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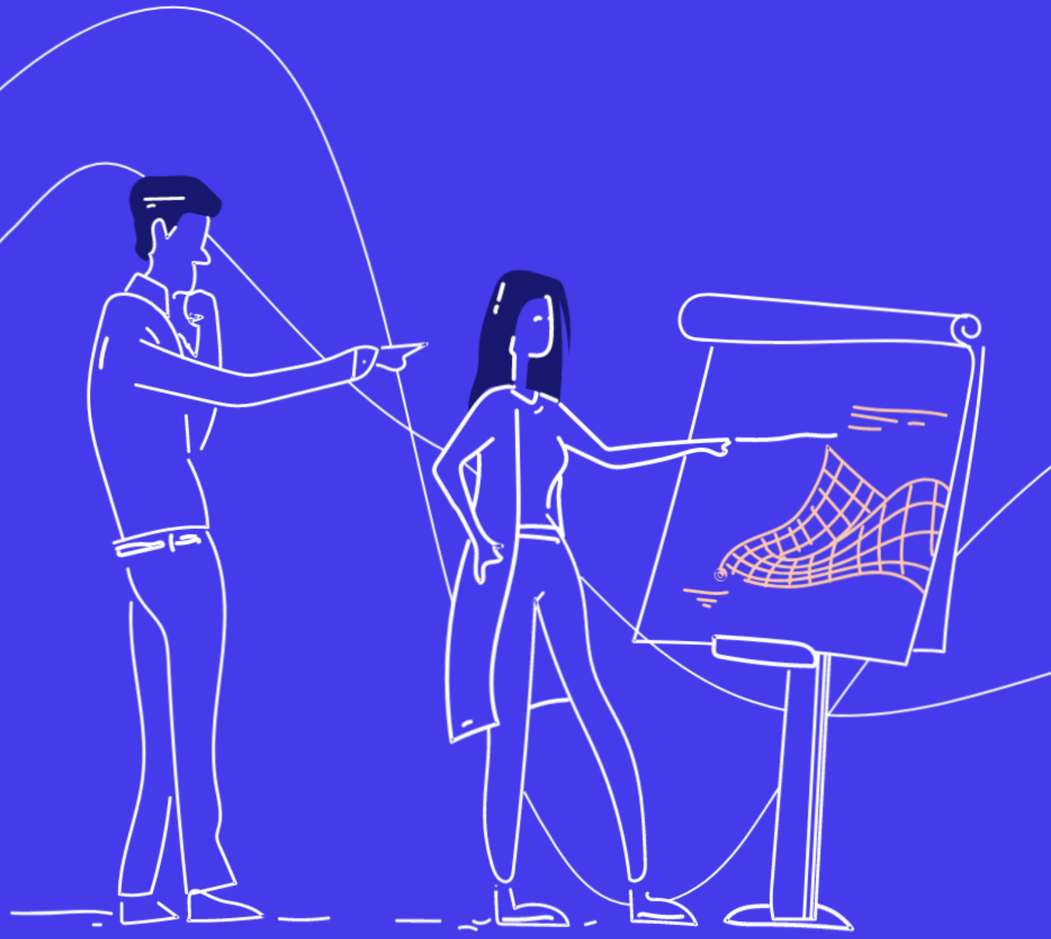
Structural Mechanics Intensive Course



SciEngineer's training courses are designed to help organizations and individuals close skills gaps, keep up-to-date with the industry-accepted best practices and achieve the greatest value from MathWorks® and COMSOL® Products.

Structural Mechanics Intensive Course

If you are interested in using the COMSOL Multiphysics® software for structural mechanics simulations, this is the course for you. During the 2-day COMSOL Multiphysics® Structural Mechanics Training course, you will develop a strong foundation for your future structural mechanics modeling work. We begin with the essential modeling steps common to all structural simulations, starting with examples from linear elasticity. From there, we will work through stationary, transient, frequency domain, and eigenvalue analyses. This will be followed by nonlinear structural mechanics: large deformation and buckling, contact analysis, and material nonlinearity. Finally, Multiphysics couplings, fatigue analysis, and other advanced techniques will be addressed. To teach this course, we use a combination of guided hands-on training, theoretical and practical lecture, and self-guided hands-on training. The goal is to immerse you in all the main aspects of using COMSOL Multiphysics® and the structural mechanics add-on modules so that you feel comfortable working with the software. You will leave the course feeling confident that you are correctly solving your structural problems with COMSOL Multiphysics®.

Suggested Background

This course assumes familiarity with basic concepts of solid or structural mechanics. We strongly recommend that those new to COMSOL Multiphysics® take the COMSOL Multiphysics® Intensive course prior to attending this class.

Topics Include

- Linear static analysis
- Anisotropic materials
- Thermal stress
- Shells, plates, membranes, beams, and trusses
- Interfacing structural elements
- Eigenfrequency, frequency-domain, transient, and modal analysis
- Geometric nonlinearity
- Buckling and post buckling analysis
- Contact, friction, adhesion, and decohesion
- Meshing best practices in solid mechanics
- Small strain inelasticity (plasticity, creep, viscoelasticity)
- Nonlinear elasticity and hyper elasticity
- Finite strain inelasticity
- External strains and stresses
- Interactions with fluids, moisture, heat, and electromagnetics
- Rigid body dynamics
- Fatigue analysis, including Multiphysics effects such as thermal fatigue

Day 1, 9:00am – 5:00pm

Please plan to check in between 8:30 am - 9:00 am

The course begins with a review of the COMSOL Multiphysics® modeling workflow using linear structural analysis as an example. You will learn:

- Analysis of stress and deformation in linearly elastic materials
- Specification of constraints and loads including thermal effects
- Modeling of high-aspect-ratio structures using shells, plate, membranes, beams, and trusses
- Connecting different structural elements such as shells and beams
- Structural dynamics (eigenfrequency, frequency-domain, transient, and modal analysis)

This will be followed by discussions and exercises on solver and meshing best practices for nonlinear mechanics problems such as:

- Large deformation and buckling
- Structural contact

Day 2, 9:00am – 5:00pm

Please plan to check in between 8:30 am - 9:00 am

The second day begins by extending nonlinear analysis to material nonlinearities such as hyper elasticity, plasticity, and creep. This includes:

- Small strain plasticity, viscoelasticity, and creep
- Nonlinear elasticity and finite strain inelasticity
- External strains and stresses

Based on audience interest, one or more of the following Multiphysics effects with solid mechanics will be treated:

- Fluid-structure interaction
- Effect of moisture transport in solids
- Electromagnetics in deforming solids

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Expand your knowledge