



POSTGRADUATE STUDIES

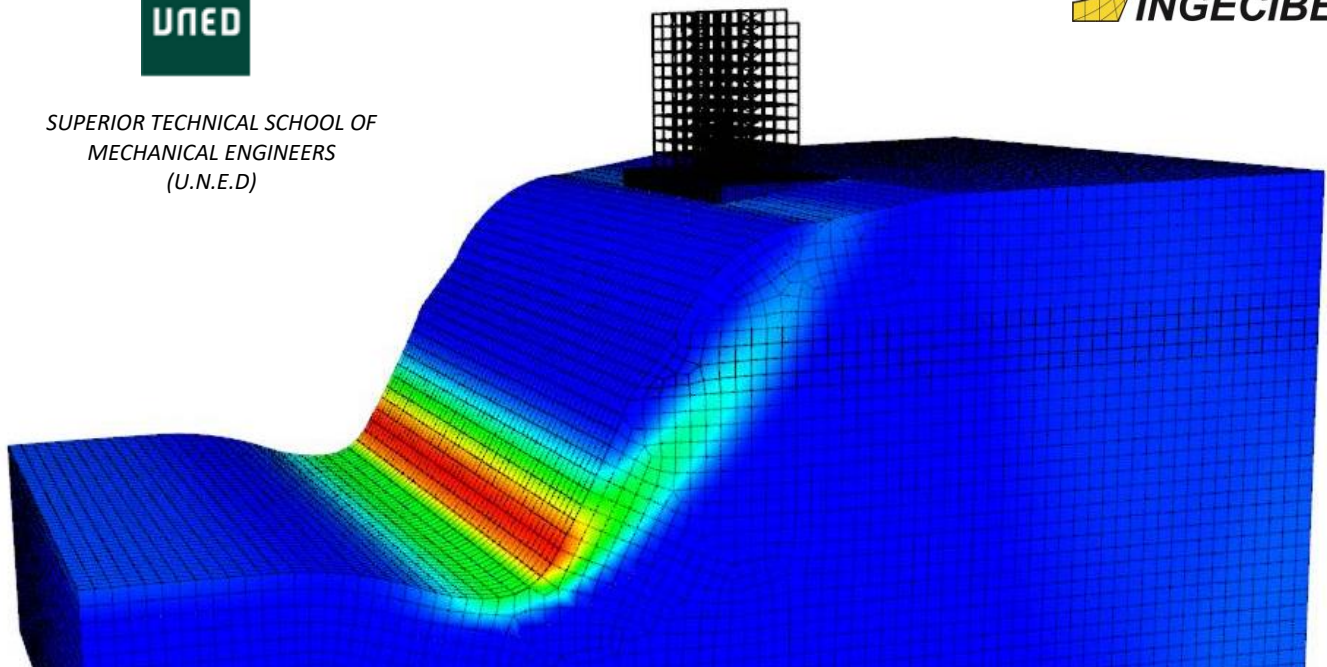
1<sup>st</sup> Ed. - INTERNATIONAL MASTER'S IN  
THEORETICAL & PRACTICAL APPLICATION OF  
FINITE ELEMENT METHOD AND CAE  
SIMULATION. PLAN 2024

# GENERAL ATTENDEE GUIDE

2024

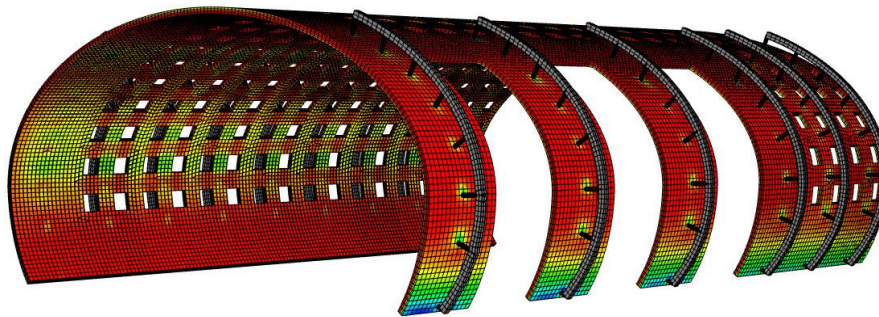


SUPERIOR TECHNICAL SCHOOL OF  
MECHANICAL ENGINEERS  
(U.N.E.D)



**COURSE GUIDE**

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## 1. COURSE OVERVIEW

### INTRODUCTION

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The principal objective of the Master's is to provide analysts and scientists with training in the Finite Element Method for use in the professional world, as a university-specific Master's should do. With this objective in mind, the Master's is structured into foundation subjects, which give an overview of the Finite Element Method, and application and practical subjects where professional software currently on the market is used.

