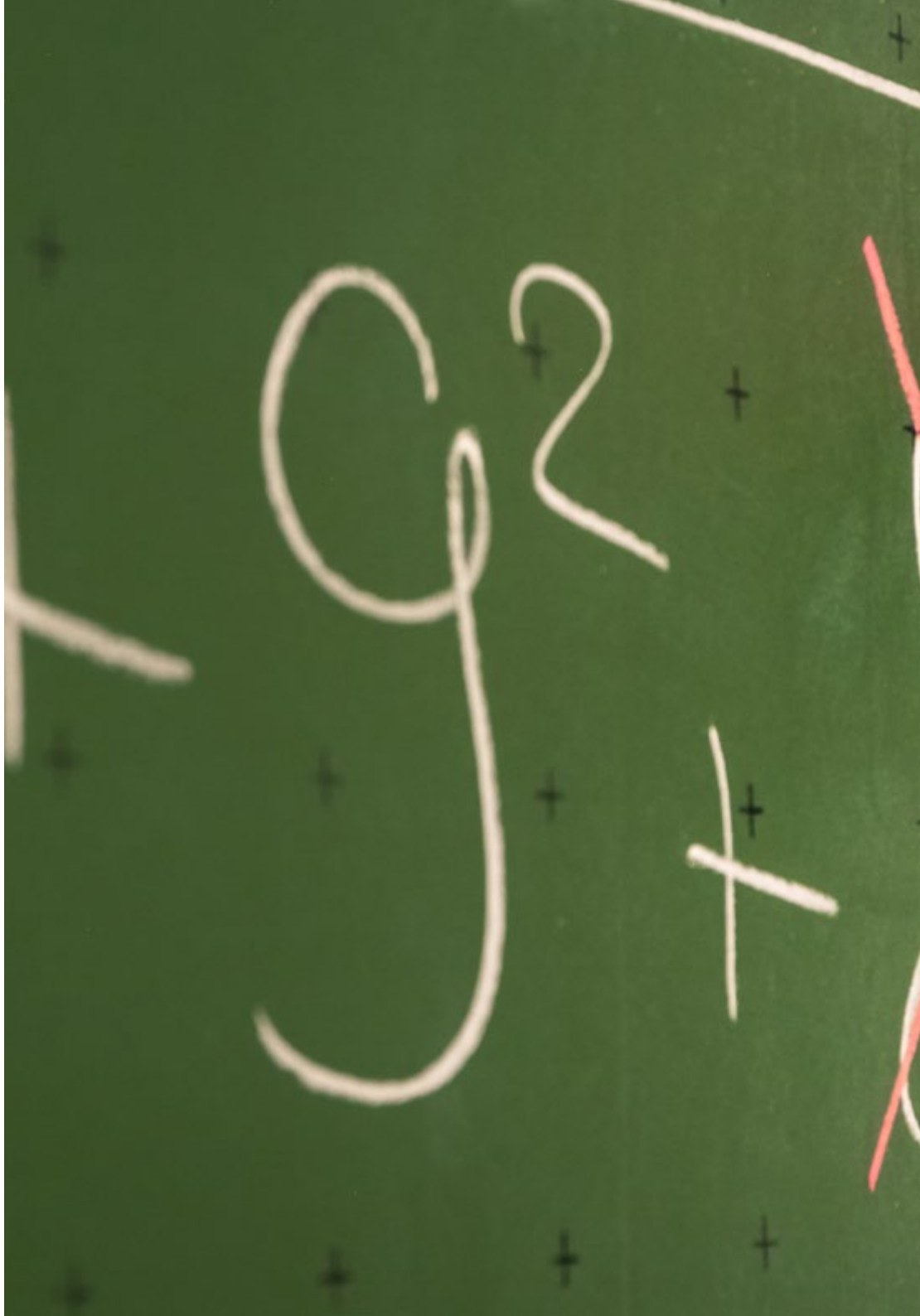


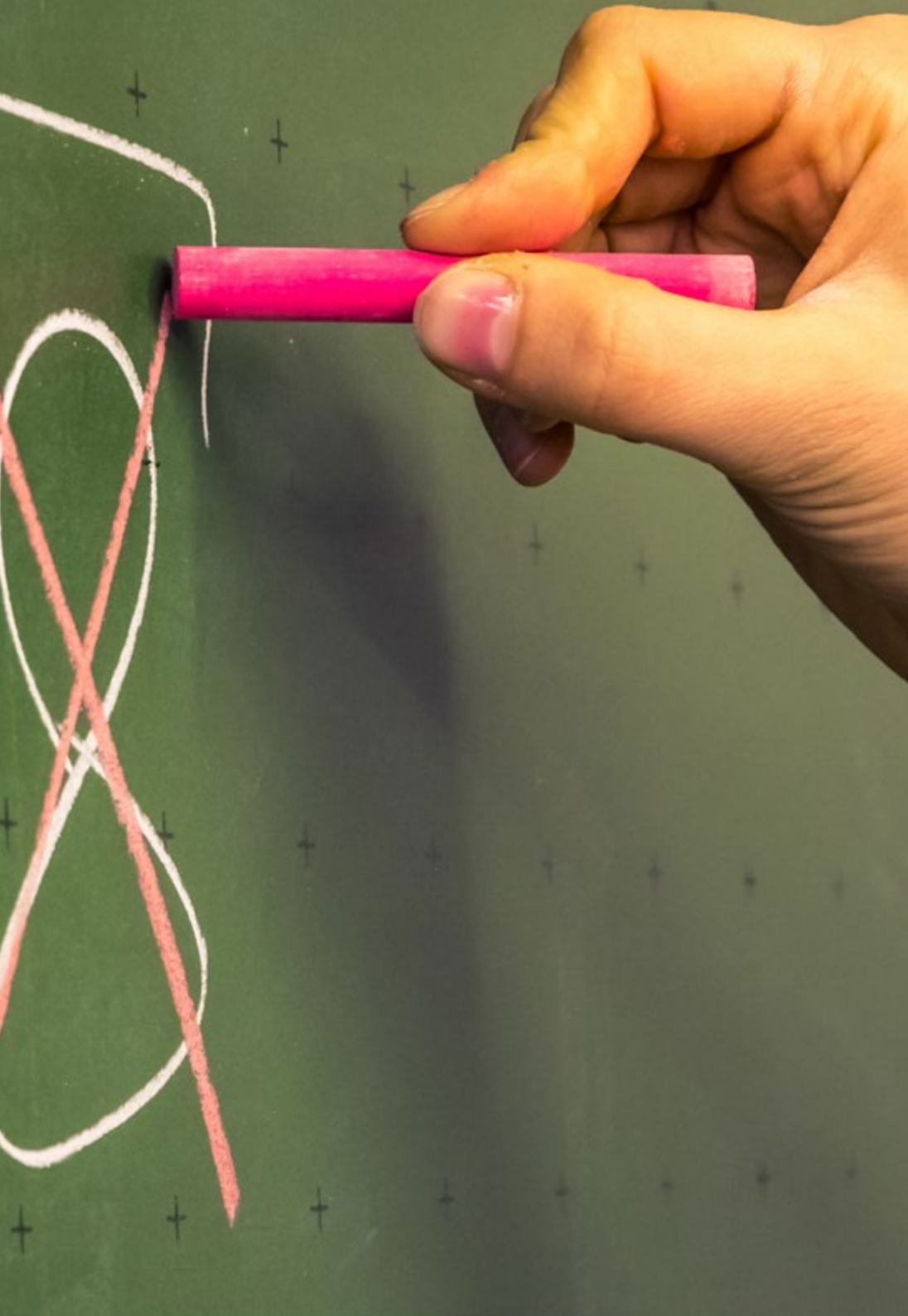
“

*A syllabus that will allow you to design your math lessons based on Problem-Based Learning”*

## Module 1. Problem-Based Learning (PBL) in Mathematics

- 1.1. What is a PBL?
  - 1.1.1. Problem-Based Learning or Project-Based Learning?
    - 1.1.1.1. Problem-Based Learning
    - 1.1.1.2. Project-based Learning
- 1.2. Features of PBL in Mathematics
  - 1.2.1. Features, Pros and Cons of Master Classes
    - 1.2.1.1. Features
    - 1.2.1.2. Positive Aspects
    - 1.2.1.3. Negative Aspects
  - 1.2.2. Features, Advantages and Disadvantages of PBL
    - 1.2.2.1. Features
    - 1.2.2.2. Positive Aspects
    - 1.2.2.3. Negative Aspects
- 1.3. Planning PBL in Mathematics
  - 1.3.1. What is a Problem?
  - 1.3.2. Criteria for Developing PBL problems
  - 1.3.3. Variants of PBL
    - 1.3.3.1. PBL for 60 Students (Hong Kong)
    - 1.3.3.2. PBL 4x4
  - 1.3.4. Methodology
    - 1.3.4.1. Group Formation
    - 1.3.4.2. Planning and Design of PBL
  - 1.3.5. Design of PBL in Mathematics
- 1.4. Development of PBL in Mathematics
  - 1.4.1. Evolution of Group in the PBL
  - 1.4.2. Steps to be Taken by Students in the Development of PBL
    - 1.4.2.1. General Process for Students
    - 1.4.2.2. Process Established by Morales and Landa (2004)
    - 1.4.2.3. Process Established by Exley and Dennick (2007)
  - 1.4.3. Use of Researched Information





