Postgraduate Diploma

Computer Assisted Mechanical Design

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Postgraduate Diploma
Computer Assisted Mechanical Design

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

Website: www.techtitute.com/ingenieria/experto-universitario/experto-diseno- Mechanical- Service.- Computer

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01

Introduction

The advance of technology has brought about a change in the manual delineation of projects. Institutions increasingly have at their disposal tools for making graphical representations. In view of this, the CAD system has become a fundamental tool in the design of 2D and 3D drawings. In this context, TECH offers a program with the most advanced software for Computer Aided Mechanical Design. A university program that stands out for having a teaching team of international prestige. In addition, its didactic resources, which are 100% online, allow students to complete their studies with ease, requiring only a device with Internet access.

Thanks to this Postgraduate Diploma you will create and interpret plans of physical objects with the most modern digital tools".

With the rise of new technologies, the processes for drawing up plans have been affected. At the same time, most organizations have at their disposal various mechanisms to design graphic elements and achieve accuracy during manufacturing processes. Among its advantages is the contribution of greater efficiency, since possible faults can be detected and corrected before reaching the manufacturing stage. Therefore, it is not surprising that more and more companies are looking to integrate Mechanical Design professionals into their organization to interpret and create drawings using the most advanced digital tools.

In this context, TECH has an innovative program of studies to enable students to develop and interpret all types of plans. To achieve this, the curriculum addresses in detail the different motion transformation systems and CAD applications in engineering. It also emphasizes the finite element method so that graduates can successfully evaluate the feasibility of designs and projects. Thus, the students of this academic itinerary have a unique opportunity to broaden their skills in Computer Aided Design and will be able to make the leap to the most prestigious companies in the sector.

On the other hand, the university program has a 100% online methodology so that the engineer can complete the program comfortably. You will only need a device with Internet access to deepen your knowledge in a sector that offers many job opportunities. In addition, the syllabus is based on the innovative Relearning method: a teaching system based on repetition, which ensures that the knowledge is acquired in a natural and progressive way, without the effort memorization.

This Postgraduate Diploma in Computer-Aided Mechanical Design contains the most complete and up-to-date educational program on the market. Its most notable features are:

- The development of case studies presented by Postgraduate Diploma experts in Computer Aided Mechanical Design.
- The graphic, schematic and practical contents with which it is conceived provide cutting- Therapeutics and practical information on those disciplines that are essential for professional practice.
- Practical exercises where the self-assessment process can be carried out 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.

You will master, through this program, motion transformation systems and CAD applications in engineering."

You will delve into finite elements and their feasibility to develop successful Mechanical Designs".

Expand your skills and become an expert in Computer Aided Mechanical Design.

You will have the support of a teaching team made up of professionals in the mechanical sector.

The program's teaching staff includes professionals from the sector who contribute their work experience to this training 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 academic year For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