In 2010, **UNED** and **Ingeciber**, principal partners in the Master's decided to make it an international course, and they made it available worldwide.

In 2024 (after 29 editions) a new programme is released to conform to a new credit system due to a new government regulation on own masters diplomas.

To reinforce its international presence and to increase the experience accumulated in the use of FEM in the industry, the Master's counts on Int'l partners.

With this enlargement of the Master's, attendees will be able to study the course with **ANSYS Workbench** (also using other software like **SpaceClaim**, **ANSYS Fluent** or **ANSYS ACP** or **ANSYS MAPDL**).

For Master's Final Project the attendees can use any of the software mentioned.

**UNED** and **Ingeciber**, the principal partners in the Master's, are investing in a determined internationalization of attendees and collaborators and want to offer participants the maximum number of options, with the objective of sharing experiences in the world of CAE on a global level.

**We welcome you to join us in this NEW EDITION of the Master's Program.**



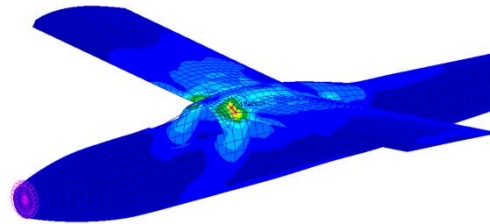
## OBJECTIVES

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The objective of the program is to teach engineers both the basic and specialized theory of Finite Element Method (FEM) using commercial grade Computer Aided Engineering technologies and the immediate transfer of this skillset to professional practical application in the workplace.

In short, it is possible to list the five main objectives:

1. To provide a solid foundation for the FEM with the Basic Modules, which can be further developed with various Specialized Modules.
2. To develop hands-on experience of commercial grade software including ANSYS, SpaceClaim, ANSYS Fluent and ANSYS ACP (depending on which modules you take).
3. To study practice examples that provide real, useful experience for the workplace.
4. To use a variety of texts and proposed exercises, which provide strong study material.
5. To use a combination of mandatory and optional subjects so that the attendee can adapt the training to their personal interests. To this end, the program offers three different levels, which award five different degrees, as will be shown later in the guide.



## COURSE STRUCTURE

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The Master's is matched with an internationally approved credit point system (ECTS).

The Master's degree has a total of 60 credits.

Please check the following website:

[https://formacionpermanente.uned.es/tp\\_actividad/actividad/teoria-y-aplicacion-practica-del-metodo-de-los-elementos-finitos-y-simulacion-plan-2024](https://formacionpermanente.uned.es/tp_actividad/actividad/teoria-y-aplicacion-practica-del-metodo-de-los-elementos-finitos-y-simulacion-plan-2024)

Each module (from 5 to 10), consists of a list of subjects that can be grouped into three

types:

1. Foundation Classes: basic and theoretical subjects.
2. Software Application Classes: hands on training using a commercial software program for each module.
3. Problem Application: application of the knowledge acquired in the theoretical classes in real problems through examples and exercises. The objective of these classes is for attendees to develop the necessary knowledge and skills needed to transfer this knowledge into practice in their professional lives.

## **DEGREES**

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The following degrees will be awarded upon the successful completion of the different requirement levels:

- **Expert in Theoretical and Practical Application of Finite Element Method (29 ECTS)**

This Expert Module is the foundation module that all attendees must complete as a pre-requisite to any of the other degrees in Theoretical and Practical Application. Attendees must take all Modules 1 to 5.

