Postgraduate Certificate
Reverse Engineering in Cybersecurity

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Postgraduate Certificate

Reverse Engineering in Cybersecurity

- Modality: **online**
- Duration: **6 weeks**
- Certificate: **TECH Technological University**
- Schedule: **at your own pace**
- Exams: **online**

Website: www.techtitute.com/us/information-technology/postgraduate-certificate/reverse-engineering-cybersecurity

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01

Introduction

In the IT environment, there are different motivations that lead us to apply different Reverse Engineering Techniques to understand and know enough about a software, a communication protocol or an algorithm. This in-depth insight is the foundation that will allow the professional to develop programs tailored to these processes that will enable the implementation of targeted protection of higher quality and greater responsiveness to cyber-attacks. This program will allow you to acquire these competencies with the security and endorsement of TECH, in a highly educational, intensive and rapid course.

Learn in a few weeks how and in which context to apply the different techniques of Reverse Engineering in Cybersecurity"

Reverse Engineering Techniques, such as Static Code Analysis and Dynamic Analysis for the Decryption of Communication Protocols, lead to a sufficient understanding of the protocol, which allows us to develop our own programs that show us how to use the protocol.

It is common to perform audits of the software being developed to detect vulnerabilities: Sometimes the vulnerability is not found in the source code, but is introduced by the compiler that generates the machine code.

Knowledge in reverse engineering and, therefore, in how we obtain the machine code will allow us to detect such vulnerabilities.

One of the best known applications of reverse engineering is malware analysis which, through different techniques such as sandboxing, will provide an understanding and knowledge of the malicious software under study and, thereby, allow the development of software capable of detecting and counteracting it, as in the case of antivirus software that works on the basis of signatures.

To this we must add an exclusive Masterclass that complements the syllabus of this program. With the participation of a professional of great international relevance, specialized in Intelligence, Cybersecurity and Disruptive Technologies.

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

- The development of case studies presented by cybersecurity experts
- 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

Complete your learning in Reverse Engineering in Cybersecurity thanks to the exclusive Masterclass designed by an internationally renowned teacher"

Analyze Reverse Engineering techniques in a professional growth process that will allow you to increase the security levels of your codes"

A high education process created to be affordable and flexible, with the most interesting methodology of online teaching.

Study through a practice-focused Postgraduate Certificate, boosting your skills to the level of a specialist.

The program's teaching staff includes professionals from the industry who contribute their work experience to this 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 throughout the program. This will be done with the help of an innovative system of interactive videos made by renowned experts.

02

Objectives

This Postgraduate Certificate provides a quick and easy way to boost the student's ability to work in this field. With realistic and highly interesting objectives, this study process is designed to progressively lead students to the acquisition of the theoretical and practical knowledge necessary to intervene with quality and to develop transversal competencies that will allow them to face complex situations by elaborating adjusted and precise answers.

Compete with quality in a field of work full of job possibilities through a process of exceptional quality"

General Objectives

- Analyze Reverse Engineering and its different techniques
- Examine different architectures and how they impact reverse engineering
- Determine under which conditions to use the different reverse engineering techniques
- Apply reverse engineering to the cybersecurity environment

The most comfortable and efficient study support systems available in a program of exceptional quality"

Specific Objectives

- Analyze the phases of a compiler
- Examine x86 processor architecture and ARM processor architecture
- Determine the different types of analysis
- Apply Sandboxing in different environments
- Develop different Malware analysis techniques
- Establish tools oriented to Malware analysis

03

Course Management

The program's professors have been selected for their expertise in this field. They combine technical and practical experience with teaching experience, offering students first-class support in achieving their goals. Through them, the course offers the most direct and immediate vision of the real characteristics of the intervention in this field, achieving a contextual vision of maximum interest.

Experts in Reverse Engineering in Cybersecurity will accompany you in each phase of the study and will give you the most realistic view of this work"

International Guest Director

Dr. Frederic Lemieux is internationally recognized as an innovative expert and inspirational leader in the fields of **Intelligence**, **National Security**, **Homeland Security**, **Cybersecurity** and **Disruptive Technologies**. His constant dedication and relevant contributions in Research and Education position him as a key figure in the **promotion of security** and the **understanding of today's** emerging technologies. During his professional career, he has conceptualized and directed cutting-edge academic programs in several renowned institutions, such as the **University of Montreal**, **George Washington University** and **Georgetown University.**

Throughout his extensive background, he has published multiple books of great relevance, all of them related to **criminal intelligence**, **policing**, **cyber threats** and **international security.**. He has also made a significant contribution to the field of **Cybersecurity** with the publication of numerous articles in academic journals, examining crime control during major disasters, counter-terrorism, intelligence agencies, and police cooperation. In addition, he has been a panelist and keynote speaker at various national and international conferences, establishing himself as a reference in the academic and professional arena.

