Course 5 — Applied Machine Learning for Engineering Systems

Tier: 3 (Technical Instructor) · **Days:** 5 · **Cohort max:** 12 · **Ratio:** 1:12
Prerequisites: Python refresher (pre-course screener) or completion of Adept Elite Python bridge.
Tools provisioned: Python/scikit-learn environment, CV model sandbox (YOLO/Detectron), engineering sensor datasets, simulation data samples.

Day 1 — Python for engineers + supervised learning: regression/classification mapped to failure prediction, load estimation.
Day 2 — Feature engineering from sensor data: model training/validation with scikit-learn; interpreting outputs for engineering decisions.
Day 3 — Computer vision for inspection: crack detection, defect identification using pre-trained models on engineering imagery.
Day 4 — Generative AI for design exploration: LLMs for design alternatives and parameter sweeps; simulation data augmentation.
Day 5 — Capstone: build a predictive model or inspection prototype on a real engineering dataset; present with uncertainty quantification.

Capstone artifact: Working model + engineering interpretation report.
Tutor certification: Tier 3 + teach-back of Day 3 (CV) + rubric calibration.
Kit-specific notes: Datasets are real but anonymized; uncertainty-quantification template in Tutor Guide.

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