- **Specialist in Theoretical and Practical Application of Finite Element Method and CAE Simulation (39 ECTS)**

Requirements:

- 1) Complete all the modules of Expert diploma (29 ECTS).
- 2) Complete one module from 6 to 10 (10 ECTS).

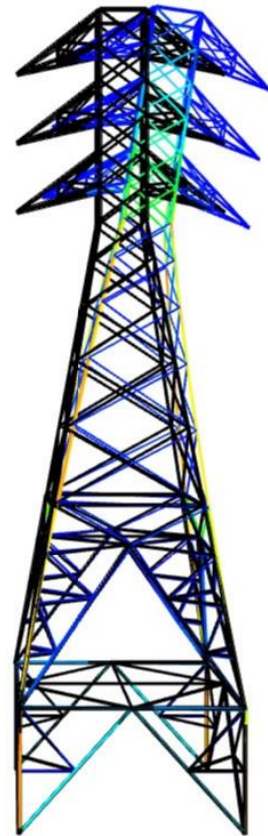
- **Master's in Theory and Practical Application of Finite Element Method and CAE Simulation (60 ECTS)**

Requirements:

- 1) Complete the Expert degree (29 ECTS).
- 2) Complete two modules from 6 to 10 (20 ECTS).
- 3) Complete the Final Master's Project (11 ECTS).

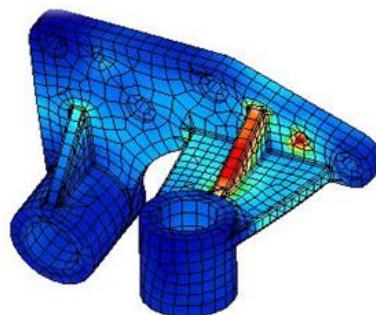
Notes:

1. Attendees must pass each module they enroll in, otherwise, they will need to re-enroll and successfully complete the module.
2. Attendees can enroll in a maximum of 60 module credits per year. A minimum of, two years is necessary to achieve the Master's degree.
3. Attendees have the option to enroll in any modules of their interest.
4. Each module ECTS credit requires approximately 15 hours of work at home.
5. Diplomas are issued by UNED (*Universidad Nacional de Educación a Distancia*) in Spain.
6. To enroll in this postgraduate program, an EHEA or equivalent Bachelor's degree or greater is required (*EEES Grade*).



**SPECIAL MASTER'S FINAL PROJECT AWARD**

UNED and its Superior Technical School of Mechanical Engineers will reward the best M.Sc.'s final project presented in the program. The award will consist of public recognition of the attendee's work and a special certificate.





## 2. METHODOLOGY

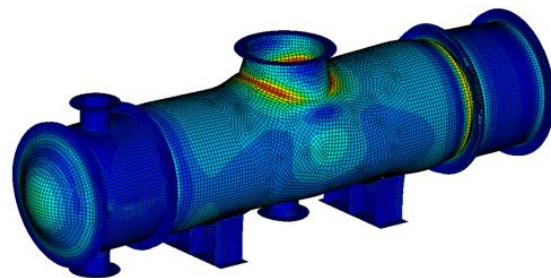
### BEFORE STARTING; HOW TO APPROACH THE MASTER'S PROGRAM

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Since this is an online Masters of great scope, it is necessary to give the attendee an idea of how to approach it. Therefore, this section should be read before starting the course.

First of all, you can attend the opening session, on site or online. This is the act in which the Master's program is officially presented, with the presence of UNED University and Master's Program directive. During this session welcoming and presentation speeches and a master class are done.

Each module will start with an online meeting. The goal of these online meetings is to lay the foundations for each subject. The professor or tutor of each subject will explain the main themes of the subject's syllabus. You will be able to



ask any questions you may have in a Q&A section. Please pay attention to forums where the meetings will be announced.

The teaching staff thinks that it is advisable to simultaneously start studying the Foundations and Application subject of each module (Expert module or specialized modules). This also implies progressively completing the corresponding self-evaluation exercises of these subjects (the exercises solved in the base text of each subject). As attendees progress in the study, they will be able to complete the **C**ontinuous **A**ssessment **E**xercises (CAEs).

