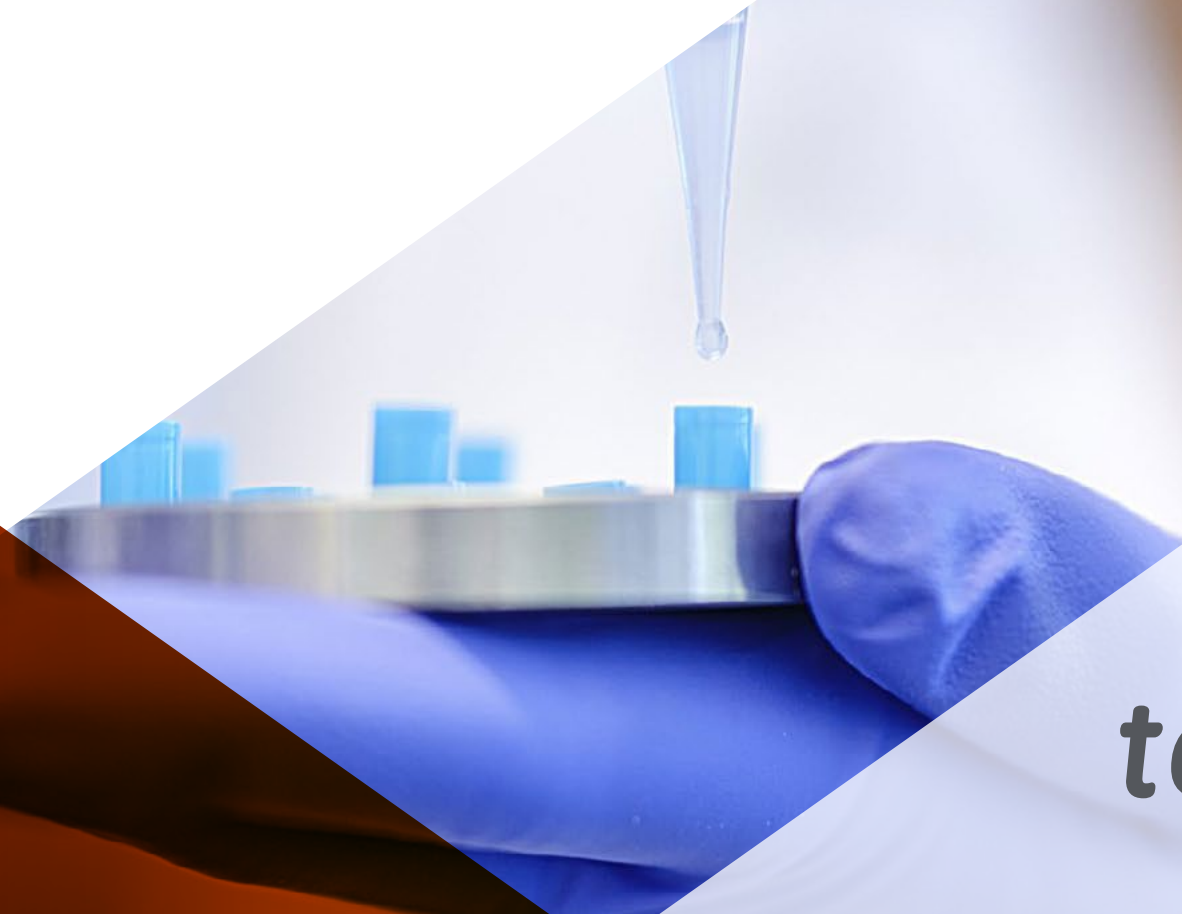


# Postgraduate Certificate

## Modeling and Formulation of Industrial Chemical Processes





## Postgraduate Certificate Modeling and Formulation of Industrial Chemical Processes

- » Modality: **online**
- » Duration: **6 weeks**
- » Certificate: **TECH Technological University**
- » Dedication: **16h/week**
- » Schedule: **at your own pace**
- » Exams: **online**

Website: [www.techtute.com/in/engineering/postgraduate-certificate/modeling-formulation-industrial-chemical-processes](http://www.techtute.com/in/engineering/postgraduate-certificate/modeling-formulation-industrial-chemical-processes)

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# 01

# Introduction

Improved resource efficiency in the Chemical Industry is largely due to the use of data-based modeling, real-time simulation, and continuous process improvement. This is coupled with innovation in the formulation of industrial chemical processes that favor sustainability. In this context, this 100% online program offers the engineering professional advanced knowledge on the progress in modeling, simulation software used, or the tools used for energy optimization. All this, thanks to the numerous teaching materials developed by an excellent faculty with extensive experience in the sector and accessible 24 hours a day, 7 days a week.





