Free FEM Course for Civil Engineering

1. Program overview

Title: Free FEM Course for Civil Engineering – online course.

Director: Professor Juan José Benito Muñoz.

Department: Construction & Manufacturing Engineering (UNED University).

Software: CivilFEM powered by Marc (free licenses are included).

Tutorships: English/Spanish.

2. Eligibility and requirements

There are no specific academic requirements.

3. Goals

This program provides students with professional training in the Finite Element Method, with a focus on civil engineering. The goal of this free course is to give students a complete understanding of the Finite Element Method and to provide the necessary knowledge to use it, which can then be applied directly at engineering and manufacturing companies, scientific research institutes and other advanced studies.

With this objective in mind, the free course is completely structured into several application and practical subjects that include professional software currently used in the market, such as CivilFEM *powered by* Marc.

Ingeciber and UNED, the partners to this course, are determined to invest in the internationalization of students and collaborators and want to offer participants the maximum number of options, such as this course, with the goal of sharing experiences in the world of CAE at a global level.

4. Contents

The course is divided into two subjects:

1. CivilFEM Software Workflow.
2. Examples.

The contents of each subject are detailed below:

- **CivilFEM Software**

1. Getting Started.
2. GUI.
3. Geometry. Tools.
4. Materials & Cross Sections.
5. Mesh: Beam, Shells, Solids.
6. Loads and Boundary Conditions.
7. Solution and Results.
8. History Plots.
9. Code Checking and Design.

- **Examples**

1. Beam on Elastic Springs.
2. Concrete Slab Rebar Design under ULS and SLS (Eurocode 2).
3. Steel Walkway Code Check.
4. Concrete Foundation.
5. Frame Rebar Check ULS-SLS.
6. Rebar Design of a Concrete Arc.
7. Prestressed Concrete Beam.
8. Crack Analysis in Under-Reinforced Beam.
9. Crack Analysis in Over-Reinforced Beam.
10. Crack Analysis (Shear Failure) in Concrete Beam.
11. Shell Linear Buckling.

12. Non-Linear Buckling.
13. Cable Stayed Bridge Using Python Script.

5. Schedule

The online course is currently available, free unlimited license will be available for 1 month since enrolment date of each student. After one month, then the free student license will be provided.

6. Methodology

Distance learning methodology, including pre-prepared study materials and bibliography, tutorials, audiovisual resources and practical application exercises.

7. Teaching Materials

Attendees will receive the teaching guide and the corresponding materials for each module, which will basically consist of the subject texts.

The course uses a virtual classroom as a training facility where study tools can be found and also as the main communication channel with the attendees.
Other tools will also be used, including audiovisual resources as well as other supplementary documentation.

The teaching materials for this subject consist of:

- The introduction to CivilFEM *powered by* Marc training material and related workbook exercises.
- Additional training material for the course developed by ICAEEC.
- Software: CivilFEM *powered by* Marc.

All the software included is 3D based and has all the elements needed to complete the various types of analysis throughout the course.

8. Tutorships

The teaching staff will be available using the online platform of the course. The available tools are the forum and email. Tutorships can be performed in both English or Spanish language.

9. Evaluation and grading criteria

Attendee evaluation will be performed through the practical application exercises.

10. Certification

Certification will consist of a diploma from ICAEEC & Ingeciber indicating successful completion of the subject by the attendee as well as the grade obtained in the practical application exercises and a quiz. This certificate will accredit the student to be able to register in the specialized modules of our Finite Element Method Master's in collaboration with UNED. The cost of this instructor-signed certification is 50 €.

11. Fees

The course and CivilFEM licenses provided are totally free. Just log in or create an account.