It should be pointed out that it is mainly a self-study course; hence it is highly advisable that attendees start to study as soon as the course material is delivered.

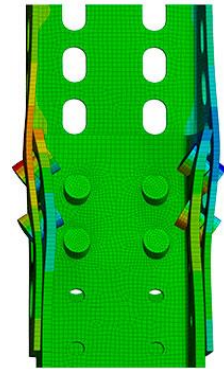
It is highly recommended (although not mandatory) that all attendees submit the CAEs; this will help you to get involved in the modules and will serve as training for the exam. All the information about the CAEs is available in the virtual classroom.

Solving the CAEs will give the attendee the opportunity to improve their modeling techniques, to learn or improve their reporting skills and to learn how to perform a Finite Element analysis (as done in the industry). Direct support from experienced engineers will be provided, giving added value to doing the CAEs.

In the different virtual classrooms of each subject, you will find the deadlines for CAEs and the exams. Additionally in the “**Evaluation**” section of this guide you can find some of these dates.

As in any other course, continuous practice is the key to success. For this purpose, each module provides the attendee with a set of training exercises that should be done as the attendee is progressing through the theoretical contents.

In the calendar at the end of this section, you will find the dates of the two exam periods please make a note of these dates. Additionally you can be informed about the exams in the “**Evaluation**” section.



## TUTORSHIPS

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Tutorships consist of guiding the attendees in their learning process. To do this the Master's mainly uses online meetings, virtual classrooms and the forums for each subject.

Tutorships will be conducted in English or Spanish (this option is available only by email).

Key elements of distance learning are:

- **Virtual classrooms:** This is where you will find the necessary materials and content to navigate through the course. You will find the teaching and exercise



materials, software, forums, etc. In order to use this tool, it is necessary to have an internet connection.

- **Base texts:** The main training material of the Master's. Specially created for the program, combined with a selected bibliography to study. These texts are for the Foundation, Application and Practical courses as well as being part of "hands-on" exercises.
- **Software:** Attendees will have access to educational software licenses of ANSYS software (including ANSYS Mechanical, ANSYS Fluent, and ANSYS ACP) by ANSYS Inc. All the software included is 3D based and has all the elements needed to complete the various types of analysis throughout the course.
- **Self-evaluation exercises:** Test yourself and track your progress through these exercises and related solutions available in the base texts. Check your acquired subject knowledge and see where you need to improve.
- **Continuous Assessment Exercises (CAEs):** These exercises are part of the various modules' training materials and are accessible through the virtual classroom. These exercises should be solved and submitted to the professor for review.
- **Online meetings/Recordings:** Subject specific sessions on each module will be given by the professor and recorded for viewing at your discretion.
- **Forums:** Where the attendees have the chance to interact and consult with each other and the tutors. This is a very powerful tool if used properly and in accordance with the rules. Lots of questions and doubts can be answered and clarified through the forums.
- **Exams:** Will be conducted using distance test questions and practical exercises. They are completely online.

Tutorships will primarily be available through the virtual classroom, although it will be possible to contact the course teaching staff by telephone, e-mail or in person during normal office hours. Each subject will offer four hours of tutorships per week. More information about this will be provided by the individual professors. The professors' contact information is located in the branch specific guides and virtual classrooms.

## EVALUATION

Attendee evaluations will be conducted using direct contact through the tutorships and the virtual classroom, online exams, continuous assessment exercises and the final project. The attendee grade will be based on the following criteria:

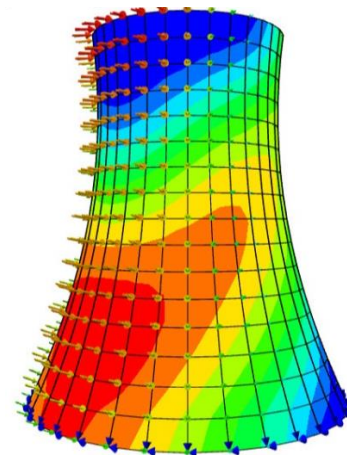
### 1- Online exams:

There will be two calls, the 1<sup>st</sup> call (September) and the 2<sup>nd</sup> call (November).

