

## SAP2000 Essentials: Modeling, Analysis & Design

### Target Audience:

This course is designed for civil and structural engineers, engineering students, and construction professionals who are looking to master SAP2000 for structural modeling, analysis, and design. Prior knowledge of basic structural mechanics is helpful but not mandatory.

### Course Objective:

The objective of this course is to provide learners with a practical understanding of SAP2000's powerful tools and features, enabling them to confidently create, analyze, and design structural models for a variety of engineering applications using industry-standard practices.

### Course Outcome:

By the end of this course, learners will be able to:

- Navigate the SAP2000 interface efficiently.
- Model different types of structural components including frames, cables, and shells.
- Apply various loads (static, dynamic, seismic, wind) and understand their behaviour.
- Perform linear and nonlinear analyses including response spectrum and time history.
- Design and optimize structural components based on code requirements.
- Generate professional reports and work with API for automation.

### Course Outline:

The course comprises **40-hours** of theory and labs and is divided into **9** different Modules. Each chapter will be followed by **hands-on lab exercises** to reinforce learning and gauge understanding of the topics covered

## **Module One: Introduction**

- Introduction to SAP2000 UI
- Creating New Project

## **Module Two: Modeling**

- Select Commands
- Draw Commands
- Nonprismatic Sections
- Area Edge Constraints
- Tension-only Bracing
- Section Designer
- Cardinal Points
- Cable Objects
- Tendons
- Gap Elements
- Varying Mass in Seismic Analyses

## **Module Three: Loading**

- Wave Loading
- Automated Wind Loads
- Define and Assign Joint Patterns in SAP2000

## **Module Four: Analysis**

- Mass and Modal Analysis
- P-Delta Analysis
- Response Spectrum Analysis
- Modal Time History Analysis
- Nonlinear Staged Construction
- Nonlinear Shear Walls
- Static Pushover Analysis
- Power Spectral Density
- Model Alive
- Buckling Factors and Modes
- Fast Nonlinear Analysis
- Steady-State Vibration
- Modeling Beam-Column Joint Flexibility

## **Module Five: Design**

- CSiLoadOptimizer
- Concrete Shell Reinforcement Design

## **Module Six: Reporting**

- Creating Reports

## **Module Seven: Tools**

- Open Application Programming Interface
- Web Activated Licensing

## **Module Eight: Database Tables**

- Interactive Database Editing
- Displaying Tabular Data

## **Module Nine: Import and Export**

- Import of DXF Models