02

Objectives

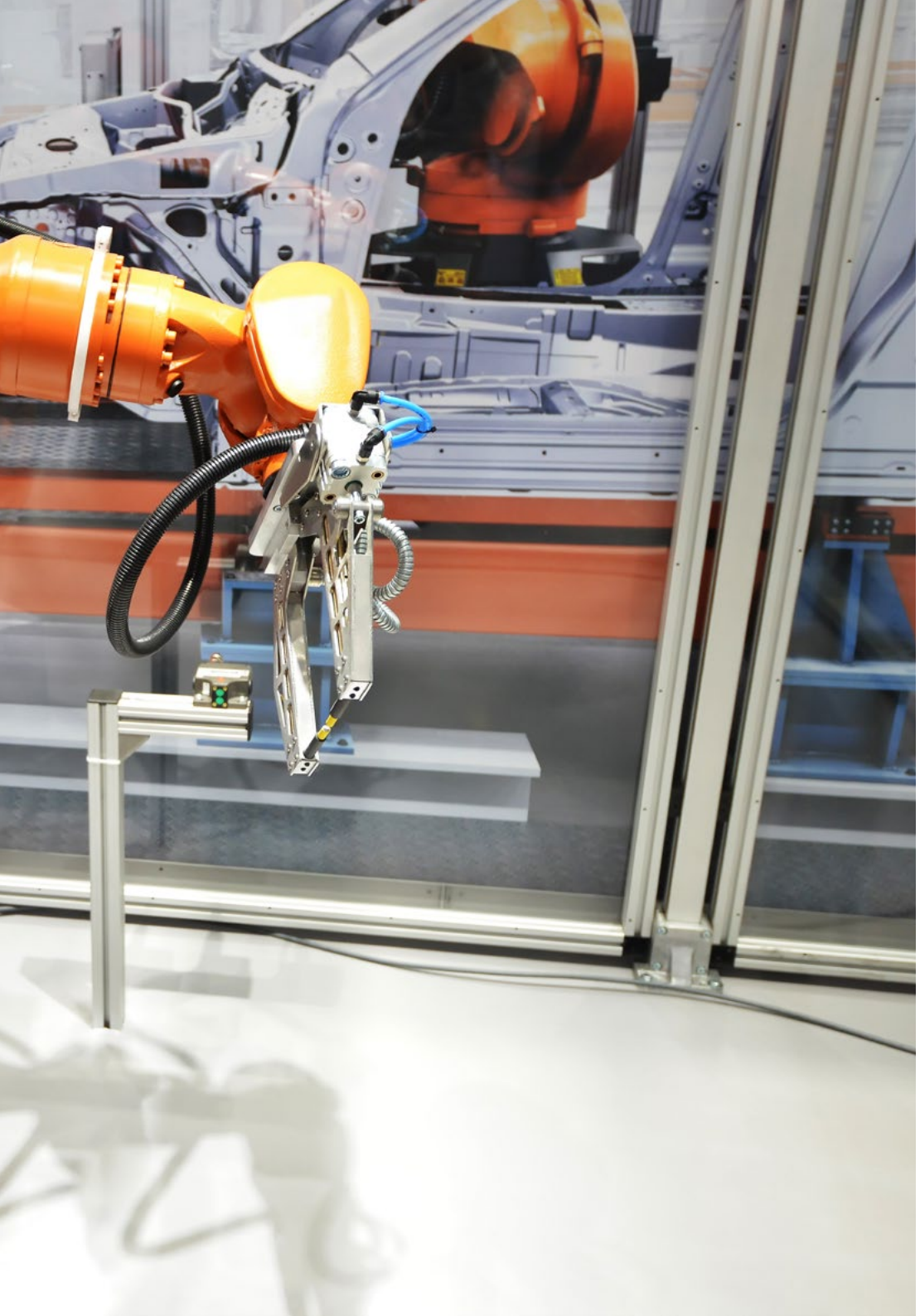
This Postgraduate Diploma will allow students to acquire the necessary skills to update their knowledge in the profession after deepening in the key aspects of Computer Aided Mechanical Design. With programming based on the latest technologies, graduates will be fully empowered in a versatile engineering field and get a jump start on their careers.

Develop elite skills for structural calculation of mechanical systems and components with this comprehensive program."

General Objectives

- Identify and analyze the main types of industrial mechanisms.
- Evaluate and analyze the stresses to which the main types of mechanical systems and elements are subjected.
- Establish the main guidelines to be taken into account in the design of these systems.
- Expand specific knowledge on evaluation criteria and selection of mechanical devices.
- Delve into in CAD design methodology and apply it to mechatronic projects.
- Generate well-defined sketches as a basis for design operations
- Effective use of solid and surface design techniques
- Create complex assemblies using mates
- Establish the analysis typology and FEM calculation model to reproduce the real test of a mechatronic component.
- Solve a representative analysis of a real test using engineering tools based on the finite element method.
- Critically analyze the results obtained from a finite element calculation.

You will achieve your objectives thanks to TECH's didactic tools, including explanatory videos and interactive summaries".