- The 1<sup>st</sup> call (September) is only for the Basic Module attendees.
- The 2<sup>nd</sup> call (November) is for all the attendees: (except the Basic Modules attendees who passed the 1<sup>st</sup> call):
  - Basic module 2<sup>nd</sup> call (for attendees who failed or were not able to take the 1<sup>st</sup> call).
  - Specialized modules exams (Important: there is only one call for the specialized modules).

The structures of the exams are:

- Basic module exam (1<sup>st</sup> and 2<sup>nd</sup> call):
  - Foundations test: they will consist in test questions to perform them online during the exams period. Each exam will have a specific time.
  - 1 Practical exercise using the chosen software: downloadable since the start date and must be delivered before the due date. Similar to the practical CAEs solved during the course.
  - 1 Practical subject test: 10 test questions about the chosen software. 1 hour to complete it online during the exams period.

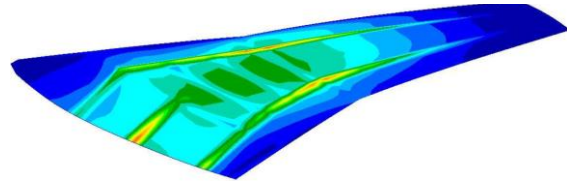


These exams will be available in each Basic Module Virtual Classroom.

- Specialized modules exams: (Per module)

- 1 Foundations test: 10 test questions. 2 hours to complete it online during the exam period.
- 1 Practical exercise using the chosen software: downloadable since the start date and must be delivered before the due date. Similar to the practical CAEs solved during the course.
- 1 Practical subject test: 10 test questions about the chosen software. 1 hour to complete it online during the exams period.

These exams will be available in each Module Virtual Classroom.



#### **IMPORTANT EXAMS INFORMATION:**

- A minimum mark of 4 out of 10 in the practical exercise is required to combine it with the other exam marks in order to successfully pass the module.
- All the exams using/about a specific software will be available for the attendees in the exams tools of the Modules Virtual Classrooms, but only the chosen software exams must be done.
- All the tests (Foundations test and Practical subject test) must be completed in a unique logging, not leaving the exam webpage before the delivery.
- The grades of the independent parts of the exam (Foundations test, Practical exercise and Practical subject test) are not saved between the 1<sup>st</sup> and the 2<sup>nd</sup> call or between Master's editions.
- The questions included in the tests will be available in English and Spanish (in the same test), excepting if the Professor is English Spoken.

#### **Exams schedule:**

- The 1<sup>st</sup> call (September) exam dates are:  
Start date: September 20, 2024  
Due date: October 7, 2024
- The 2<sup>nd</sup> call (November) exam dates are:

Start date: November 8, 2024

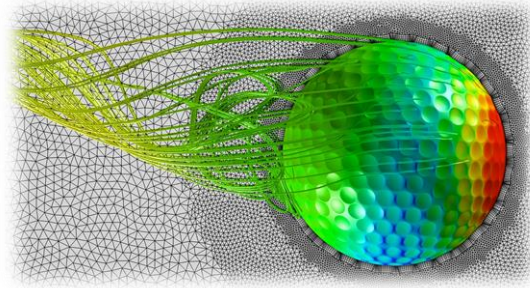
Due date: November 25, 2024

## 2- Continuous assessment exercises (CAEs):

There are many benefits to these exercises:

- A way to settle ideas and to clarify concepts related to the course content.
- A way to develop teacher/attendee relationship and communication.
- A means of self-assessment.
- A means of assessment by the professor.

We suggest gradually sending the remote evaluation exercises as the attendee progresses through the subject. This will help the attendee absorb the materials as part of the continuous learning process.



It is worth noting that the completion of these exercises is not mandatory, but counts two points of the final grade of the corresponding module (1 point foundations CAEs + 1 point practical CAEs). The CAEs are available through the corresponding subject virtual classrooms.

### CAEs schedule:

The delivery schedule of the foundations subjects CAEs is indicated in the Foundations virtual classrooms.

