Postgraduate Certificate
Biophysics

tech technological university

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Postgraduate Certificate
Biophysics

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

Website: **www.techtitute.com/in/engineering/postgraduate-certificate/biophysics**

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01

Introduction

Biophysics research has led to important advances in the understanding of the basic biological mechanisms of human beings: from the structure of DNA to the functioning of neurons. In this sense, it is essential that professionals have the essential knowledge to be able to enhance their studies in this line or create projects that favor the development of biotechnology for diagnosis and medical treatment. Given the relevance of this discipline, TECH has designed this 100% online program, where students will obtain intensive learning about molecular biophysics, complex systems, as well as transport through cell membranes. All with innovative multimedia didactic material and accessible 24 hours a day.

A 100% online Postgraduate Certificate that provides you with the most current knowledge about Biophysics in only 6 weeks"

Among the most relevant scientific discoveries in biophysics are the DNA double helix, which earned Rosalind Franklin, Maurice Wilkins, Francis Crick and James Watson the Nobel Prize in Medicine in 1962. From this discovery, the impulse given by this research to science is incalculable, and it also boosts interdisciplinarity.

Given this reality, the development of this discipline has aroused great interest in fields such as engineering, giving rise to the creation of biotechnological studies and devices that favor the diagnosis and medical approach to various pathologies. Given the relevance of Biophysics, TECH has created a program that brings together the most advanced and recent knowledge in 150 teaching hours.

All in an intensive program made up of an exhaustive syllabus that covers the key concepts of molecular and cellular Biophysics, the arrangement in time and helps to understand from this area the membrane potential, transport and nerve impulses. In addition, students have access to pedagogical tools based on video summaries, detailed videos, readings or case studies.

Likewise, with the *Relearning* method, the engineers will be able to consolidate the most important contents in a simpler way and reduce the long hours of study and memorization so frequent in other pedagogical systems.

The future professionals are thus faced with an ideal opportunity to obtain a quality, flexible education that can be accessed conveniently whenever and wherever they wishes. The only thing they need is an electronic device (cell phone, tablet or computer) with an Internet connection to be able to view the syllabus of this program at any time. An ideal academic option for those who wish to progress in their sector while combining a Postgraduate Certificate with their daily activities.

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

- Practical case studies are presented by experts in Physics
- 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

It delves into the latest scientific advances in the field of Biophysics Molecular, cellular and complex systems biophysics"

Delve into time ordering and chaos in biological systems with the most exhaustive and scientifically rigorous syllabus"

Explore the Biophysics of membrane potential through the most cutting-edge teaching material available at the university.

You will have access to the virtual library at any time of the day and from a digital device with Internet connection.

The program's teaching staff includes professionals from 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 professionals 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 professionals must try to solve the different professional practice situations that are presented throughout the academic course. For this purpose, the students will be assisted by an innovative interactive video system created by renowned experts.