Specific Objectives

Module 1. Machines and Mechatronic Systems

- Recognize the different methods of motion transmission and transformation.
- Identify the main types of machines and mechanisms that allow the transmission and transformation of motion.
- Define the basis for the study of static and dynamic stresses of mechanical systems.
- Establish the basis for the study, design and evaluation of the following mechanical elements and systems: gears, shafts and shafts, bearings, springs, mechanical connecting elements, flexible mechanical elements, and brakes and clutches.

Module 2. Mechatronic Systems Design

- Define relationships and equations to create parametric models that adapt to design changes with agility
- Find and utilize available resources from mechatronics manufacturers or repositories, and include them in the design to increase productivity.
- Efficient development of bent sheet metal parts
- Generate technical drawings and detailed plans from 3D models of parts and assemblies

Module 3. Structural Calculation of Mechanical Systems and Components

- Establish the most suitable material model to represent the behavior of a material under its test conditions.
- Define the boundary conditions representing a real trial
- Determine the results required in a finite element calculation to evaluate the feasibility of a design.

03

Course Management

In its maxim of offering an elite education for all, TECH relies on renowned professionals so that graduates acquire a solid knowledge in the specialty of Computer Aided Mechanical Design. For this reason, this program has a highly qualified team with extensive experience in the sector, which will offer the best tools for the student in the development of their skills during training.

Acquire the skills you need through the experienced teaching staff of this Postgraduate Diploma".

International Guest Director

With an extensive background in the Technology industry, Hassan Showkot is a renowned **Computer Engineer** highly specialized in the implementation of advanced **robotic solutions** in a variety of fields. He also stands out for his **strategic vision** to manage multidisciplinary work teams and lead projects oriented to the specific needs of clients.

In this way, he has worked in international reference companies such as **Huawei** or **Omron Robotics and Safety Technologies.** Among his main achievements, he has created **innovative techniques** to improve both the reliability and safety of robotic systems. In turn, this has enabled many companies to improve their operational processes and automate complex routine tasks ranging from **inventory management to component manufacturing**. As a result, institutions have managed to reduce human errors in their work chains and significantly increase their **productivity** .

In addition, it has led the **Digital Transformation** of numerous entities that needed to increase their competitiveness in the market and ensure their long-term sustainability in the market. Consequently, it has integrated emerging technological tools such as **Artificial Intelligence, Machine Learning, Big Data, Internet of Things or Blockchain**. Thanks to this, organizations have used **predictive analytics** systems to anticipate both trends and needs, something fundamental to adapt to a constantly changing business environment. This has also contributed to optimize **informed strategic decision** making, based on large volumes of data and even patterns.

In addition, its ability to manage initiatives with interdisciplinary groups has been essential to boost collaboration between different corporate departments. As a result, he has fostered an **institutional culture** based on **innovation**, excellence and continuous improvement. Undoubtedly, this has given businesses a substantial competitive advantage.