## 3- Module final grade calculation

The module final grade will be obtained using the following equation:

$$\text{Final grade} = 80\% \text{ exam grade contribution} + 20\% \text{ CAEs contribution}$$

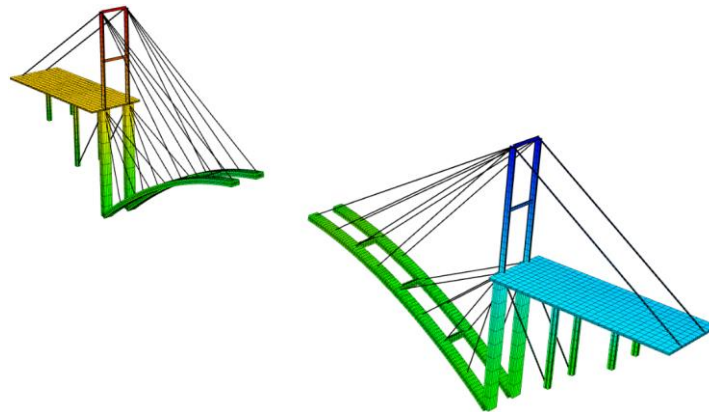
The weight of each exam part is:

- Expert Module:
  - Foundations test: 50%
  - Practical exercise: 40%

- Practical subject test: 10%
- Specialized Modules:
  - Foundations test: 35%
  - Practical exercise: 40%
  - Practical subject test: 25%

In order to successfully pass the module, it is necessary to obtain a minimum mark of 5 out of 10 in the Module final grade (as long as the requirement of the exam's practical exercise is fulfilled).

- 4- **Master's Final Project:** Will be directed by a member of the teaching staff of the program and judged by a committee appointed by the Master's Directorate.



## TEACHING STAFF

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### Director:

Professor J. J. Benito Muñoz. Construction Engineering and Manufacturing  
Department, School of Mechanical Engineers, UNED University.

### Coordinator:

Mr. Ronald Siat Caparrós. MSc Civil Engineer, Ingeciber, S.A.  
Ms. Cristina Moreno Romero, Ingeciber, S.A.

### Professors & Lecturers:

Associate Professor Alberto Fraile de Lerma. Mechanical Engineer PhD, U.P.M.

Associate Professor Claudio Zanzi. Mechanical Engineer PhD, UNED.

Mr. Alberto Mota Cossio. MSc Civil Engineer, Ingeciber, S.A.

Mr. Ambrosio Baños Abascal. MSc Science, Ibérica del Espacio, S.A.

Mr. Ángel Muelas Rodríguez. Civil Engineer PhD, Acciona Energía

Mr. Eduardo Salette Casino. Civil Engineer PhD, TECOPY

Mr. Jesús Flores. MSc Civil Engineer, Solute

Mr. José Ramón Arroyo Arroyo. MSc Mechanical Engineer, INTEMAC

Mr. Marcos Latorre Ferrús. Aeronautical Engineer PhD, UPV-Yale

Mr. Román Martín Martín. MSc Civil Engineer, Ingeciber, S.A.

Mr. Ronald Siat Caparrós. MSc Civil Engineer, Ingeciber, S.A

Professor José M<sup>a</sup> Sancho Aznal. Architect PhD, U.P.M.

Professor Juan José Benito Muñoz. Mechanical Engineer PhD, UNED

Professor Julio Hernández Rodríguez. Mechanical Engineer PhD, UNED

Professor Luis Gavete Corvinos. Mine Engineer PhD, U.P.M.

## INFORMATION SERVICE

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### o Master's Program secretariat

e-mail: [secretariat@ingeciber.com](mailto:secretariat@ingeciber.com)

Ingeciber, S.A.