*A 100% online intensive program  
in Modeling and Formulation of  
Industrial Chemical Processes"*

For the sake of sustainability, optimization, and simulation of chemical processes, the engineering professional must be aware of the improvement of techniques, the digital tools used in simulation, as well as the current paradigm of the sector in the face of multi-product plants. Given this scenario, TECH has developed this Postgraduate Certificate in Modeling and Formulation of Industrial Chemical Processes of 150 teaching hours.

It is a 6-week program with a syllabus designed and developed by a team of specialists with extensive experience in the sector and in the field of scientific research. In this way, students will delve into simulation software such as Aspen plus, Aspen hysys, Unisim, Matlab, or COMSOL. In addition, you will explore the possibilities of retrofitting existing conventional plants into multi-product plants or delve into the Pinch method and its advantages.

Furthermore, thanks to the Relearning method, based on the reiteration of content, the graduate will reduce the long hours of study and memorization, reinforcing the key concepts in a simple way. In addition, this teaching will gain dynamism with high-quality teaching resources such as multimedia pills or case studies.

This **Postgraduate Certificate in Modeling and Formulation of Industrial Chemical Processes** contains the most complete and up-to-date program on the market. The most important features include:

- ◆ The development of practical cases presented by experts in Chemistry 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 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



*Delve with the best teaching material into the possibilities of remodeling existing conventional plants into multi-product plants"*

“

*This program will take you deeper into the concept of multi-product plants, highlighting the advantages of these in the current industry paradigm"*

*This is a program that allows you to self-manage your study time and make it compatible with your daily activities. Enroll now.*

*Get the most rigorous and current information on simulation techniques in unit operations in the Chemical Industry.*

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 educational year. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.



# 02

# Objectives

The goal of this Postgraduate Certificate is to provide high school students with an education in simulation and optimization of chemical processes. Therefore, at the end of the 6-week program, the graduate will have mastered the essential tools and strategies to improve efficiency and effectiveness in the chemical industry. To this end, TECH provides the most advanced pedagogical tools, in which this institution has employed the latest technology applied to higher education.







“

*Analyze the different simulation and optimization software for chemical processes and expand your digital skills with TECH”*



## General Objectives

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- ◆ Analyze optimization techniques and simulation of chemical processes
- ◆ Apply simulation techniques to common unit operations in the chemical industry
- ◆ Examine the multi-product industry and strategies for its optimization

“

*The Relearning methodology will allow you to obtain advanced learning in Formulation of industrial chemical processes without investing long hours of study"*





## Specific Objectives

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- ◆ Establish the basis for the optimization of chemical processes
- ◆ Establish the Pinch method as a key tool for energy management
- ◆ Use optimization methods under uncertainty
- ◆ Examine chemical process simulation and optimization software
- ◆ Simulate essential separation operations in the chemical industry
- ◆ Perform simulations of heat exchange networks
- ◆ Expose the fundamental aspects of multi-product plants

03

# Course Management

TECH's philosophy is based on offering students a high-quality learning that is accessible to all. For this reason, it carefully selects the faculty that integrates each of its programs. In this way, the students will have the guarantee of achieving a high-level of education from the hands of authentic experts with experience in the sector. In addition to all this, the proximity of the teaching staff will allow you to resolve any doubts you may have about the content of the Postgraduate Certificate throughout its development.



“

*Get a complete update on energy optimization from the expert faculty that make up this program”*

## Management



### Dr. Barroso Martín, Isabel

- ♦ Expert in Inorganic Chemistry, Crystallography and Mineralogy
- ♦ Postdoctoral researcher of the I Own Research and Transfer Plan of the University of Málaga
- ♦ Research Staff at the University of Málaga
- ♦ ORACLE Programmer in CMV Consultants Accenture
- ♦ PhD in Sciences from the University of Málaga
- ♦ Master's Degree in Applied Chemistry - specialization in materials characterization - from the University of Málaga
- ♦ Master's Degree in SE, High School, Vocational Training, and Language Teaching - specializing in Physics and Chemistry University of Malaga

