

# LS-DYNA® Training

By Predictive Engineering

## Implicit and Explicit Nonlinear Transient Analysis for Structural Mechanics



**When:** Oct 5 - 9, 2020 (five days)

**Where:** Portland, Oregon

**Cost:** \$3,250.00/student

**What's Included:** Course manual, notes and workshop video files will be provided on a flash drive for post-class refresher training. One lunch and one social event are provided to encourage class interaction with fellow users. Course provides 40 hours of professional continuing education credits.

**Registration:** Early registration is encouraged since space is limited to 15 students and it is expected that the class will fill. Class hours are 8am-5pm Mon-Thurs with Friday 7am-2pm.

To register please send email to:

[Training@PredictiveEngineering.com](mailto:Training@PredictiveEngineering.com)

Attn: George Laird, PhD, PE

**Computer:** All course materials will be available on USB stick. We recommend that students configure and bring their own laptops since a 10,000 element LS-DYNA license is provided to provide continuity of learning after the class. We do have limited availability of loaner laptops for students.

### Training Venue:

Our training venue is the Hotel Rose, located along Portland's beautiful waterfront. Please contact us for the block room discount code.

### About Predictive Engineering

Based in Portland, Oregon, Predictive has 15+ years of experience with LS-DYNA consulting, services and training. References available at our website:

[www.PredictiveEngineering.com](http://www.PredictiveEngineering.com)



FINITE ELEMENT ANALYSIS

# Predictive Engineering

## Engineering Short Course

This week-long course is directed toward the engineering professional simulating highly nonlinear, transient dynamic problems involving large deformations and contact between multiple bodies. Our goal is to provide a realistic foundation toward the practical usage of LS-DYNA as we have used it on hundreds of simulation projects.

The course is fast paced and follows a theory, usage discussion and workshop format followed up by Q&A sessions. All workshops are provided in video format for later review by the students.

### Course Outline

#### Day 1: Theoretical Foundation

- I. Implicit versus Explicit
- II. Explicit Time Step - CFL (Workshop)
- III. Mass Scaling – CMS/SMS (Workshop)
- IV. Meshing for Explicit Success (Workshop)
- V. Explicit Element Technology (Workshop)

#### Day 2: LSPP & Material Modeling

- I. LS-PrePost Philosophy (Workshop)
- II. Material Modeling: Metals, Elastomers, Foams (Workshop)
- III. Equation of State (EOS)
- IV. Material Failure & Fracture (Workshop)
- V. Rigid Bodies (Workshop)

#### Day 3: Contact & Load Initialization

- I. Contact Theory & Application (Workshop)
- II. Edge-to-Edge Contact & Other Pathologies (Workshop)
- III. Tied-Contact: Mesh Transitions, Gluing, Welding (Workshop)
- IV. Negative Sliding Interface Energy (Workshop)
- V. Implicit-to-Explicit Switching: Load Initialization (Workshop)

#### Day 4: Drop Test, Damping & Bird Strike (SPH)

- I. Dynamic Relaxation for Bolt Preload (Workshop)
- II. Damping (Workshop)
- III. Drop Test Simulation (Workshop)
- IV. Smoothed Particle Hydrodynamics (Workshop)
- V. Bird Strike / Ballistic Impact (Workshop)

#### Day 5: Implicit Analysis: Linear to Nonlinear to Vibration

- I. Observations on Implicit versus Explicit Analysis
- II. Implicit analysis: Linear, Static Stress Analysis (Workshop)
- III. Nonlinear Implicit Analysis with Mortar Contact (Workshop)
- IV. Troubleshooting Nonlinear Implicit Analyses (Workshop)
- V. Normal Modes Analysis, Sine Sweep and PSD Analyses
- VI. PSD Analysis with Fatigue Assessment (Workshop)
- VII. Q&A