

# Postgraduate Certificate Automata Theory and Formal Languages



## Postgraduate Certificate Automata Theory and Formal Languages

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

Website: [www.techtute.com/us/information-technology/postgraduate-certificate/automata-theory-formal-languages](http://www.techtute.com/us/information-technology/postgraduate-certificate/automata-theory-formal-languages)

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# 01

# Introduction

An in-depth knowledge of basic and advanced concepts related to languages and regular expressions is essential for any computer professional who wants to specialize in Automata Theory and Formal Languages. In this program the student will learn latest developments in the sector and will develop their skills under guidance of professionals.

```
else  
    False  
    = True  
at the end -add back the d  
select= 1  
select=1  
st.scene.objects.active = modifi  
selected" + str(modifier_ob)) # mo  
modifier_ob.select = 0  
key.context.selected_objects[0]  
one.name].select = 1  
print("please select exactly two obje  
OPERATOR CLASSES -----
```

“

*This Postgraduate PROGRAM will allow you to update your knowledge in Automata Theory and Formal Languages in a practical way, 100% online, without renouncing to the maximum academic rigor”*

This program is intended for those interested in reaching a higher level of knowledge in Automata Theory and Formal Languages. The main objective is for students to specialize their knowledge in simulated work environments and conditions in a rigorous and realistic manner so they can later apply it in the real world.

This program will prepare students for professional practice of computer engineering, thanks to a transversal and versatile training adapted to new technologies and innovations in this field. You will obtain extensive knowledge in Automata Theory and Formal Languages, from professionals in the sector.

The students will be able to take the opportunity and study this program in a 100% online format, without neglecting their obligations.

This **Postgraduate Certificate in Automata Theory and Formal Languages** contains the most complete and updated educational program on the market. Its most outstanding features are:

- ◆ Development of 100 simulated scenarios presented by experts in Automata Theory and Formal Languages
- ◆ Its graphic, schematic and eminently practical contents provide scientific and practical information on Automata Theory and Formal Languages
- ◆ News on the latest developments in Automata Theory and Formal Languages
- ◆ Contains practical exercises where the self-assessment process can be performed to improve learning
- ◆ Interactive learning system based on the case method and its application to real practice
- ◆ All of this will be complemented by 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



*Learn the latests techniques and strategies with this program and achieve success as an IT Engineer”*

“

*Get qualified in Automata Theory and Formal Languages with this intensive program, from the comfort of your own home”*

It includes in its teaching staff professionals belonging to the field of computer engineering, who pour their work experience into this program, in addition to recognized specialists belonging to reference societies and prestigious universities.

Thanks to its multimedia content elaborated with the latest educational technology, this program will allow the professional a situated and contextual learning, that is to say, a simulated environment that will provide an immersive learning programmed to work in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the teacher must try to solve different professional practice situations that arise during the academic year. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned experts in Automata Theory and Formal Languages with extensive teaching experience.

*Take advantage of the latest educational technology to get updated in Automata Theory and Formal Languages without leaving home.*

*Learn the latest techniques in Automata Theory and Formal Languages from experts in the field.*



# 02 Objectives

The objective of this program is to provide IT professionals with the knowledge and skills necessary to carry out their activity using the most advanced protocols and techniques of the moment. Through a work approach that is fully adaptable to the student, this program will progressively lead them to acquire skills that will propel them to a higher professional level.





“

*Achieve your desired level of knowledge and master fundamental concepts in Automata Theory and Formal Languages with this high-level education”*



## General Objectives

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- ♦ To provide scientific and technological education, as well as to prepare for professional practice of computer engineering, all this with a transversal and versatile training adapted to new technologies and innovations in this field
- ♦ To obtain a wide knowledge in computing field, computer structure, and in Automata Theory and Formal Languages, including mathematical, statistical and physical basis essential in engineering



*Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice"*





## Specific Objectives

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- ◆ To understand the Automata Theory and formal languages, learning concepts of alphabets, strings and languages, as well as how to perform formal demonstrations
- ◆ To deepen in different types of finite automata, either deterministic or non-deterministic
- ◆ To learn basic and advanced concepts related to regular languages and regular expressions, as well as the application of pumping slogan and regular language closure
- ◆ To understand context-independent grammars, as well as the operation of stack automata
- ◆ To deepen normal forms, pumping slogan of context-independent grammars and properties of context-independent languages