## Professors

### Mr. Montaña, Maia

- ♦ Postdoctoral Researcher at the Department of Chemical, Energetic, and Mechanical Technology of the Rey Juan Carlos University
- ♦ Interim Assistant at the Department of Chemical Engineering, School of Engineering, La Plata National University
- ♦ Collaborating teacher in the course "Introduction to Chemical Engineering"
- ♦ Teaching tutor at the La Plata National University
- ♦ PhD in Chemistry from the La Plata National University
- ♦ Graduate in Chemical Engineering from the La Plata National University



04

# Structure and Content

The syllabus of this university program will lead students to delve into process optimization, the use of the most sophisticated simulation and design tools, as well as understanding the importance of energy optimization and multi-product plants in the Chemical Industry. Intensive learning that is also engaging thanks to high-quality multimedia teaching tools, case studies, and specialized readings.







“

*A Virtual Library is available 24 hours a day, 7 days a week. Access it from any electronic device with an Internet connection”*

## Module 1. Chemical Process Simulation and Optimization

- 1.1. Optimization of Chemical Processes
  - 1.1.1. Heuristic Rules in Optimization of Processes
  - 1.1.2. Determination of Degrees of Freedom
  - 1.1.3. Selection of Design Variables
- 1.2. Energy Optimization
  - 1.2.1. Pinch Method Advantages
  - 1.2.2. Thermodynamic Effects Influencing Optimization
  - 1.2.3. Cascade Diagrams
  - 1.2.4. Enthalpy-Temperature Diagrams
  - 1.2.5. Corollaries of the Pinch Method
- 1.3. Optimization Under Uncertainty
  - 1.3.1. Linear Programming (LP)
  - 1.3.2. Graphical Methods and Simplex Algorithm in LP
  - 1.3.3. Non-Linear Programming
  - 1.3.4. Numerical Methods for the Optimization of Nonlinear Problems
- 1.4. Simulation of Chemical Processes
  - 1.4.1. Simulated Process Design
  - 1.4.2. Property Estimation
  - 1.4.3. Thermodynamic Packages
- 1.5. Software for Chemical Process Simulation and Optimization
  - 1.5.1. Aspen plus and Aspen hysys
  - 1.5.2. Unisim
  - 1.5.3. Matlab
  - 1.5.4. COMSOL
- 1.6. Simulation of Separation Operations
  - 1.6.1. Marginal Steam Flow Rate Method for Rectification Columns
  - 1.6.2. Rectifying Columns with Thermal Coupling
  - 1.6.3. Empirical Method for the Design of Multicomponent Columns
  - 1.6.4. Calculation of the Number Minimally of Plates





- 1.7. Heat Exchanger Simulation
  - 1.7.1. Simulation of a Shell and Tube Heat Exchanger
  - 1.7.2. Heads on Heat Exchangers
  - 1.7.3. Configurations and Variables to be Defined in Heat Exchanger Design
- 1.8. Reactor Simulation
  - 1.8.1. Ideal Reactor Simulation
  - 1.8.2. Multiple Reactor Systems Simulation
  - 1.8.3. Reacting or Equilibrium Reactor Simulation
- 1.9. Multi-Product Plants Design
  - 1.9.1. Multi-Product Plant
  - 1.9.2. Multi-Product Plants Advantages
  - 1.9.3. Multi-Product Plants Design
- 1.10. Multi-Product Plants Optimization
  - 1.10.1. Factors Affecting Optimization Efficiency
  - 1.10.2. Factorial Design Applied to Multiproduct Plants
  - 1.10.3. Optimization of Equipment Size
  - 1.10.4. Remodeling of Existing Plants

“*Delve into strategies for optimizing multi-product plants from the comfort of your home*”

05

# 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.





“

*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.

“

*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.