Dr. Lemieux has held editorial and evaluative roles in different academic, private and governmental organizations, reflecting his influence and commitment to excellence in his field of expertise. As such, his prestigious academic career has led him to serve as Professor of Practice and Faculty Director of the MPS programs in **Applied Intelligence** , **Cybersecurity Risk Management**, **Technology Management** and **Information Technology Management** at **Georgetown University.**

Dr. Lemieux, Frederic

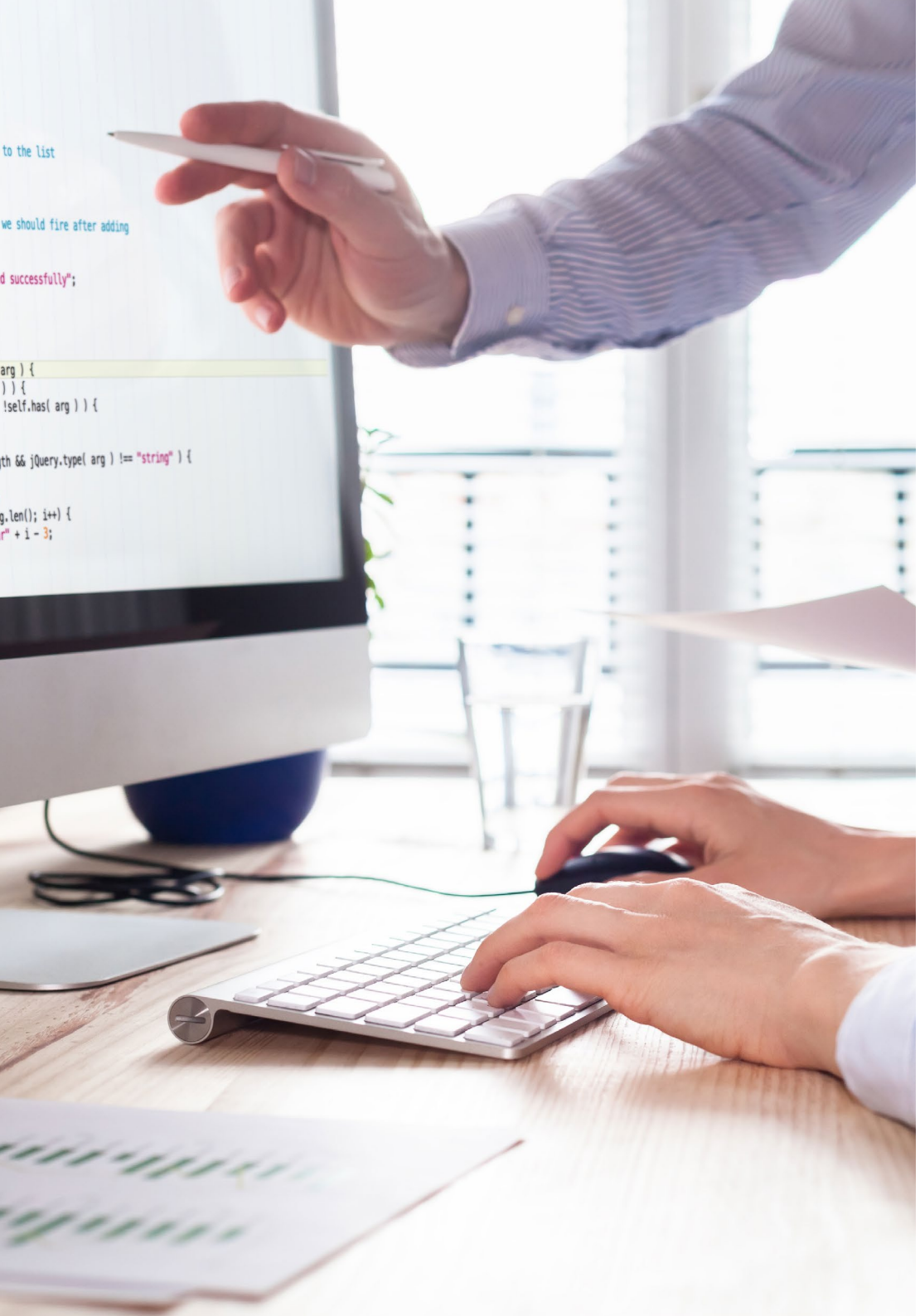
- Director of the Master's Degree in Cybersecurity Risk Management at Georgetown, Washington, United States
- Director of the Master in Technology Management at Georgetown University
- Director of the Master in Applied Intelligence at Georgetown University
- Professor of Internships at Georgetown University
- PhD in Criminology from the School of Criminology at the University of Montreal
- B.A. in Sociology and Minor Degree in Psychology from Laval University
- Member of: New Program Roundtable Committee, Georgetown University