# 03

# Structure and Content

The content structure has been designed by a team of computer engineering professionals, aware of the relevance of current education to deepen this area of knowledge in order to humanistically enrich students and raise their knowledge level in Automata Theory and Formal Languages by means of the latest educational technologies available.





```
Project Window Help
es DocumentModel.test.js -- wikidom

es.DocumentModel.test.js
es.DocumentModel.test.js
es.DocumentModel.test.js

this.data.length ) {
  in( this.data.length - offset );

prototype.rebuild = function( regions ) {
  ; 1 = regions.length; i++ ) {
  = regions[i];
  e.normalize();
  this.buildNodesFromData(
    data.slice( region.start, region.end )
  );
  vert( this, region.index, nodes );
};

action to the content data.

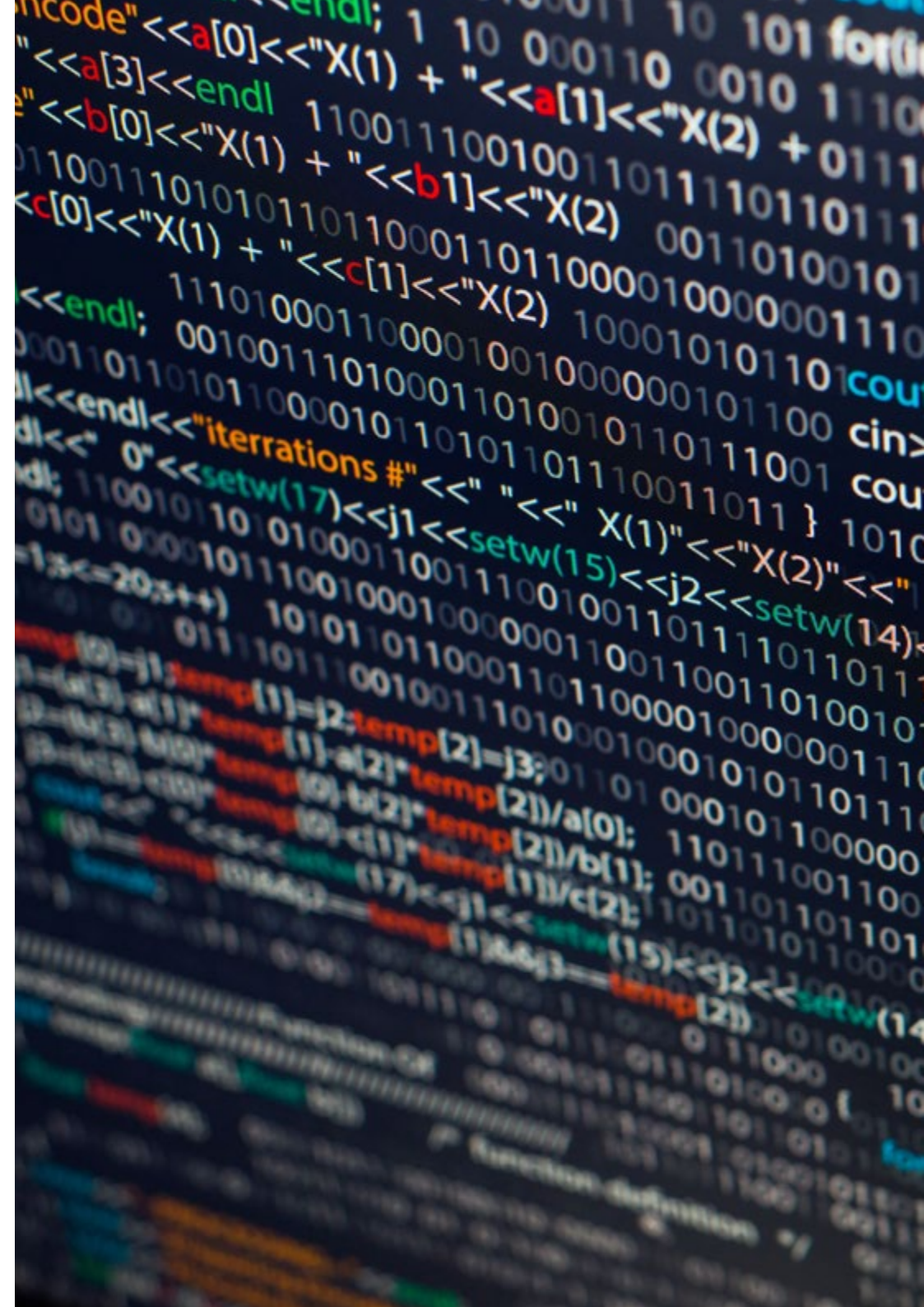
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prototype.commit = function( transaction ) {
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  ion.type in es.DocumentModel.operations ) {
  umentModel.operations[operation.type].commit.call( state, operation );
  'Invalid operation error. Operation type is not supported: ' + operati
};
normalize op.tree - insert elements and adjust lengths
action's effects on the content data.
action()
prototype.rollback = function( transaction ) {
  is.data,
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  0,
  ];
  [ ];
  0, length = transaction.length; i = length; i++ ) {
  ion = transaction[i];
  ion.type in es.DocumentModel.operations ) {
  umentModel.operations[operation.type].rollback.call( state, operation
  'Invalid operation error. Operation type is not supported: ' + operati
```