C/ Vivero, 5, 3<sup>o</sup>2. 28040 Madrid (Spain)

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### o Master's coordination

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Cristina Moreno



E- mail: [c.moreno@ingeciber.com](mailto:c.moreno@ingeciber.com)

- **Master's Program Web:** [www.uned.es/mastermef](http://www.uned.es/mastermef)
- **Escuela Superior de Ingenieros Industriales** (Superior School of Mechanical Engineers). *UNED*

C/ Juan del Rosal, 12. 28040 Madrid (España)

### 3. VIRTUAL CLASSROOM

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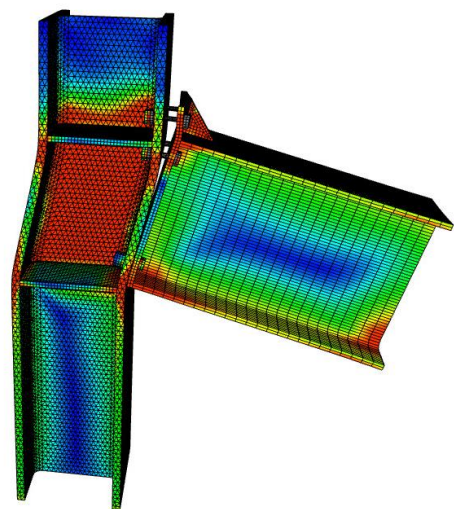
#### INTRODUCTION

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Over the last decade the importance of the internet as an information and ideas exchange has grown while the ease of access to the web has increased. Today the internet is rapidly becoming the best way to provide an extended teaching-learning environment that goes beyond the capabilities of a conventional university classroom. The learning experience is enhanced by making the following tools and benefits available for attendees:

- Remote Online Access: offers the time savings and the distance learning flexibility
- Multimedia Communication with other attendees, professors and tutors from around the Globe
- Online Notice board
- 24/7 Access to current teaching materials and exercises
- Online meetings
- Etc.

In order to take advantage of all the available technology and to create a top notch teaching-learning environment on the web, UNED and INGECIBER have adopted the aLF, Learning Management System which contains all the required features and tools in a friendly and easy to use framework. This environment will provide *attendees with all the essential information to participate and succeed in the program.*



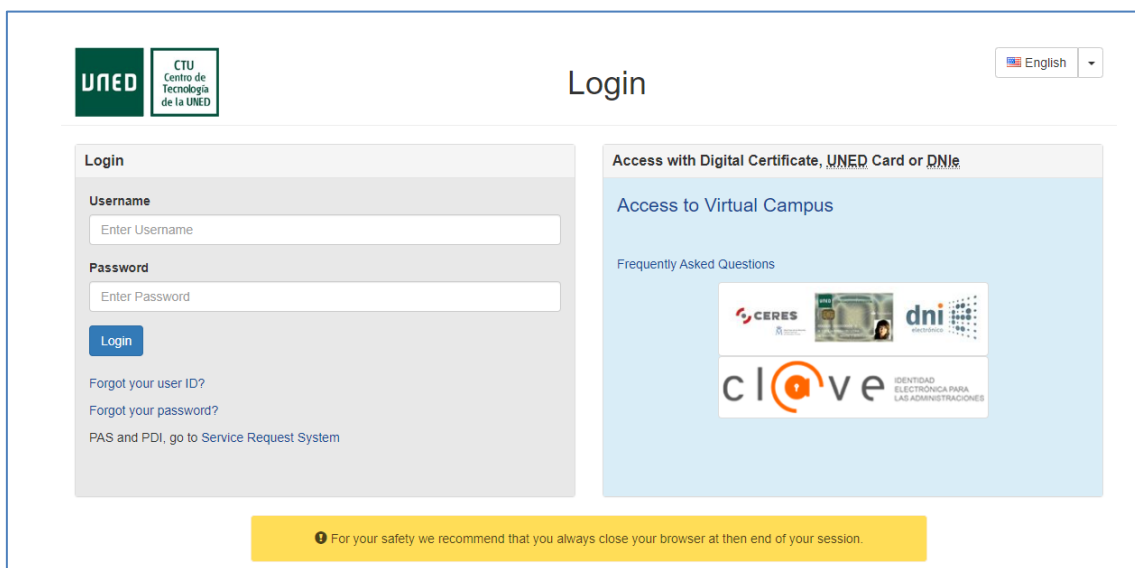
## VIRTUAL CLASSROOM LOG IN INSTRUCTIONS

