

## Senior Certificate In Structural Engineering Commercial Software's

<b>Senior Certificate In Structural Engineering Commercial Software's</b>	
<b>Program Courses</b>	<b>Course Hours</b>
<a href="#"><u>ETABS - Extended 3D Analysis of Building Systems</u></a>	32
SAFE 12 - Designing Concrete Floor and Foundation Systems	14
SAP 2000-Beams and Bridge Analysis	14
D Beams and Prokon Software	14
ANSYS Finite Element Analysis	21
AutoCAD 2014	21

### Program Outlines

#### ➤ ETABS - Extended 3D Analysis of Building Systems

- **Day 1:**
  - General Introduction about ETABS. This will include the basic concepts like coordinate systems, local Axes, Nodes and Joints, Modeling, Finite Element Method, etc.
  - Identifying the toolbars and program commands through explaining the icons and some windows.
- **Day 2:**
  - Continuation of identifying the toolbars and orders of program.
- **Day 3:**
  - Analysis and design of multistory reinforced concrete building (12 story) which lateral structural system is building frame with shear walls, the exercise will include the following:
    1. Defining the material properties (concrete and steel).
    1. Defining and modeling all columns' and beams' sections.
    2. Defining and modeling all slabs' and shear walls' sections.
    3. Defining the vertical loads (dead and live) and lateral loads (wind and earthquake)
    4. Inserting the effects of the wind and seismic loads on the building and create load combinations.
    5. Analyzing the building (static analysis only)

6. Extracting the design results for each of the building elements.
7. Exporting the slabs and footings to the SAFE program which deals with analysis and design of slabs and footings.

**Day 4:**

Analysis and design of multi-story reinforced concrete building (24 story) which lateral structural system is dual system (shear walls and frames), that include the following:

1. Defining the material properties (concrete and steel).
2. Defining and modeling all columns' and beams' sections.
3. Defining and modeling all slabs' and shear walls' sections.
4. Defining the vertical loads (dead and live) and lateral loads (wind and earthquake)
5. Inserting the effects of the wind and seismic loads on the building and create load combinations.
6. Analyzing the building (static and dynamic analysis)
7. Extracting the design results for each elements.
8. Exporting the slabs and footings to the SAFE program which deals with analysis and design of slabs and footings.

✓ **SAFE 12 - Designing Concrete Floor and Foundation Systems**

**Day 1:**

- Introduction about SAFE 12.
- Definition of the toolbars and the commands of SAFE 12
- Modeling using built in template
  - Modelling roofs with and without drop beams.
  - Modeling an isolated and combined footings.
- Design and analysis of five story building established on an isolated and combined footing (type of soil assumed is sand)
- Design and analysis of a pile cap

**Day 2:**

- Design and analysis of a 25 multi-story building sitting on a raft foundation. The design will be against the vertical and horizontal applied loads.
  - Perform none linear analysis to characterize the tension within the foundation as a result of horizontal and vertical loading will be discussed in depth.
  - Design and analysis of none linear concrete slab. The representation of cracks in concrete deck will be detected. Data obtained will be compared to American and British building codes by using two different slabs: one is solid while the second one will be hollow slab.
- ✓ **Sap 2000 Beams and Bridge Analysis.**

**Day 1:**

- Sap program definition and introduction
- Explanation of Sap toolbars and program command
- Analysis and design of reinforced concrete continuous beams using concentrated and distributed loads
- Analysis and design of concrete frame to resist horizontal and vertical applied loads

#### **Day 2:**

- Design and analysis of steel frame to resist vertical and horizontal loads
- Design and Analysis of steel trusses to resist both vertical and horizontal applied loads
- Modeling and design a circular water tank having a diameter of 25m and a height of 7m.
- Modeling, analysis and design of elevated water tank.
- 

#### ✓ **D Beams and PROKON Structural Analysis Software**

#### **Day 1**

- Analysis of 2d and 3d frames.
- Analysis, design and detailing of continuous beam.
- Analysis, design and detailing of pre-stressed concrete beams.
- Design of flat slabs using shell finite element analysis including punching shear
- Design and detailing of long columns (rectangular, circular columns, any general shape )
- Design and detailing of an isolated and combined footings.
- Stability analysis, design and detailing of concrete retaining walls for soil and surcharge loads, and seismic load conditions (cantilever, simply supported).

#### **Day 2**

- Analysis, design and detailing of single beam subjected to wide range of loading conditions.
- Analysis, design and detailing of continuous beam including the calculations of immediate and long term deflections accounting for a cracked section.
- Analysis, design and detailing of single beam subjected to torsion.

#### ✓ **ANSYS Finite Element Analysis**

#### **Day 1:**

- Introduction
- Plane stress brackets
- Solid modeling
- Two dimensional truss
- Analysis of beams

#### **Day 2:**

- Effect of self-weight
- Distributed loadings
- Nonlinear analysis
- Buckling
- Dynamic Analysis

**Day 3:**

- Springs and joints
- Analysis of pole structures
- Analysis of guyed steel towers
- ANSYS project
- ✓ **AutoCAD 2014**

**Day 1:**

- Introduction of AutoCAD 2014
- Creating basic drawings
- Manipulating objects
- Drawing organization & inquiry commands
- Altering objects

**Day 2:**

- Working with layouts
- Annotating the drawing
- Dimensioning
- Hatching objects

**Day 3:**

- Working with reusable content
- Plotting your drawings
- AutoCAD small project
- Certificate submission and graduation Ceremony