Thanks to TECH you will be able to learn with the best professionals in the world"

Management

Ms. Fernández Sapena, Sonia

- Trainer in Computer Security and Ethical Hacking at the National Reference Center of Getafe in Computer Science and Telecommunications in Madrid
- Certified E-Council instructor
- Trainer in the following certifications: EXIN Ethical Hacking Foundation and EXIN Cyber & IT Security Foundation. Madrid
- Accredited expert trainer by the CAM of the following certificates of professionalism: Computer Security (IFCT0190), Voice and Data Network Management (IFCM0310), Departmental Network Administration (IFCT0410), Alarm Management in Telecommunications Networks (IFCM0410), Voice and Data Network Operator (IFCM0110), and Internet Services Administration (IFCT0509)
- External collaborator CSO/SSA (Chief Security Officer/Senior Security Architect) at the University of the Balearic Islands
- Degree in Computer Engineering from the University of Alcalá de Henares, Madrid.
- Master's Degree in DevOps: Docker and Kubernetes. Cas-Training
- Microsoft Azure Security Techonologies. E-Council



Professors

Mr. Redondo, Jesús Serrano

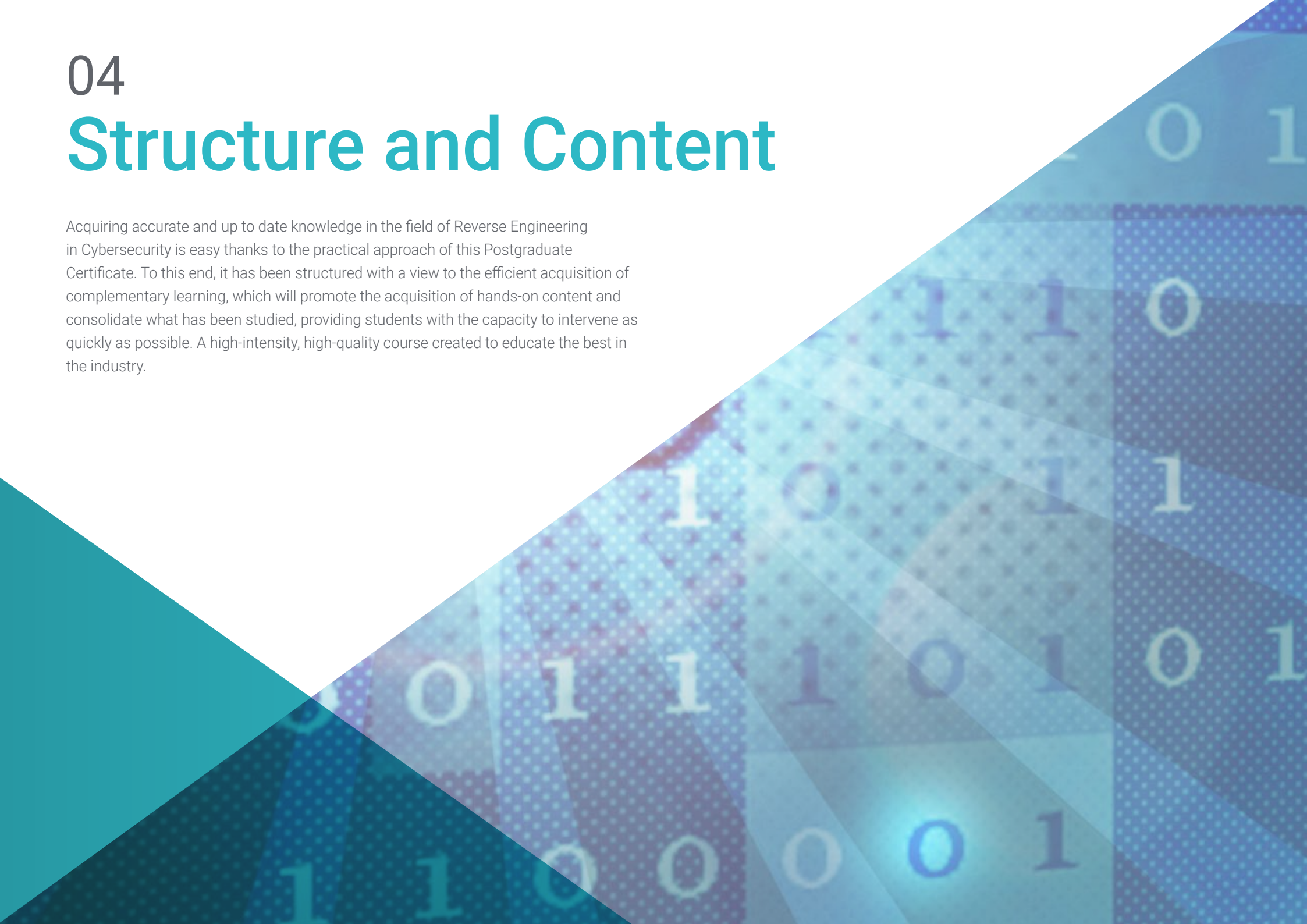
- Web Developer and Cybersecurity Technician
- Web Developer at Roams, Palencia, Spain
- FrontEnd Developer at Telefónica, Madrid
- FrontEnd Developer at Best Pro Consulting SL, Madrid
- Telecommunications Equipment and Services Installer at Grupo Zener, Castilla y León, Spain
- Telecommunications Equipment and Services Installer at Lican Comunicaciones SL, Castilla y León, Spain
- Certificate in Computer Security by CFTIC Getafe, Madrid
- Senior Technician in Telecommunications and Computer Systems at IES Trinidad, Arroyo, Palencia
- Senior Technician in MV and LV Electrotechnical Installations by IES Trinidad Arroyo, Palencia
- Training in Reverse Engineering, Stenography and Encryption by Incibe Hacker Academy.