“

*This study of Automata Theory and Formal Languages contains the most complete and updated learning program on the market”*

## Module 1. Automata Theory and Formal Languages

- 1.1. Introduction to Automata Theory
  - 1.1.1. Why Study Automata Theory?
  - 1.1.2. Introduction to Formal Demonstrations
  - 1.1.3. Other Forms of Demonstration
  - 1.1.4. Mathematical Induction
  - 1.1.5. Alphabets, Strings and Languages
- 1.2. Deterministic Finite Automata
  - 1.2.1. Introduction to Finite Automata
  - 1.2.2. Deterministic Finite Automata
- 1.3. Non-Deterministic Finite Automata
  - 1.3.1. Non-Deterministic Finite Automata
  - 1.3.2. Equivalence Between AFD and AFN
  - 1.3.3. Finite automata with  $\epsilon$  transitions
- 1.4. Languages and Regular Expressions I
  - 1.4.1. Languages and Regular Expressions
  - 1.4.2. Finite Automata and Regular Expressions
- 1.5. Languages and Regular Expressions II
  - 1.5.1. Conversion of Regular Expressions into Automata
  - 1.5.2. Applications of Regular Expressions
  - 1.5.3. Algebra of Regular Expressions
- 1.6. Pumping and Closure Lemma of Regular Languages
  - 1.6.1. Pumping Lemma
  - 1.6.2. Closure Properties of Regular Languages
- 1.7. Equivalence and Minimization of Automata
  - 1.7.1. FA Equivalence
  - 1.7.2. AF Minimization



- 1.8. Context-Independent Grammars GIC
  - 1.8.1. Context-Independent Grammars
  - 1.8.2. Derivation Trees
  - 1.8.3. GIC applications
  - 1.8.4. Ambiguity in Grammars and Languages
- 1.9. Stack Automata and GIC
  - 1.9.1. Definition of Stack Automata
  - 1.9.2. Languages Accepted by a Stack Automaton
  - 1.9.3. Equivalence between Stack Automata and GICs
  - 1.9.4. Deterministic Stack Automata
- 1.10. Normal Forms, Pumping Lemma of GICs and Properties of LICs
  - 1.10.1. Normal Forms of GICs
  - 1.10.2. Pumping Lemma
  - 1.10.3. Closure Properties of Languages
  - 1.10.4. Decision Properties of LICs



*A unique, key, and decisive educational experience to boost your professional development*

# 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 has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. 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 course, students 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 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 Automata Theory and Formal Languages guarantees, in addition to the most rigorous and updated education, access to a Postgraduate Certificate issued by TECH Global University.





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*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 Automata Theory and Formal Languages** 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 Automata Theory and Formal Languages**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**



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 Automata Theory and Formal Languages

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

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