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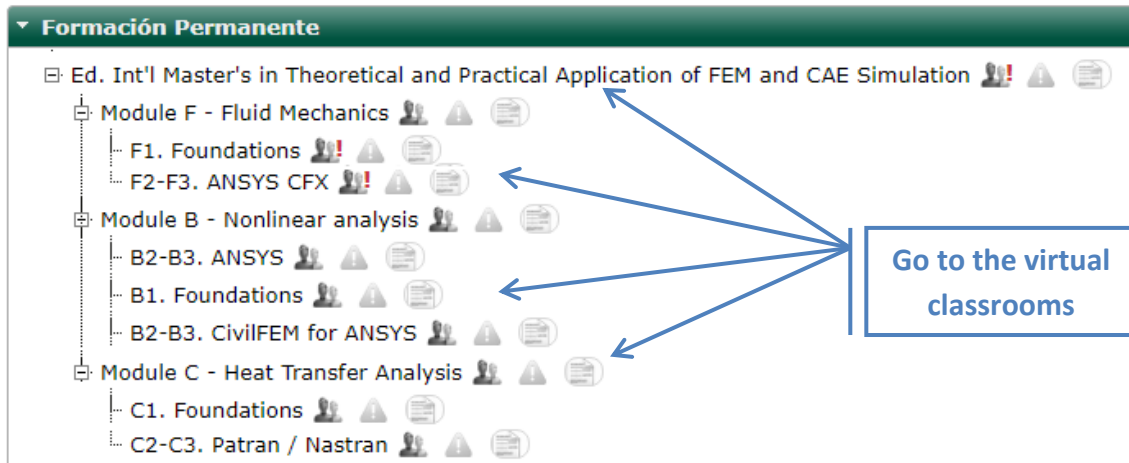
To access the virtual classroom, please use the following link:

<https://www.uned.es/universidad/campus/>

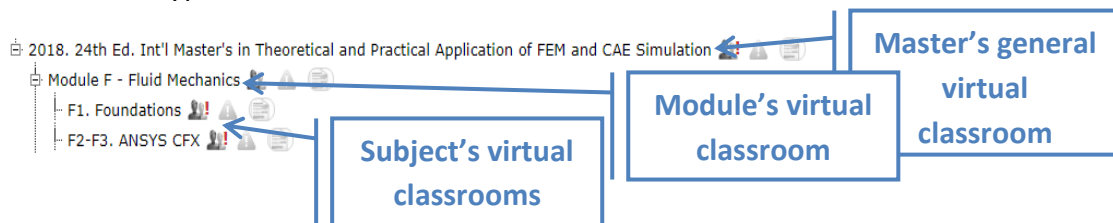
Username and password needed: Use the UNED ID and password obtained during the registration process (the Master's secretariat will provide it after the complete registration).



You will arrive to the Master's Program Tree:



There are 3 types of virtual classrooms:



After completing your registration, at the start date indicated in the previous timetable, you should have access to the Master's general virtual classroom, the Module's virtual classroom corresponding to your registration and the subject virtual classrooms (foundations and practical subjects depending on your software choice).

## CONTENTS AND STRUCTURE

The program is organized by modules and their corresponding virtual classrooms. These classrooms are the hub for accessing and learning the content of the various modules' subjects and facilitating communication between attendees, professors and tutors.

Please visit all the virtual classrooms to have a complete understanding of the Master's Program and the contents that you will find in each virtual classroom. This information will be also explained during the coordination session at the beginning of the course.

The following contents will be generally found in the **Subject's virtual classrooms**:

- Teaching materials for the subject.
- Self-assessment tools.
- Remote evaluation tools (CAEs).

- Means to contact professors and tutors.
- Forums to ask doubts and with specific information about the subject.

The following contents will be generally found in the **Module's virtual classrooms**:

- Exam tools (during the exam period).
- Links to the sessions of each subject.

In the common space, for all attendees, called "**Master's general virtual classroom**", the following contents are available:

- Communications from the course coordination (Forums and News tool).
- Guides and information about the course.
- Software access and installation instructions.
- Information and links to the inaugural session.
- Communication tools and contact information:
  - Technical support forum: Direct communication with the person in charge of resolving problems regarding software installation and the use of the virtual classroom.
  - Attendees' forum: For the exchange of ideas and views.
  - Secretariat.