A stimulating journey of professional growth designed to keep you interested and motivated throughout the entire program"

04

Structure and Content

Acquiring accurate and up to date knowledge in the field of Reverse Engineering in Cybersecurity is easy thanks to the practical approach of this Postgraduate Certificate. To this end, it has been structured with a view to the efficient acquisition of complementary learning, which will promote the acquisition of hands-on content and consolidate what has been studied, providing students with the capacity to intervene as quickly as possible. A high-intensity, high-quality course created to educate the best in the industry.



Learn in just a few weeks how the application of Reverse Engineering provides invaluable data for cybersecurity intervention"

Module 1. Reverse Engineering

1.1. Compilers
- 1.1.1. Types of Codes
- 1.1.2. Phases of a Compiler
- 1.1.3. Table of Symbols
- 1.1.4. Error Manager
- 1.1.5. GCC Compiler

1.2. Types of Analysis in Compilers
- 1.2.1. Lexical Analysis
  - 1.2.1.1. Terminology.
  - 1.2.1.2. Lexical Components
  - 1.2.1.3. LEX Lexical Analyzer
- 1.2.2. Parsing
  - 1.2.2.1. Context-free Grammars
  - 1.2.2.2. Types of Parsing
    - 1.2.2.2.1. Top-down Analysis
    - 1.2.2.2.2. Bottom-up Analysis
  - 1.2.2.3. Syntactic Trees and Derivations
  - 1.2.2.4. Types of Parsers
    - 1.2.2.4.1. LR Analyzers (Left to Right)
    - 1.2.2.4.2. LALR Analyzers
- 1.2.3. Semantic Analysis
  - 1.2.3.1. Attribute Grammars
  - 1.2.3.2. S-attributes
  - 1.2.3.3. L-attributes

1.3. Data Structures in Assembler
- 1.3.1. Variables
- 1.3.2. *Arrays*
- 1.3.3. Pointers
- 1.3.4. Structures
- 1.3.5. Objects

