

CS6260: Automated Planning and Learning

January-May 2026

E slot, CS15

Instructor: Pulkit Verma (pulkitv@cse.iitm.ac.in)

TA(s): Sayak, Swapnil, Tushar.

Note: Course related communication will be on IITM Moodle site [↗](#). Course material will be available on course website [↗](#).

1 Course objectives

To introduce students to the theoretical foundations and practical techniques of automated planning, ranging from classical deterministic planning to advanced forms including temporal and durative actions, planning under uncertainty, hierarchical planning, and autonomously learning the underlying models for these various planning paradigms.

2 Learning Outcomes

Students would learn (i) concepts in search and automated planning; (ii) encoding of planning problems in STRIPS-like formulation (PDDL, PPDDL, HDDL, MA-PDDL, etc.); (iii) approaches to learn the encodings autonomously; and (iv) implementing the aforementioned concepts to build planning agents.

3 Course prerequisite(s)

CS2800 Design and Analysis of Algorithms (or equivalent); MA2040 Probability, Statistics, and Stochastic Processes (or equivalent).

4 Classroom Mode

Traditional lectures, with one 50-minute tutorial slot per week. Tutorials would be interspersed with theory lectures.

5 Textbooks

1. Acting, Planning, and Learning by Malik Ghallab, Dana Nau, and Paolo Traverso; Cambridge University Press; 2025.

2. An Introduction to the Planning Domain Definition Language by Patrik Haslum, Nir Lipovetzky, Daniele Magazzeni, and Christian Muise; Morgan & Claypool Publishers; 2019.
3. Artificial Intelligence: A Modern Approach by Stuart Russell and Peter Norvig; Prentice Hall, 3rd Edition; 2009.

6 Attendance Requirements

Standard institute rules apply.

7 Planned Syllabus

The following topics will be covered:

1. Module 1: Deterministic Planning
 - (a) Introduction
 - (b) Search and Planning with Deterministic Models
 - (c) PDDL (Planning Domain Definition Language)
 - (d) Heuristics, Planners, Planning Graphs
 - (e) PDDL 3.0: Features and Planners
 - (f) PDDL 3.1: Object Fluents and Practical Limitations to Adoption
2. Module 2: Hierarchical and Multi-Agent Planning
 - (a) Hierarchical Task Networks (HTNs)
 - (b) HDDL (Hierarchical Domain Definition Language) and HTN Planning
 - (c) MA-PDDL (Multi-Agent PDDL) and Cooperative Multi-Agent Planning
3. Module 3: Planning under Uncertainty
 - (a) Markov Decision Processes (MDPs) and RL Basics
 - (b) FOND (Fully-Observable Non-Deterministic) Planning

- (c) Probabilistic Planning and PPDDL (Probabilistic PDDL)

4. Module 4: Learning for Planning

- (a) Learning Heuristics
- (b) Learning Deterministic Action Models
- (c) Learning HTN Methods
- (d) Learning PPDDL and NDRs (Noisy Deictic Rules)
- (e) Learning Predicates/Symbols for Planning

5. Module 5: Practical Applications (Some of the following topics depending on time)

- (a) PDDL for RL
- (b) PDDL for Task and Motion Planning (TAMP)
- (c) Large Language Models (LLMs) for PDDL Planning

8 Tentative Grading Policy

Quiz 1	Feb 19	20%
Quiz 2	Apr 02	20%
EndSem	May 12	30%
Assignments	Feb 13, Mar 13, Mar 30, Apr 17, May 05	25%
In-Class Tasks	Random	5%

9 Academic Honesty

Standard institute rules apply.