- 1.5. Role of the Teacher and the Student
  - 1.5.1. The Role Played by Teachers in PBL
  - 1.5.2. Tutor's Manner of Guiding/Counselling
  - 1.5.3. Use of Researched Information
  - 1.5.4. The Role Played by Students in PBL
  - 1.5.5. Student Roles in PBL
- 1.6. Assessment of PBL in Mathematics
  - 1.6.1. Student Assessment
  - 1.6.2. Teacher Evaluation
  - 1.6.3. PBL Assessment (Process)
  - 1.6.4. Assessment of Process Outcome
  - 1.6.5. Assessment Techniques
- 1.7. Example of PBL Applied to Mathematics.
  - 1.7.1. Planning or Design of PBL
    - 1.7.1.1. Phases of the PBL Design
    - 1.7.1.2. Application Phases of PBL Design
  - 1.7.2. Group Determination
  - 1.7.3. Role of the Teacher
  - 1.7.4. Work Process with Students
  - 1.7.5. Evaluation of PBL

“ A 100% online Postgraduate Certificate with the most innovative multimedia didactic resources in the educational panorama”

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.





“

*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.*

“

*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.





#### Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, TECH presents real cases in which the expert will guide students, focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.



#### 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 your goals.



#### 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.



#### Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical, and effective way to help students progress in their learning.



06

# Certificate

The Postgraduate Certificate in Problem-Based Learning in Mathematics guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.



“

*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 Problem-Based Learning in Mathematics** 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.

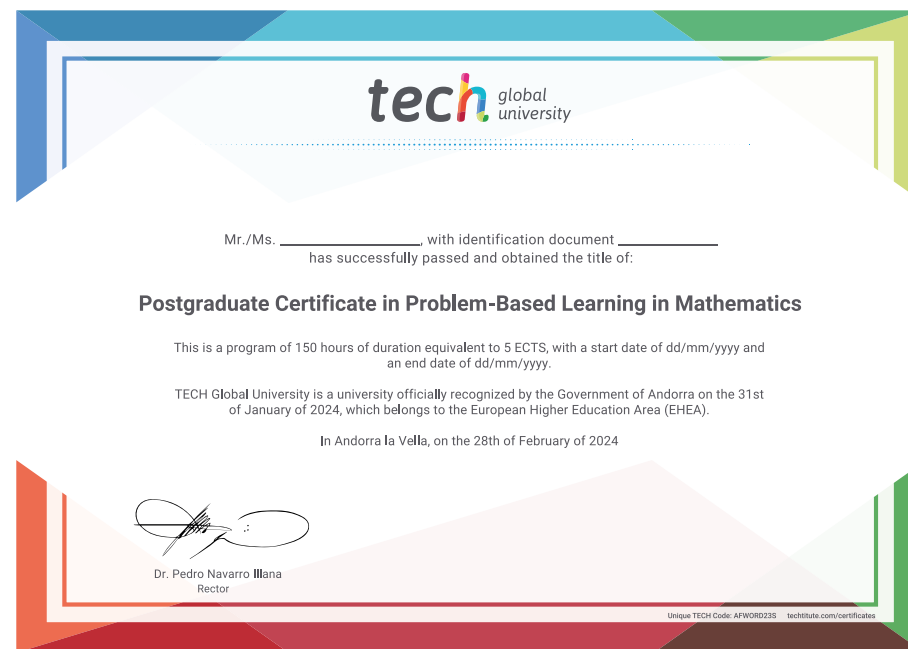
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Problem-Based Learning in Mathematics**

Modality: **online**

Duration: **6 weeks**

Accreditation: **5 ECTS**



\*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present  
development languages  
virtual classroom



Postgraduate Certificate  
Problem-Based Learning  
in Mathematics

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Global University
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# Postgraduate Certificate Problem-Based Learning in Mathematics