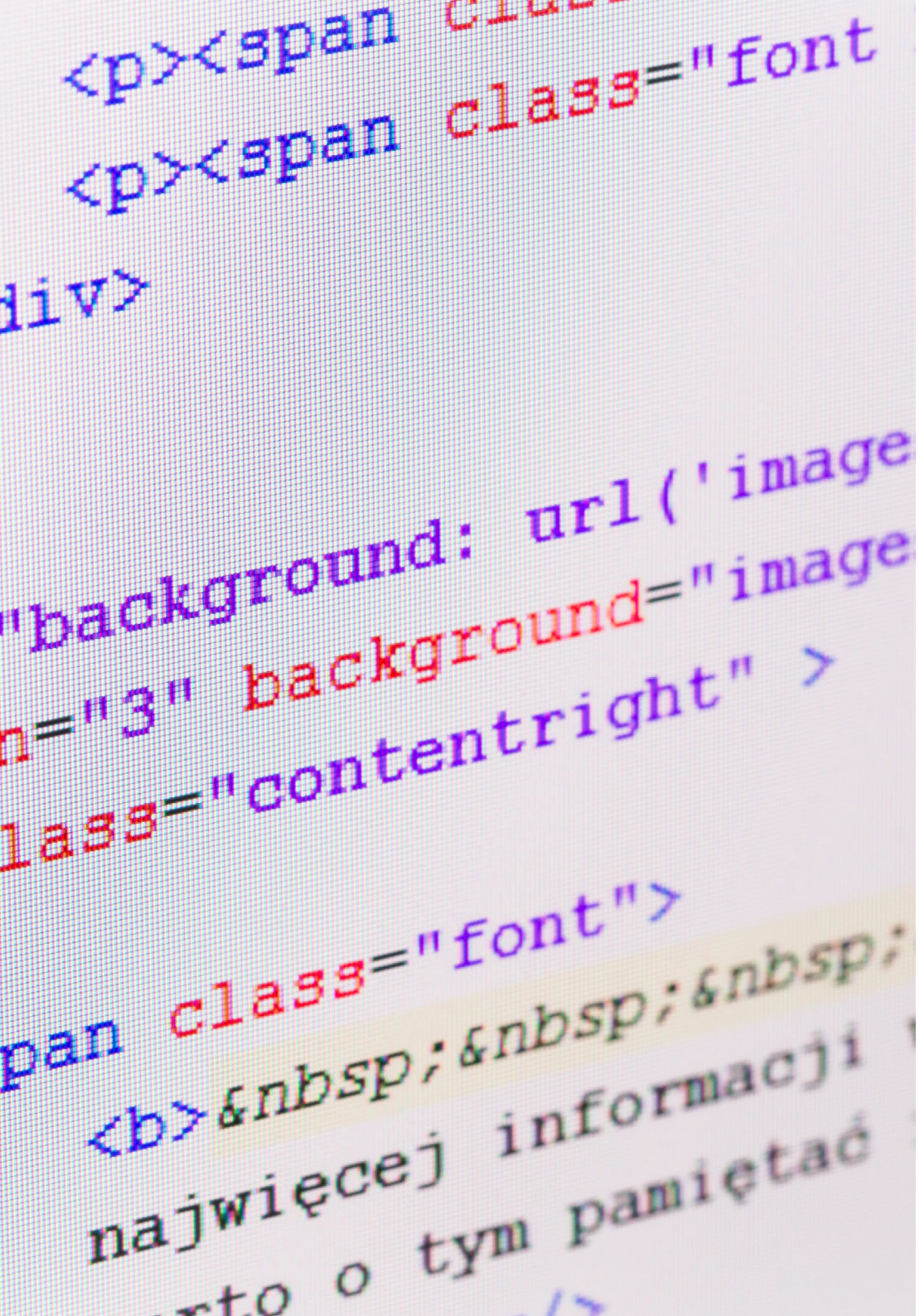
1.4. Assembler Code Structures
- 1.4.1. Selection Structures
  - 1.4.1.1. If, else if, Else
  - 1.4.1.2. *Switch*
- 1.4.2. Iteration Structures
  - 1.4.2.1. *For*
  - 1.4.2.2. *While*
  - 1.4.2.3. Use of Break
- 1.4.3. Functions

1.5. X86 Architecture Hardware
- 1.5.1. x86 Processor Architecture
- 1.5.2. x86 Data Structures
- 1.5.3. x86 Code Structures
- 1.5.4. x86 Code Structures

1.6. ARM Architecture Hardware
- 1.6.1. ARM Processor Architecture
- 1.6.2. ARM Data Structures
- 1.6.3. ARM Code Structures

1.7. Static Code Analysis
- 1.7.1. Disassemblers
- 1.7.2. IDA
- 1.7.3. Code Rebuilders

1.8. Dynamic Code Analysis
- 1.8.1. Behavioral Analysis
  - 1.8.1.1. Communication
  - 1.8.1.2. Monitoring
- 1.8.2. Linux Code Debuggers
- 1.8.3. Windows Code Debuggers



1.9. Sandbox
- 1.9.1. Sandbox Architecture
- 1.9.2. Sandbox Evasion
- 1.9.3. Detection Techniques
- 1.9.4. Avoidance Techniques
- 1.9.5. Countermeasures
- 1.9.6. Sandbox and Linux
- 1.9.7. Sandbox and Windows
- 1.9.8. Sandbox on MacOS
- 1.9.9. Sandbox on android

1.10. Malware Analysis
- 1.10.1. Malware Analysis Methods
- 1.10.2. Malware Obfuscation Techniques
  - 1.10.2.1. Executable Obfuscation
  - 1.10.2.2. Restriction of Execution Environments
- 1.10.3. Malware Analysis Tools

A process of maximum interest for the professional working in cybersecurity, which will bring you up to date and propel you into the job market"

05

Study Methodology

TECH is the world's first university to combine the **case study** methodology with **Relearning**, a 100% online learning system based on guided repetition.