02

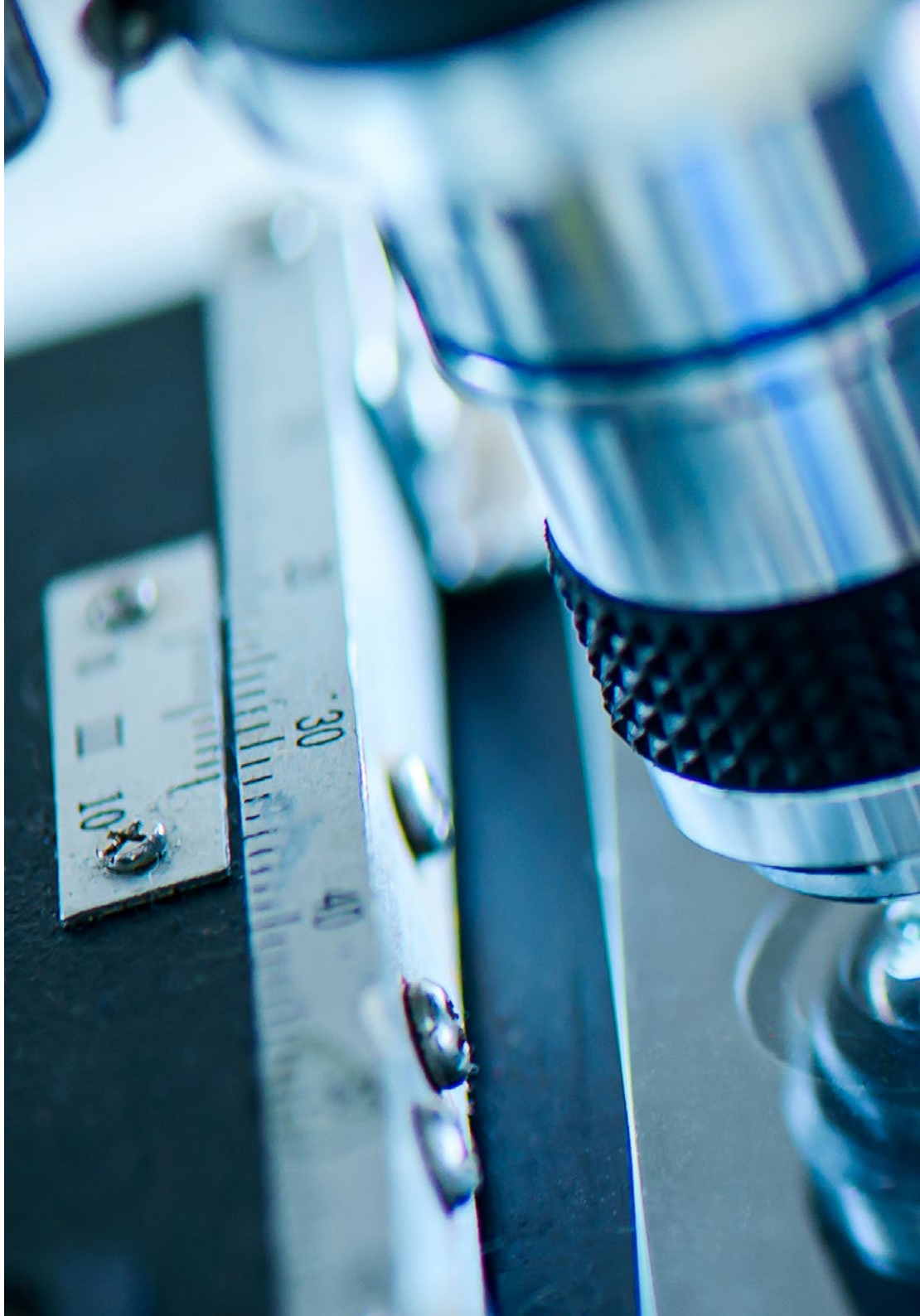
Objectives

Upon completion of the 150 teaching hours, students will have obtained a solid knowledge of Biophysics, the different types of transport through cell membranes and the mathematical relationships that model biological processes. Thus, the graduates will be able to implement this knowledge in their projects and research focused on this area of great utility in the field of health.

You will be able to take firm steps towards a sector that requires highly qualified professionals in the field of Biophysics"

General Objectives

- Be able to explain the behaviors using the basic equations of fluid dynamics
- Understand the four principles of thermodynamics and apply them to the study of thermodynamic systems 1
- Apply processes of analysis, synthesis and critical reasoning
- Know the main principles on which Medical Physics is based
- Understand the concepts of 3D and 4D segmentation and processing
- Be aware of advances in remote sensing and image processing
- Understand the main characteristics of nuclear medicine



Specific Objectives

- Know the characteristics of living systems from the physical point of view
- Acquire basic knowledge about the different types of transport through cell membranes and how they work
- Know the mathematical relationships that model biological processes
- Acquire basic notions about the physics of nerve impulses

Get a practical insight into the thermodynamics of irreversible processes through the examples provided in this university program"

03

Structure and Content

TECH provides students with numerous innovative teaching materials that can be accessed comfortably from an electronic device with Internet connection and at any time of the day. In this way, the graduates will obtain the most advanced and current information on Biophysics, thermodynamics of irreversible processes, the active effect or nerve impulses. All with the theoretical-practical perspective that the future engineering professionals need to progress in their sector.