Mr. Hassan, Showkot

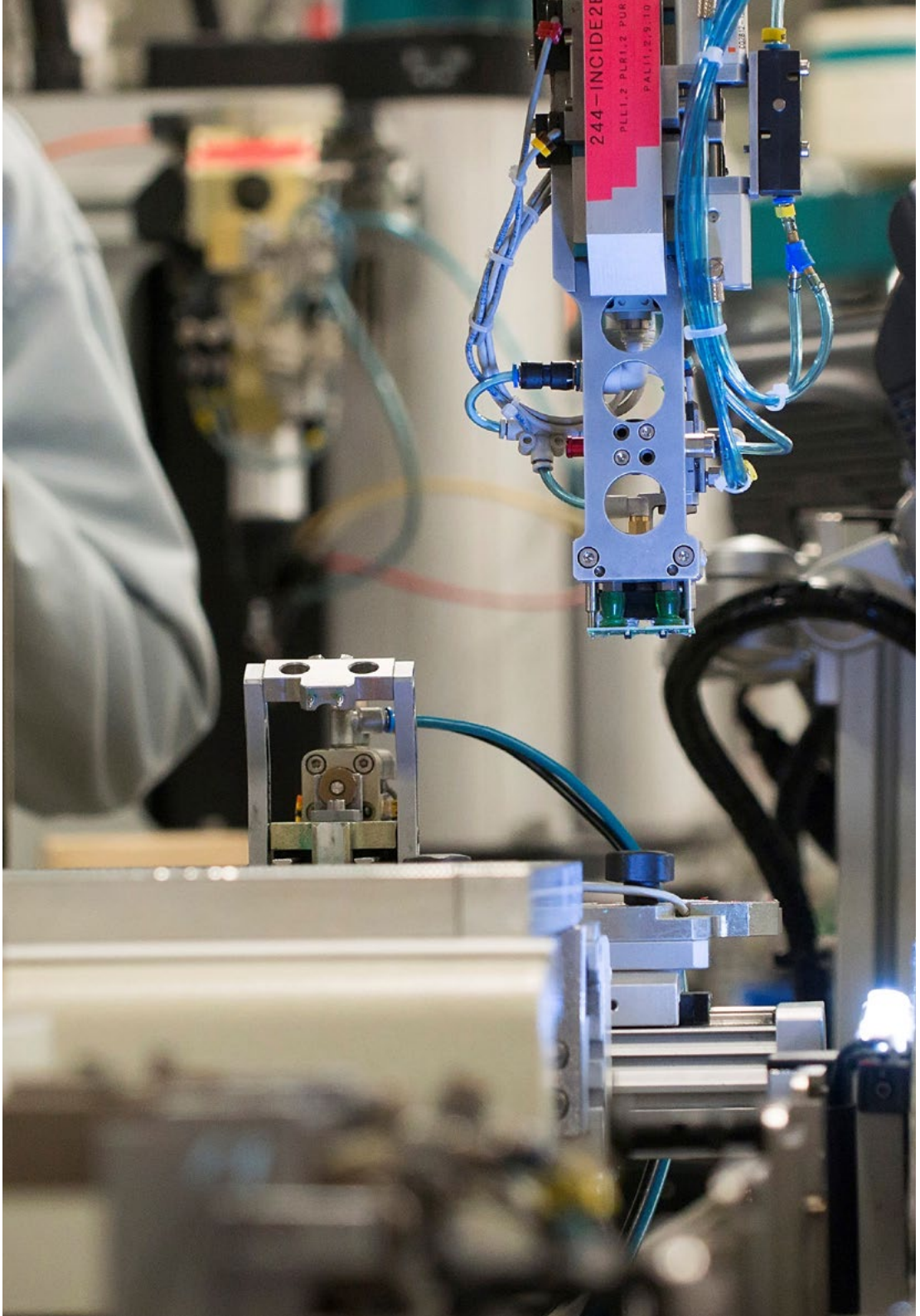
- Director of Omron Robotics and Safety Technologies in Illinois, United States
- Program Manager at Seminet, San Jose, San Jose
- Systems Analyst at Corporación Miriam INC, Lima
- Software Engineer at Huawei, Shenzhen
- M.S. in Engineering Technology at Purdue University
- Master in Business Administration with specialization in Project Management from the
- Bachelor's Degree in Computer Science and Engineering from Shahjalal University of Science and Technology

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

Management

Dr. José Ángel López Campos

- Specialist in design and numerical simulation of mechanical systems.
- Calculation Engineer at ITERA TÉCNICA S.L.
- Dr. in Industrial Engineering from the University of Vigo.
- Master's Degree in Automotive Engineering from the University of Vigo
- Master's Degree in Competition Vehicle Engineering from the Universidad Antonio de Nebrija
- FEM University Specialist from the Polytechnic University of Madrid.
- Graduated in Mechanical Engineering from the University of Vigo.



