

# Postgraduate Certificate Mathematical Methods and Operations Research



Presenter:



## Postgraduate Certificate Mathematical Methods and Operations Research

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

Website: [www.techtitute.com/pk/engineering/postgraduate-certificate/mathematical-methods-operations-research](http://www.techtitute.com/pk/engineering/postgraduate-certificate/mathematical-methods-operations-research)

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# 01

# Introduction

With the amazing technological advances and the implementation of algorithms in different systems, there is an increasing demand for professionals with outstanding knowledge in the analysis, development and understanding of data to streamline and optimize decision making in industrial and productive processes, in search of efficiency and that everything translates into profit. Meeting these sector requirements demands specific training programs such as this one, which are essential for updating the professional who works in the industrial sector. With a 100% online modality, based on the most innovative Relearning methodology, achievable in 6 weeks.





*Acquire an updated knowledge in  
Mathematical Methods and Operations  
Research in 6 weeks and 100% online"*

Today's organizational environments require effective and evolved processes that reduce risks and increase benefits. With the correct application of research techniques in company operations, it is possible for managers to build effective systems that are based on complete data, consideration of all possible alternatives, careful prediction of results and the use of decision tools and techniques.

Apply mathematical functions in decision making for the optimization of resources in concrete cases, with the objective of solving organizational problems, applying observation, simulation and probability; requires specific knowledge in mathematical methods and operational research. The use of professional specialists undoubtedly helps companies to achieve more complete data sets, consider all available options, predict all possible outcomes and estimate risk.

Therefore, this training lends itself to achieve the objective, through the most avant-garde methodology of the online university environment, powered by TECH. A total of 150 hours of learning based on relearning, with a variety of multimedia resources and theoretical and practical content formats, available from the first day to facilitate and dynamize the learning process.

This **Postgraduate Certificate in Mathematical Methods and Operations Research** 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 industrial 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
- ◆ The availability of access to content from any fixed or portable device with an Internet connection



*As a professional capable of developing innovative solutions through Mathematical Methods and Operations Research, countless job opportunities will come your way. Enroll now and stand out"*

“

*You will be able to use computer tools applied to operations research problem solving”*

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 immersive 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.

*The ease of studying from wherever, however and whenever you want.*

*Learn to interpret quantitative results for economic and management decision making in proposed situations.*





# 02

# Objectives

The update program aims to provide the student with the necessary knowledge to understand the fundamentals of operational processes, calculations and tools necessary for the advanced solution of timely problems in the operation of the company and preventive analysis to be taken into account, applying mathematical reasoning appropriate to Industry 4.0 in specific contexts. Combining the most advanced technology and 100% online study methodology.







“

*Adjustments in industrial processes are on the agenda, update yourself with this Postgraduate Certificate in Mathematical Methods and Operations Research"*



## General Objectives

- ◆ Obtain knowledge about the operational research of the company
- ◆ Understand the fundamentals of business mathematics and its appropriate use in the company's operations
- ◆ Delve deeper into statistical fundamentals to apply them to make company operational processes more effective
- ◆ Understand in the scientific method in research to find advanced solutions to problems
- ◆ Delve into computer tools applied to the resolution of operational research problems in business
- ◆ Advance in organizational problem solving by applying the necessary calculations and tools according to current market demand

“TECH provides you with multiple resources for training that is in high demand in today's labor market. Enroll now”





## Specific objectives

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- ◆ Identify the applications of mathematical reasoning in industrial engineering
- ◆ Apply the mathematical reasoning in industrial engineering to the company in proposed situations
- ◆ Identify phases and techniques in operations research and their application
- ◆ Apply mathematical functions in decision making to optimize resources in specific cases
- ◆ Interpret quantitative results for economic and managerial decision making in proposed situations
- ◆ Use mathematical calculation software for decision making in proposed cases
- ◆ Use computer tools applied to the resolution of operational research problems





# 03

## Structure and Content

TECH has designed this program under the relearning methodology, which 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 wish 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.





“

*TECH promotes quality education by choosing the best content and team of experts for each of its programs”*

## Module 1. Mathematical Methods and Operations Research

- 1.1. Introduction to Operations Research
  - 1.1.1. History of Operations Research
  - 1.1.2. Applications
  - 1.1.3. Operations Research Stages
  - 1.1.4. Operations Research Techniques
  - 1.1.5. Implementation
- 1.2. Lineal Programming: Formulating Problems
  - 1.2.1. Linear Programming Modeling
  - 1.2.2. Graphic Method
  - 1.2.3. Approaching Lineal Programming Problems
  - 1.2.4. Applications and Examples
- 1.3. Simplex Method
  - 1.3.1. Set and Convex Functions
  - 1.3.2. Resolution Algorithms
  - 1.3.3. Simplex Method Algebra. Algorithm Calculus
  - 1.3.4. Post-Optimum Analysis
  - 1.3.5. Revised Simplex Method
- 1.4. Duality Theory
  - 1.4.1. Introduction to Duality
  - 1.4.2. Duality Theory
  - 1.4.3. Economic Interpretation of Duality
  - 1.4.4. Simplex Dual Algorithm
- 1.5. Postoptimization
  - 1.5.1. Need for Post-Optimal Analysis
  - 1.5.2. Sensitivity Analysis
  - 1.5.3. Parametric Analysis
  - 1.5.4. Linear Programming Model Solutions Using Spreadsheets
- 1.6. Transport Problems
  - 1.6.1. Introduction
  - 1.6.2. Transport Simplex Method
  - 1.6.3. Dummy Destination and Origin
  - 1.6.4. Degenerate Solutions
  - 1.6.5. Impossible Transports: M Method







- 1.7. Allocation Problems
  - 1.7.1. Introduction
  - 1.7.2. Hungarian Algorithm
  - 1.7.3. Dummy Resources
  - 1.7.4. Dummy Tasks for Resources Unable to Perform a Certain Task
- 1.8. Network Optimization: Project Planning Application
  - 1.8.1. Types of Network Optimization Models
  - 1.8.2. Monte Carlo Method
  - 1.8.3. Planning and Programming Projects
  - 1.8.4. Defining and Sequencing Activities
  - 1.8.5. Critical Path Method (CPM) with Cost/Time Trade-offs
  - 1.8.6. ROY Method
- 1.9. Dynamic Programming
  - 1.9.1. Dynamic Programming Problem Features
  - 1.9.2. Dynamic Programming Prototype
  - 1.9.3. Deterministic Dynamic Programming
- 1.10. Integer Programming and Nonlinear Programming
  - 1.10.1. Integer Programming Applications
  - 1.10.2. Integer Programming Prototype
  - 1.10.3. Non-Linear Programming
  - 1.10.4. Non-Linear Programming Applications
  - 1.10.5. Graphic Solutions for Non-Linear Programming Problems



*Enroll now and get your degree  
in Mathematical Methods and  
Operations Research in only 6  
weeks and 100% online"*



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.



*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 Mathematical Methods and Operations Research guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.



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

This **Postgraduate Certificate Mathematical Methods and Operations Research** contains the most complete and up-to-date scientific 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 Mathematical Methods and Operations Research**

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  
personalized service innovation  
knowledge present  
development languages  
virtual classroom



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