This disruptive pedagogical strategy has been conceived to offer professionals the opportunity to update their knowledge and develop their skills in an intensive and rigorous way. A learning model that places students at the center of the educational process giving them the leading role, adapting to their needs and leaving aside more conventional methodologies.

TECH will prepare you to face new challenges in uncertain environments and achieve success in your career"

The student: the priority of all TECH programs

In TECH's study methodology, the student is the main protagonist.
The teaching tools of each program have been selected taking into account the demands of time, availability and academic rigor that, today, not only students demand but also the most competitive positions in the market.

With TECH's asynchronous educational model, it is students who choose the time they dedicate to study, how they decide to establish their routines, and all this from the comfort of the electronic device of their choice. The student will not have to participate in live classes, which in many cases they will not be able to attend. The learning activities will be done when it is convenient for them. They can always decide when and from where they want to study.

"At TECH you will NOT have live classes (which you might not be able to attend)"

The most comprehensive study plans at the international level

TECH is distinguished by offering the most complete academic itineraries on the university scene. This comprehensiveness is achieved through the creation of syllabi that not only cover the essential knowledge, but also the most recent innovations in each area.

By being constantly up to date, these programs allow students to keep up with market changes and acquire the skills most valued by employers. In this way, those who complete their studies at TECH receive a comprehensive education that provides them with a notable competitive advantage to further their careers.

And what's more, they will be able to do so from any device, pc, tablet or smartphone.

> *TECH's model is asynchronous, so it allows you to study with your pc, tablet or your smartphone wherever you want, whenever you want and for as long as you want"*

Case Studies and Case Method

The case method has been the learning system most used by the world's best business schools. Developed in 1912 so that law students would not only learn the law based on theoretical content, its function was also to present them with real complex situations. In this way, they could make informed decisions and value judgments about how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

With this teaching model, it is students themselves who build their professional competence through strategies such as Learning by Doing or Design Thinking, used by other renowned institutions such as Yale or Stanford.

This action-oriented method will be applied throughout the entire academic itinerary that the student undertakes with TECH. Students will be confronted with multiple real-life situations and will have to integrate knowledge, research, discuss and defend their ideas and decisions. All this with the premise of answering the question of how they would act when facing specific events of complexity in their daily work.

Relearning Methodology

At TECH, case studies are enhanced with the best 100% online teaching method: Relearning.

This method breaks with traditional teaching techniques to put the student at the center of the equation, providing the best content in different formats. In this way, it manages to review and reiterate the key concepts of each subject and learn to apply them in a real context.

In the same line, and according to multiple scientific researches, reiteration is the best way to learn. For this reason, TECH offers between 8 and 16 repetitions of each key concept within the same lesson, presented in a different way, with the objective of ensuring that the knowledge is completely consolidated during the study process.

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.

A 100% online Virtual Campus with the best teaching resources

In order to apply its methodology effectively, TECH focuses on providing graduates with teaching materials in different formats: texts, interactive videos, illustrations and knowledge maps, among others. All of them are designed by qualified teachers who focus their work on combining real cases with the resolution of complex situations through simulation, the study of contexts applied to each professional career and learning based on repetition, through audios, presentations, animations, images, etc.

The latest scientific evidence in the field of Neuroscience points to the importance of taking into account the place and context where the content is accessed before starting a new learning process. Being able to adjust these variables in a personalized way helps people to remember and store knowledge in the hippocampus to retain it in the long term. This is a model called Neurocognitive context-dependent e-learning that is consciously applied in this university qualification.

