Modern Robot Learning: Hands-on Tutorial

IAP 2025

Instructor:	Pulkit Agrawal	Younghyo Park	**Time:**	Jan 6 — Jan 31
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Course Pages: https://dexhub.ai/mit-iap2025

Objectives: This course provides a comprehensive, hands-on introduction to training robots using state-of-the-art machine learning techniques. Key topics include data collection, machine learning methods such as Action Chunking Transformer (ACT) and/or Diffusion Policy, environment modeling in the MuJoCo simulator, and Real2Sim/Sim2Real techniques. Students will teleoperate a simulated robot in augmented reality via the Apple Vision Pro, and train a machine learning model to autonomously complete a task of their own design. The course culminates in a competition, judged on both robot performance and creativity of the chosen task. A solid working knowledge of Python and a basic understanding of machine learning are prerequisites. The course focuses entirely on the project, with no additional assignments.

Prerequisites: 6.390 Intro ML / **6.101** Intro Python

Course Schedule:

1. Week 1: (Mon) Course Introduction, (Wed) Policy Architectures and Training Tutorials, (Fri) MuJoCo Tutorial
2. Week 2: (Mon) Real2Sim/Sim2Real Techniques, (Wed) DART and DexHub Tutorial, (Fri) Project Proposal Due
3. Week 3: (Mon–Fri) Office Hours for Data Collection and Training
4. Week 4: (Mon–Thur) Office Hours, (Fri) Policy Evaluation Competition

Important Dates:

Project Proposal ..... Week 2, Fri
Project Approval ..... Week 3, Mon
Policy Evaluation Competition ..... Week 4, Fri

Course Instructors:

- Pulkit Agrawal, pulkitag@mit.edu
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- Jagdeep Bhatia, jagdeep@mit.edu
- Lars Ankile, ankile@mit.edu

Note: Students are expected to be in-person around campus for this IAP course.