Enroll now in a program that allows you to self-manage your study time and make quality education compatible with your daily activities"

Module 1. Biophysics

1.1. Introduction to Biophysics
- 1.1.1 Introduction to Biophysics
- 1.1.2. Characteristics of Biological Systems
- 1.1.3. Molecular Biophysics
- 1.1.4. Cell Biophysics
- 1.1.5. Biophysics of Complex Systems

1.2. Introduction to the Thermodynamics of Irreversible Processes
- 1.2.1. Generalization of the Second Principle of Thermodynamics for Open Systems
- 1.2.2. Dissipation Function
- 1.2.3. Linear Relationships between Conjugate Thermodynamic Fluxes and Forces
- 1.2.4. Validity Interval of the Linear Thermodynamics
- 1.2.5. Properties of Phenomenological Coefficients
- 1.2.6. Onsager's Relations
- 1.2.7. Theorem of Minimum Entropy Production
- 1.2.8. Stability of Steady States in the Vicinity of Equilibrium. Stability Criteria
- 1.2.9. Processes Far from Equilibrium
- 1.2.10. Evolution Criteria

1.3. Ordering in Time: Irreversible Processes away from Equilibrium
- 1.3.1. Kinetic Processes Considered as Differential Equations
- 1.3.2. Stationary Solutions
- 1.3.3. Lotka-Volterra Model
- 1.3.4. Stability of Stationary Solutions: Disturbance Method
- 1.3.5. Trajectories: Solutions of the Systems of Differential Equations
- 1.3.6. Types of Stability
- 1.3.7. Analysis of the Stability in the Lotka-Volterra Model
- 1.3.8. Timing: Biological Clocks
- 1.3.9. Structural Stability and Bifurcations. Brusselator's Model
- 1.3.10. Classification of the Different Types of Dynamic Behavior

1.4. Spatial Arrangement: Systems with Diffusion
- 1.4.1. Spatial-Temporal Self-Organization
- 1.4.2. Reaction-Diffusion Equations
- 1.4.3. Solutions of These Equations
- 1.4.4. Examples

1.5. Chaos in Biological Systems
- 1.5.1. Introduction
- 1.5.2. Attractors. Strange or Chaotic Attractors
- 1.5.3. Definition and Properties of Chaos
- 1.5.4. Ubiquity: Chaos in Biological Systems
- 1.5.5. Universality: Routes to Chaos
- 1.5.6. Fractal Structure Fractals
- 1.5.7. Fractal Properties
- 1.5.8. Reflections on Chaos in Biological Systems

1.6. Membrane Potential Biophysics
- 1.6.1. Introduction
- 1.6.2. First Approach to the Membrane Potential: Nernst Potential
- 1.6.3. Gibbs-Donnan Potentials
- 1.6.4. Surface Potentials

1.7. Transport across Membranes: Passive Transport
- 1.7.1. Nernst-Planck Ecuation
- 1.7.2. Constant Field Theory
- 1.7.3. GHK Equation in Complex Systems
- 1.7.4. Fixed Charge Theory
- 1.7.5. Action Potential Transmission
- 1.7.6. TPI Transport Analysis
- 1.7.7. Electrokinetic Phenomena

1.8. Facilitated Transport. Ion Channels Transporters
- 1.8.1. Introduction
- 1.8.2. Characteristics of Transport Facilitated by Transporters and Ion Channels
- 1.8.3. Model of Oxygen Transport with Hemoglobin Thermodynamics of Irreversible Processes
- 1.8.4. Examples

1.9. Active Transport: Effect of Chemical Reactions on Transport Processes
- 1.9.1. Chemical Reactions and Steady State Concentration Gradients
- 1.9.2. Phenomenological Description of Active Transport
- 1.9.3. The Sodium-Potassium Pump
- 1.9.4. Oxidative Phosphorylation

1.10. Nervous Impulses
- 1.10.1. Phenomenology of the Action Potential
- 1.10.2. Mechanism of the Action Potential
- 1.10.3. Hodgkin-Huxley Mechanism
- 1.10.4. Nerves, Muscles and Synapses

You will have 24-hour access to all the content of the Virtual Campus, giving you the flexibility you need to adapt it to your own pace"

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.