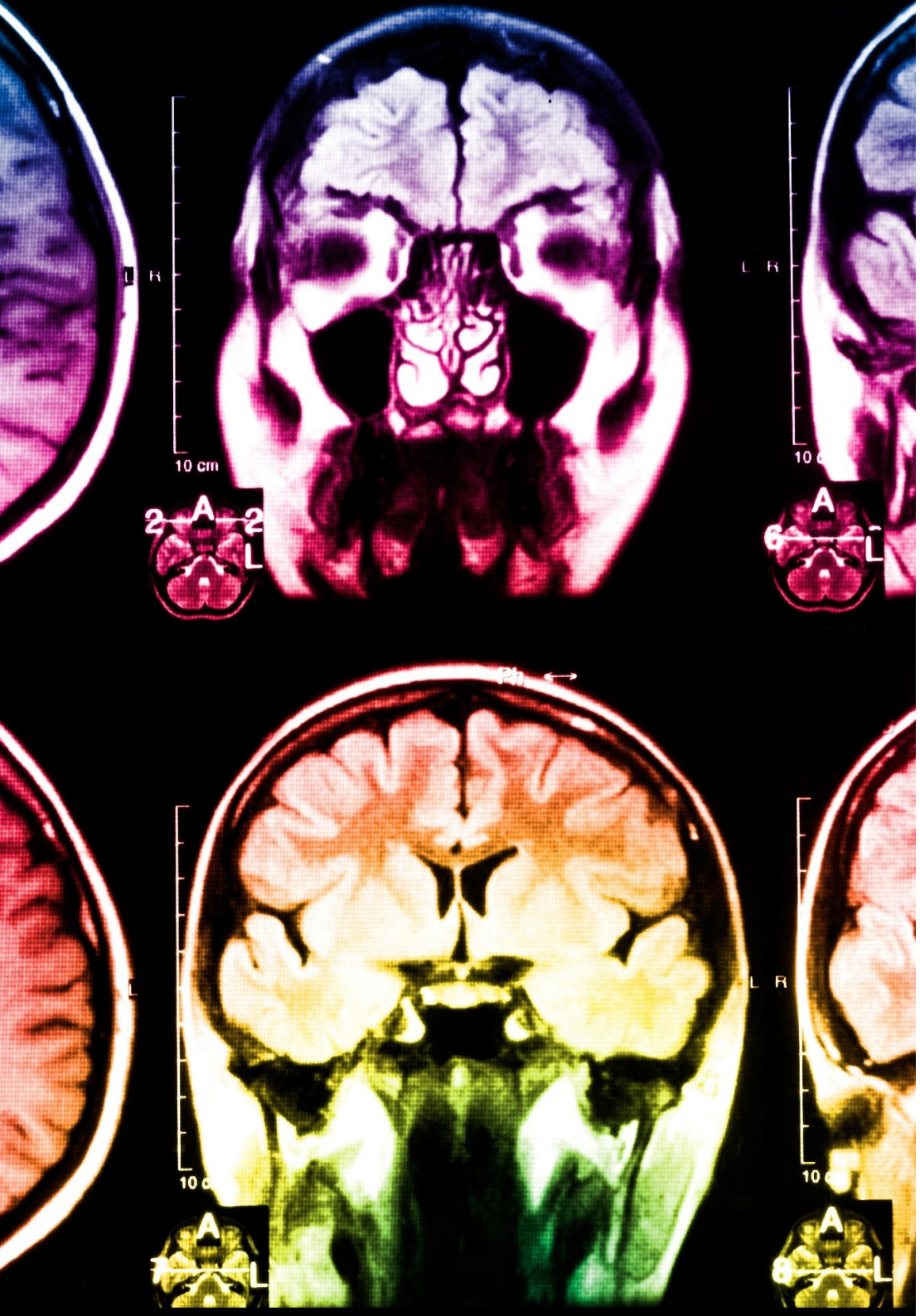
In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

Likewise, this very complete Virtual Campus will allow TECH students to organize their study schedules according to their personal availability or work obligations. In this way, they will have global control of the academic content and teaching tools, based on their fast-paced professional update.

The online study mode of this program will allow you to organize your time and learning pace, adapting it to your schedule"

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

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that assess real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
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.



The university methodology top-rated by its students

The results of this innovative teaching model can be seen in the overall satisfaction levels of TECH graduates.

The students' assessment of the quality of teaching, quality of materials, course structure and objectives is excellent. Not surprisingly, the institution became the best rated university by its students on the Trustpilot review platform, obtaining a 4.9 out of 5.

Access the study contents from any device with an Internet connection (computer, tablet, smartphone) thanks to the fact that TECH is at the forefront of technology and teaching.

You will be able to learn with the advantages that come with having access to simulated learning environments and the learning by observation approach, that is, Learning from an expert.

As such, the best educational materials, thoroughly prepared, will be available in this program:

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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.

Practicing Skills and Abilities

You will carry out activities to develop specific competencies and skills in each thematic field. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop within the framework of the globalization we live in.