Professors

Ms. Sofía Suárez García

- Researcher and Industrial Engineering Specialist
- Mechanical Engineer in Model Preparation and Calculation by the Finite Element Method at the University of Vigo.
- University teaching assistant in several undergraduate courses
- Master's Degree in Industrial Engineering by the University of Vigo
- Graduated in Mechanical Engineering from the University of Vigo.

Dr. David Agudo del Río

- Specialist in Mechanics, Energy and Sustainability
- Simulation Engineer at CTAG-IDIADA Safety Technology
- Simulation Engineer at Makross Simulation and Testing
- Industrial Technical Engineer at the Granite Technological Center.
- Researcher at the University of Vigo
- Degree in Mechanical Engineering from the Catholic University of Avila
- Specialization in Industrial and Mechanical Engineering from the University of Vigo.
- Master's Degree in Energy and Sustainability by the University of Vigo

Dr. Abraham Segade Robleda

- Specialist in Mechanics and Machinery Intensification
- Full Professor of Industrial Engineering
- Dr. in Industrial Engineering
- Degree in Industrial Engineering
- University Specialist in Theory and Practical Application of Finite Elements
- Advanced Studies in Mechanical, Energy and Fluid Systems Analysis

04

Structure and Content

This academic itinerary is supported by a teaching team of international prestige. In this sense, the specialists have extensive professional experience in the field of Computer Aided Mechanical Design. For this reason, the training has the most renewed and updated resources in this field to guarantee successful learning. In this way, students will broaden their knowledge and obtain key competencies that will allow them to enter professionally in a sector that offers numerous job opportunities.

Access the cutting-edge content of this program through multimedia resources such as how-to videos and interactive overviews and interactive summaries".

Module 1. Mechatronics Engineering Machines and Systems

1.1. Motion transformation systems
- 1.1.1. Complete circular transformation: reciprocating circular
- 1.1.2. Complete circular transformation: continuous rectilinear
- 1.1.3. Intermittent motion
- 1.1.4. Straight line mechanisms
- 1.1.5. Detention mechanisms

1.2. Machines and mechanisms: motion transmission
- 1.2.1. Linear motion transmission
- 1.2.2. Circular motion transmission
- 1.2.3. Transmission of flexible elements: belts and chains

1.3. Machine requirements
- 1.3.1. Static stresses
- 1.3.2. Judgment criteria
- 1.3.3. Fatigue in machines

1.4. Gears
- 1.4.1. Gear types and manufacturing methods
- 1.4.2. Geometry and kinematics
- 1.4.3. Gear trains
- 1.4.4. Force analysis
- 1.4.5. Gear resistance

1.5. Axles and shafts
- 1.5.1. Tree stresses
- 1.5.2. Design of shafts and axles
- 1.5.3. Rotodynamics

1.6. Bearings and bearings
- 1.6.1. Types of bearings and bearings
- 1.6.2. Bearing calculation
- 1.6.3. Selection Criteria
- 1.6.4. Assembly, lubrication and maintenance techniques

1.7. Springs
- 1.7.1. Types of springs
- 1.7.2. Coil springs
- 1.7.3. Energy storage by means of springs

1.8. Mechanical connecting elements
- 1.8.5. Types of joints
- 1.8.6. Design of Non-Permanent Joints
- 1.8.7. Design of Permanent Connections

1.9. Transmissions by means of flexible elements
- 1.9.1. Straps
- 1.9.2. Roller chains
- 1.9.3. Metallic cables
- 1.9.4. Flexible shafts

1.10. Brakes and clutches
- 1.10.1. Brake classes/clutches
- 1.10.2. Friction materials
- 1.10.3. Calculation and sizing of clutches
- 1.10.4. Brake calculation and sizing

Module 2. Mechatronic Systems Design

2.1. CAD in engineering
- 2.1.1. CAD in Engineering
- 2.1.2. 3D parametric design
- 2.1.3. Types of software on the market
- 2.1.4. SolidWorks. Inventor