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

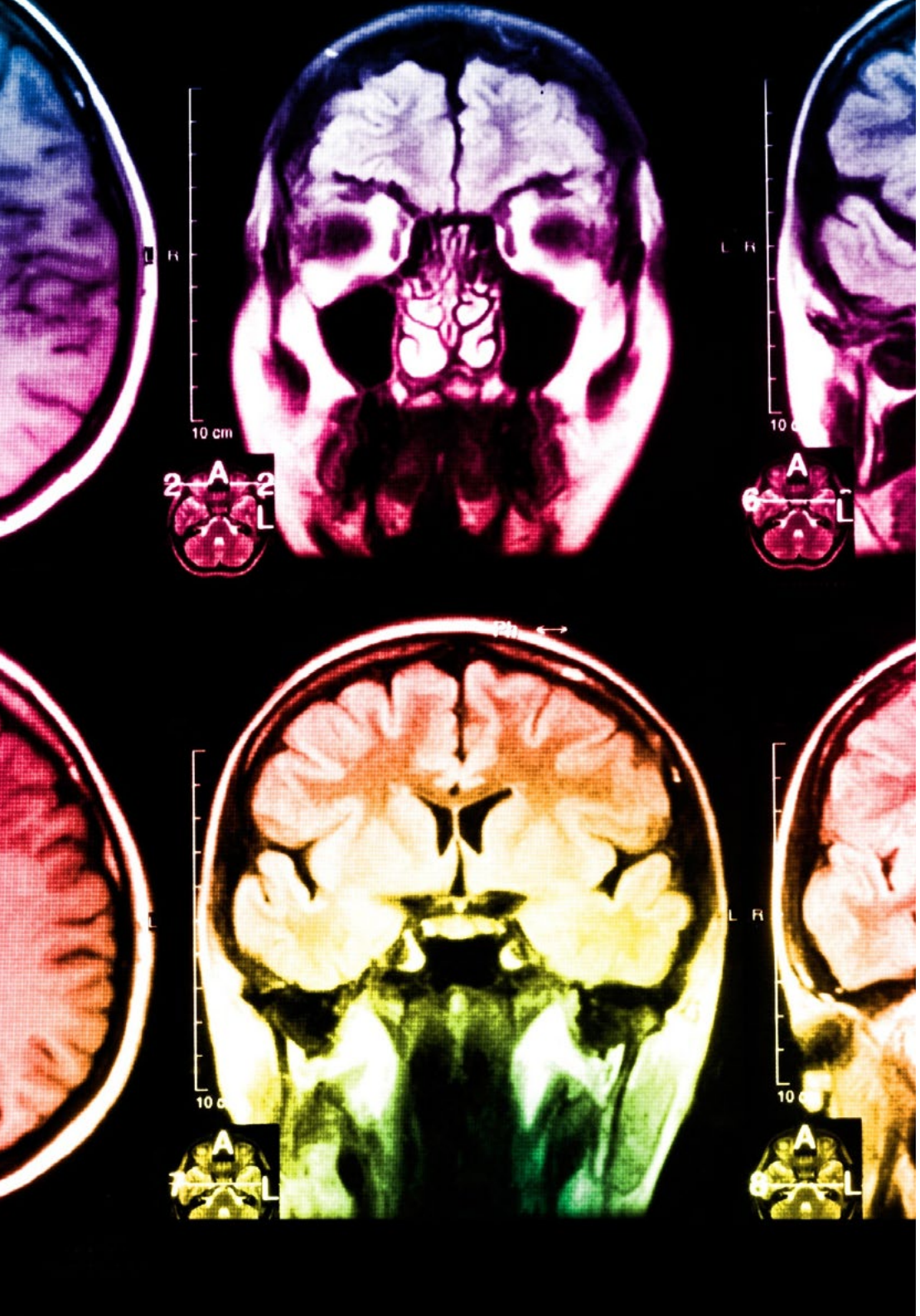
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