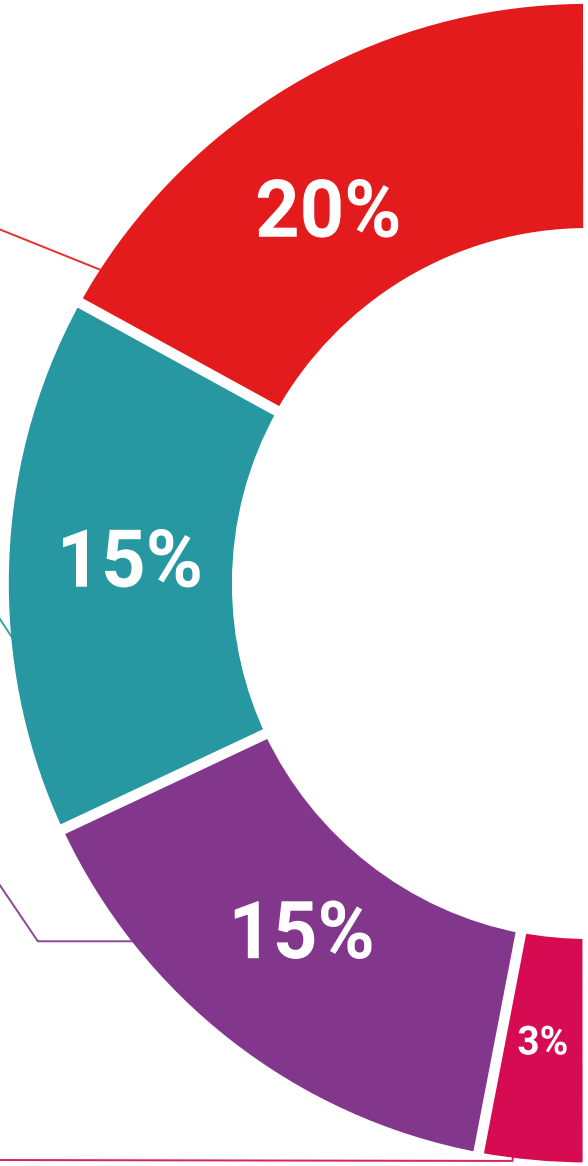
Interactive Summaries

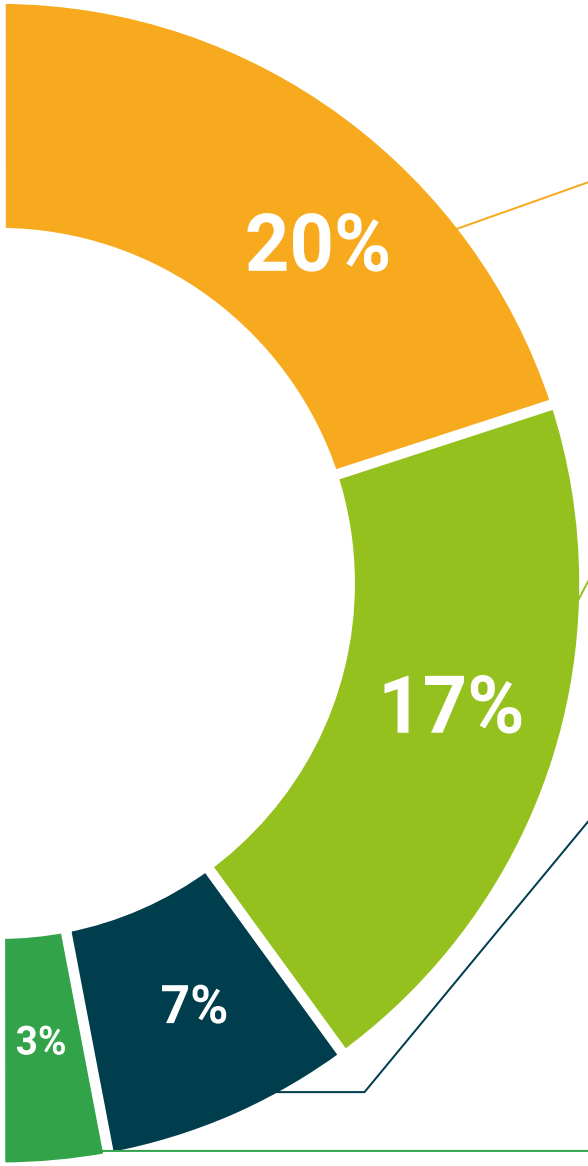
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

Additional Reading

Recent articles, consensus documents, international guides... In our virtual library you will have access to everything you need to complete your education.





Case Studies

Students will complete a selection of the best case studies in the field. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Testing & Retesting

We periodically assess and re-assess your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.

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 for 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 Reverse Engineering in Cybersecurity 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 Reverse Engineering in Cybersecurity** 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 diploma 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 Reverse Engineering in Cybersecurity**

Modality: **online**

Duration: **6 weeks**

tech technological university

Awards the following

DIPLOMA

to

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

For having passed and accredited the following program

POSTGRADUATE CERTIFICATE

in

Reverse Engineering in Cybersecurity

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

Unique TECH Code: AFWORD23S techtitute.com/certificates

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

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Postgraduate Certificate
Reverse Engineering in Cybersecurity

- Modality: **online**
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- Certificate: **TECH Technological University**
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Postgraduate Certificate
Reverse Engineering in Cybersecurity

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