2.2. Work Environment
- 2.2.1. The work environment
- 2.2.2. Menus.
- 2.2.3. Visualization
- 2.2.4. Default working environment settings

2.3. Design and work structure
- 2.3.1. Computer-aided 3D design
- 2.3.2. Parametric design methodology
- 2.3.3. Methodology for the design of sets of parts. Assemblies

2.4. Croquizado
- 2.4.1. Basics of Sketch Design
- 2.4.2. Creation of 2D sketches
- 2.4.3. Sketch editing tools
- 2.4.4. Sketch dimensioning and relationships
- 2.4.5. Creation of 3D sketches

2.5. Mechanical design operations
- 2.5.1. Mechanical design methodology
- 2.5.2. Mechanical design operations
- 2.5.3. Other operations

2.6. Surfaces
- 2.6.1. Creation of surfaces
- 2.6.2. Tools for surface creation
- 2.6.3. Tools for surface editing

2.7. Assemblies
- 2.7.1. Creation of assemblies
- 2.7.2. The position relationships
- 2.7.3. Tools for the creation of assemblies

2.8. Standardization and design tables. Variables
- 2.8.1. Component library. Toolbox
- 2.8.2. Online repositories/element manufacturers
- 2.8.3. Design tables

2.9. Folded sheet metal
- 2.9.1. Bended sheet metal module in CAD software
- 2.9.2. Sheet metal operations
- 2.9.3 Developments for sheet metal cutting

2.10. Generation of drawings
- 2.10.1. Creation of plans
- 2.10.2. Drawing formats
- 2.10.3. Creation of views
- 2.10.4. Dimensioning
- 2.10.5. Annotations
- 2.10.6. Lists and tables

Module 3. Structural Calculation of Mechanical Systems and Components

3.1. Finite element method
- 3.1.1. The finite element method
- 3.1.2. Mesh discretization and convergence
- 3.1.3. Form functions. Linear and quadratic elements
- 3.1.4. Formulation for bars. Stiffness matrix method
- 3.1.5. Non-linear problems. Sources of nonlinearity. Iterative methods

3.2. Linear static analysis
- 3.2.1. Preprocessing: geometry, material, mesh, boundary conditions: forces, pressures, remote loading
- 3.2.2. Solution
- 3.2.3. Post-processing: stress and strain maps
- 3.2.4. Application Examples

3.3. Geometry preparation
- 3.3.1. Types of import files
- 3.3.2. Geometry preparation and cleaning
- 3.3.3. Conversion to surfaces and beams
- 3.3.4. Application Examples

3.4. Mesh
- 3.4.1. One-dimensional, two-dimensional, three-dimensional elements
- 3.4.2. Mesh control parameters: local meshing, mesh growth
- 3.4.3. Meshing methodologies: structured meshing, sweeping
- 3.4.4. Mesh quality parameters
- 3.4.5. Application Examples

3.5. Material modeling
- 3.5.1. Elastic-linear materials
- 3.5.2. Elasto-plastic materials. Plasticity criteria
- 3.5.3. Hyperelastic materials. Models in isotropic hyperelasticity: Mooney Rivlin, Yeoh, Ogden, Arruda-Boyce
- 3.5.4. Application Examples

3.6. Contact
- 3.6.1. Linear contacts
- 3.6.2. Non-linear contacts
- 3.6.3. Formulations for contact resolution: Lagrange, Penalty
- 3.6.4. Preprocessing and postprocessing of the contact
- 3.6.5. Application Examples

3.7. Connectors
- 3.7.1. Bolted Joints
- 3.7.2. Beams
- 3.7.3. Kinematic torques: rotation and translation
- 3.7.4. Example of Application. Loads on connectors

3.8. Solver. Resolution of the problem
- 3.8.1. Resolution parameters
- 3.8.2. Convergence and definition of residuals
- 3.8.3. Application Examples

3.9. Post-Process
- 3.9.1. Stress and strain mapping. Isosurfaces
- 3.9.2. Forces on connectors
- 3.9.3. Safety coefficients
- 3.9.4. Application Examples