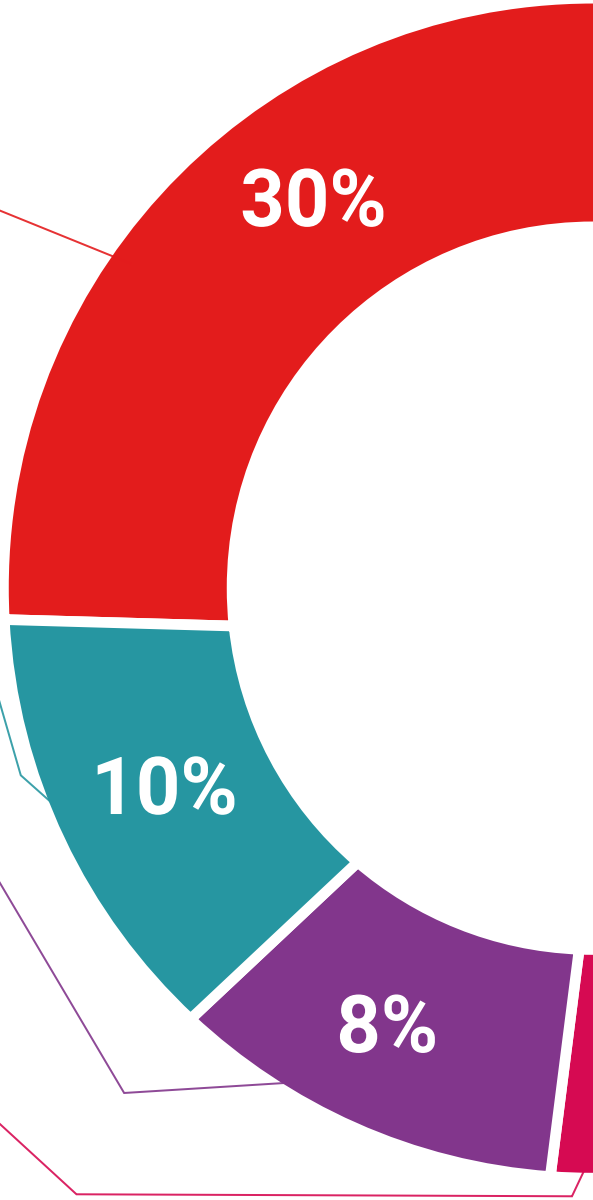
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

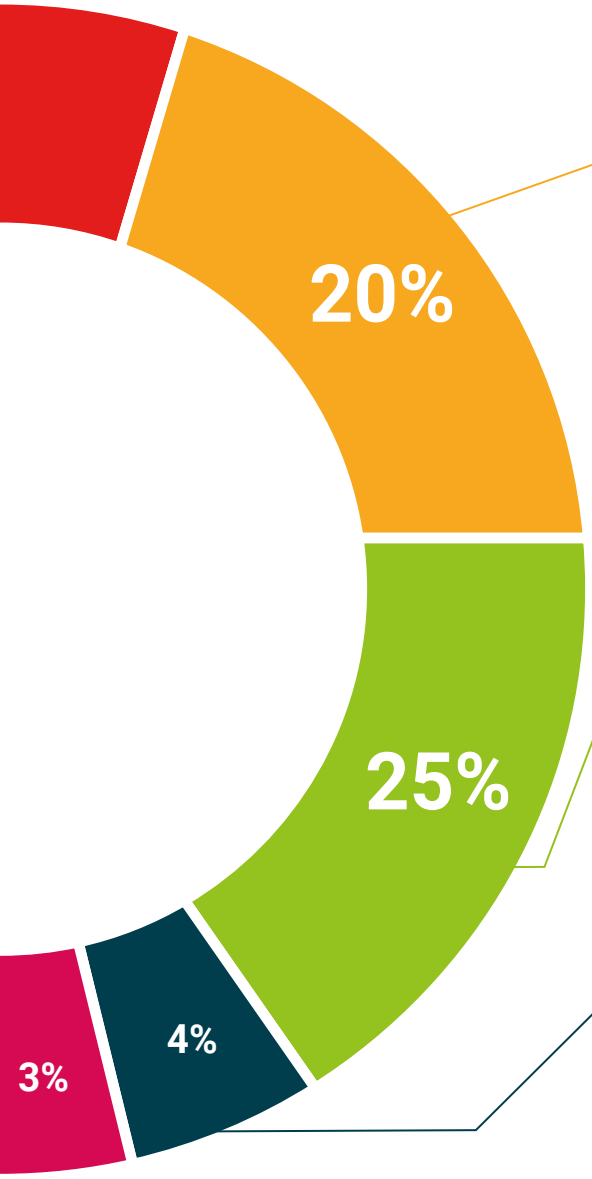
Practising Skills and Abilities

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 Biophysics 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 Biophysics** 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 Biophysics**

Official Nº of Hours: **150 h.**


tech technological university

Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having passed and accredited the following program

POSTGRADUATE CERTIFICATE

in

Biophysics

This is a qualification awarded by this University, equivalent to 150 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro

Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates

*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.

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