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Computer-Aided Design and Analysis

SolidWorks

- Interface and Basic Sketch Tools
- Part Design and Features
- Assembly and Mating
- Technical Drawing and Dimensioning
- Surface Modeling
- Sheet Metal and Weldments
- SolidWorks Simulation (Intro to Static Analysis)

MATLAB & Simulink

- MATLAB Basic Syntax, Vectors, and Matrices
- Functions, Loops, and Scripting
- Data Visualization (2D and 3D Plotting)
- Numerical Methods (Derivatives, Integrals, ODEs)
- System Modeling with Simulink Block Diagrams
- Control Systems Design (Control System Toolbox)

Computational Fluid Dynamics (CFD)

- Introduction to CFD and Navier-Stokes Equations
- Meshing Strategies and Quality Criteria
- Turbulence Models (k-epsilon, k-omega, LES)
- Ansys Fluent / CFX Setup and Solution Stages

Finite Element Analysis (FEA)

- Finite Element Method (FEM) Fundamentals
- Linear and Non-linear Static Analyses
- Dynamic, Vibration, and Modal Analyses
- Fatigue and Life Analysis
- Using Ansys Mechanical and Boundary Conditions

Artificial Intelligence Applications (AI)

- Artificial Intelligence and Machine Learning in Engineering
- Big Data and Data Processing
- Neural Networks and Design Optimization
- Predictive Maintenance

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Last update: **2026/04/02 16:51**