3.10. Vibration analysis
- 3.10.1. Vibrations: stiffness, damping, resonance
- 3.10.2. Free vibrations and forced vibrations
- 3.10.3. Frequency Domain Analysis
- 3.10.4. Application Examples

05

Methodology

This 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 method of skills and knowledge development. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a way of learning 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

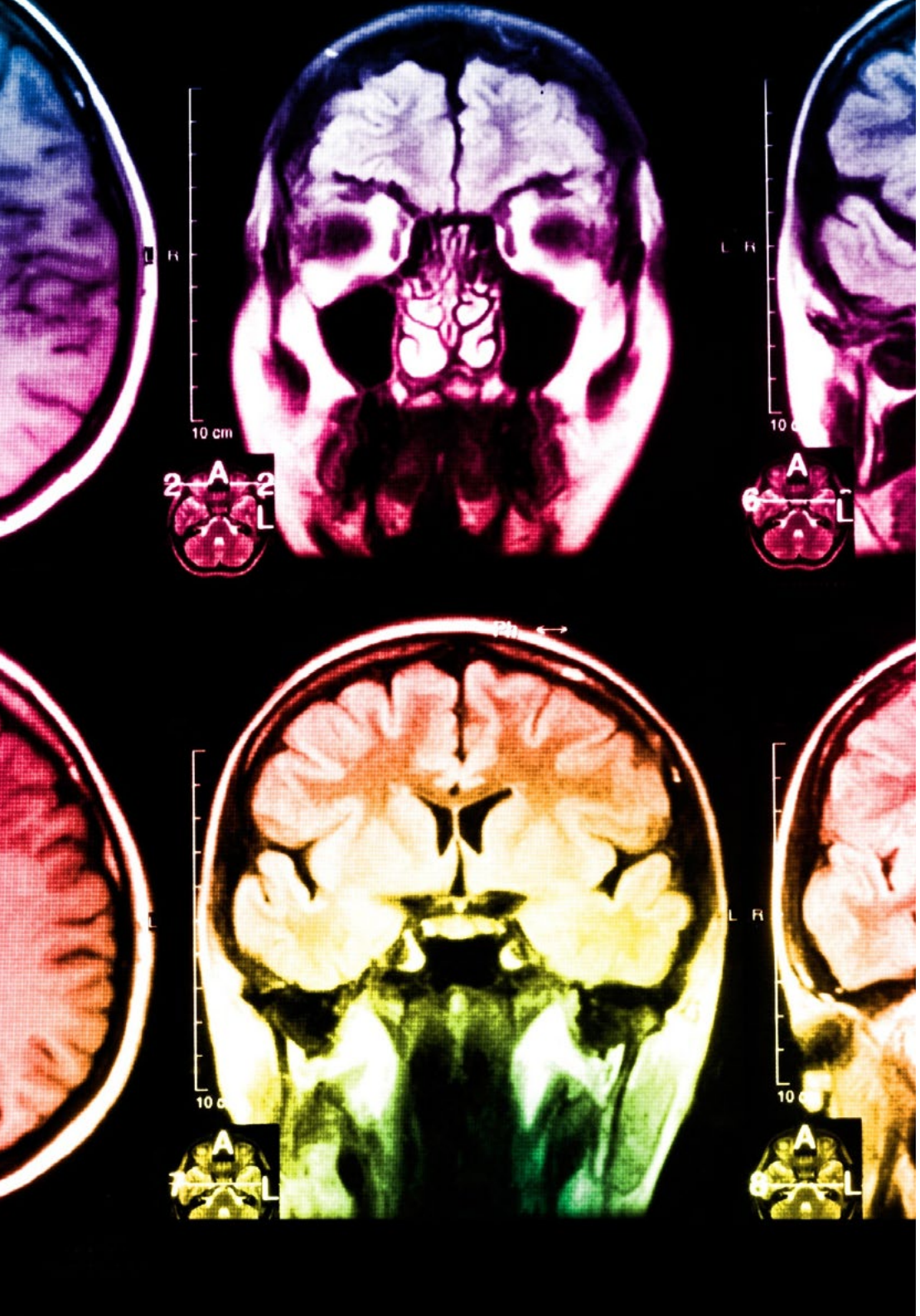
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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 prepare 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 prepared 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 education, 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 adapted in 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.