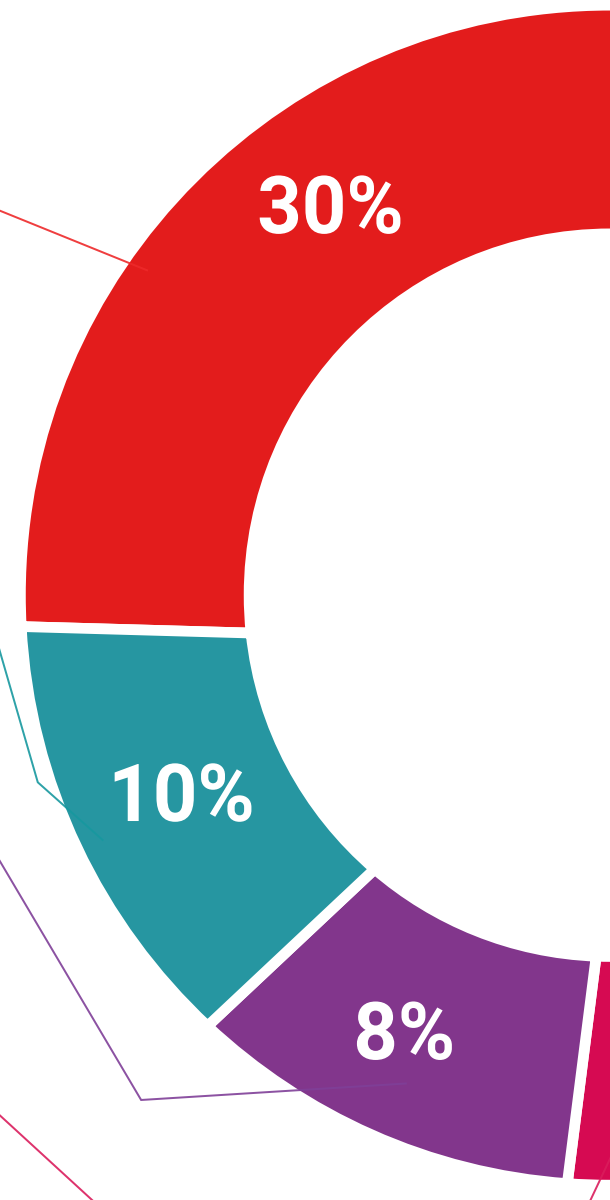
### Practising Skills and Abilities

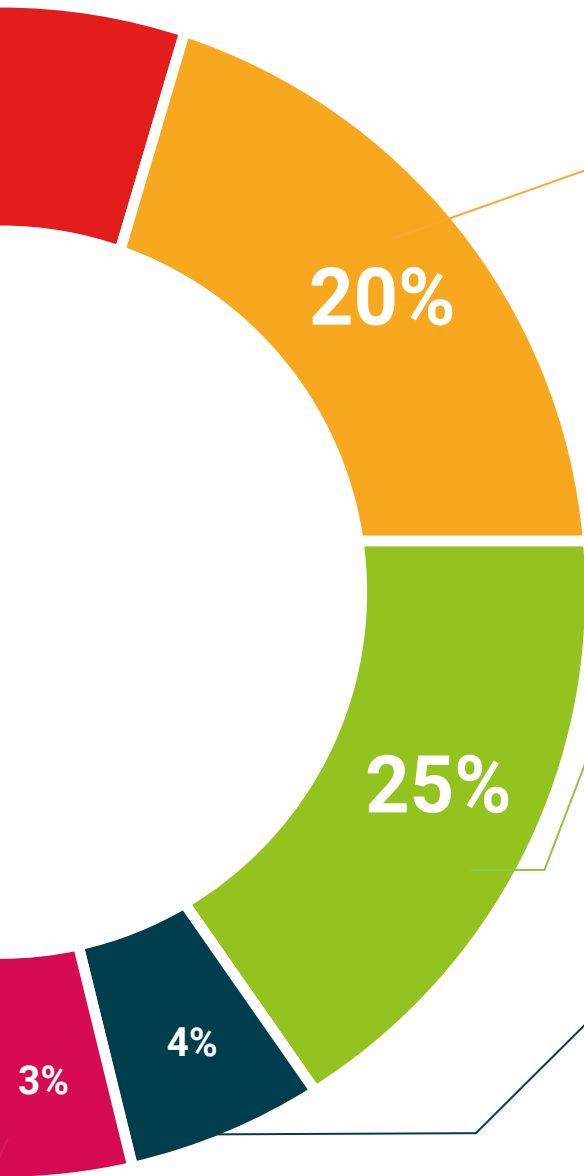
They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



### 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.



06

# Certificate

The Postgraduate Certificate in Modeling and Formulation of Industrial Chemical Processes guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.



“

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

This **Postgraduate Certificate in Modeling and Formulation of Industrial Chemical Processes** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** via tracked delivery\*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Certificate in Modeling and Formulation of Industrial Chemical Processes**

Official N° of Hours: **150 h.**



\*Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH EDUCATION 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

**tech** technological  
university

personalized service innovation

knowledge present

online training

development languages

virtual classroom

## Postgraduate Certificate

Modeling and Formulation  
of Industrial Chemical  
Processes

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

# Postgraduate Certificate

## Modeling and Formulation of Industrial Chemical Processes