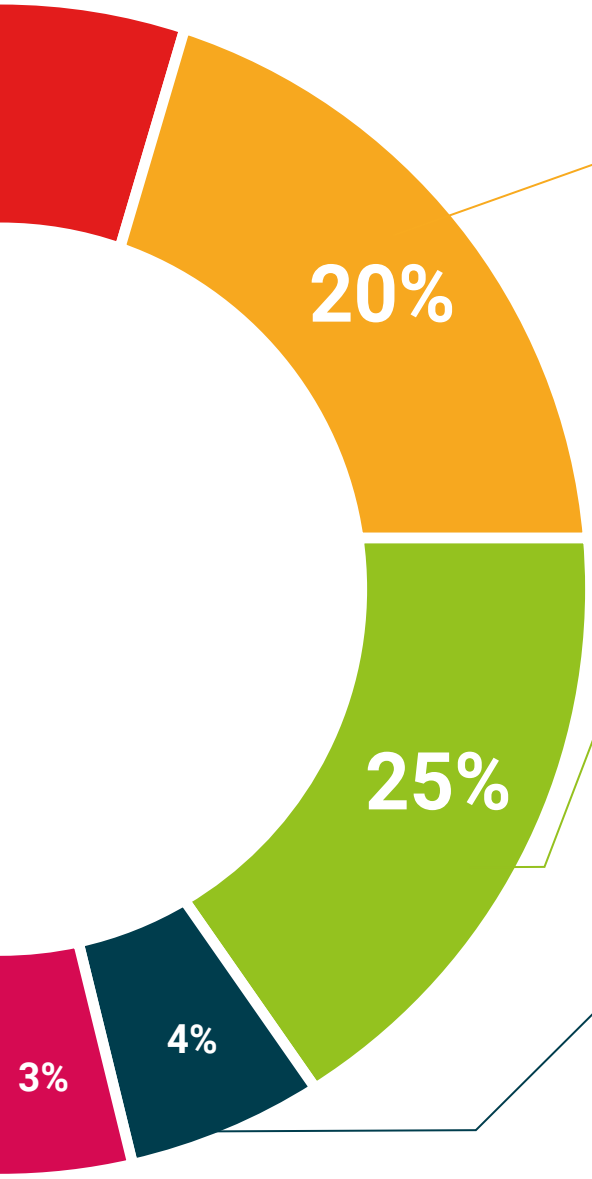
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

Practicing Skills and Abilities

They 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 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 assess and re-assess 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 Diploma in Computer Assisted Mechanical Design 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 Diploma in Virtual Design in Fashion** 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 Diploma** issued by **TECH Technological University via tracked delivery*.**

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

Title: **Postgraduate Diploma in Computer Assisted Mechanical Design**

Official Nº of Hours: **450 hours.**

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Por haber superado con éxito y acreditado el programa de

EXPERTO UNIVERSITARIO

en

Diseño Mecánico Asistido por Ordenador

Se trata de un título propio de esta Universidad con una duración de 450 horas, con fecha de inicio dd/mm/aaaa y fecha de finalización dd/mm/aaaa.

TECH es una Institución Particular de Educación Superior reconocida por la Secretaría de Educación Pública a partir del 28 de junio de 2018.

A 17 de junio de 2020

Mtra.Tere Guevara Navarro
Rectora

Este título propio se deberá acompañar siempre del título universitario habilitante expedido por la autoridad competente para ejercer profesionalmente en cada país. código único TECH: AFWOR23S techtitute.com/titulos

*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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