

# Introduction to AI

## Tentative Course Syllabus - Spring 2025

<b>Week 1</b> <b>Introduction to AI</b>		<b>Start of ENSIA Semester 26/01/2024</b>
	Lectures 27-29/01	<ul style="list-style-type: none"> <li>• What Is AI?</li> <li>• The Foundations of Artificial Intelligence</li> <li>• The History of Artificial Intelligence</li> <li>• The State of the Art</li> <li>• Risks and Benefits of AI</li> </ul>
<b>Weeks 2-3</b> <b>Intelligent Agents</b>	Lectures 03-05-10/02	<ul style="list-style-type: none"> <li>• Agents and Environments</li> <li>• Good Behaviour: The Concept of Rationality</li> <li>• The Nature of Environments</li> <li>• The Structure of Agents</li> </ul>
<b>Weeks 3-5</b> <b>Solving Problems by Searching</b>	Lectures 12-17-19-24/02	<ul style="list-style-type: none"> <li>• Search Algorithms</li> <li>• Uninformed Search Strategies</li> <li>• Informed (Heuristic) Search Strategies</li> <li>• Tree search and graph search</li> <li>• A* algorithm and its properties.</li> <li>• Memory efficiency search algorithms</li> </ul>
<b>Weeks 5 - 6</b> <b>Beyond Classical Search</b>	Lectures 26/02 & 03-05/03  <b>Thursday 28/02</b>	<ul style="list-style-type: none"> <li>• Local Search Algorithms and Optimization Problems</li> <li>• Local Search in Continuous Spaces</li> <li>• Searching with Nondeterministic Actions</li> <li>• Searching with Partial Observations</li> </ul> <p style="text-align: center;"><b>MINI-PROJECT out (Week 6)</b></p>
<b>Weeks 7 to 8</b> <b>Adversarial Search</b>	Lectures 10-12-17/03	<ul style="list-style-type: none"> <li>• Games</li> <li>• Optimal Decisions in Games</li> <li>• Alpha--Beta Pruning</li> <li>• Imperfect Real-Time Decisions</li> <li>• Stochastic Games</li> <li>• Partially Observable Games</li> <li>• Alternative Approaches</li> <li>• Limitations of Game Search Algorithms</li> </ul>
<div> <b>Midterm Exams Week</b> </div> <div> <b>To be determined by the administration</b> </div>		
<b>Weeks 8 to 9</b> <b>Constraint Satisfaction Problems</b>	Lectures 19/03 & 07-09/04	<ul style="list-style-type: none"> <li>• Defining Constraint Satisfaction Problems</li> <li>• Constraint Propagation: Inference in CSPs</li> <li>• Backtracking Search for CSPs</li> <li>• Local Search for CSPs</li> <li>• The Structure of Problems</li> </ul>

<b>Weeks 10 to 11</b> <b>Logical Agents</b>	Lectures 14-16-21/04	<ul style="list-style-type: none"> <li>• Knowledge-Based Agents</li> <li>• The Wumpus World</li> <li>• Logic</li> <li>• Propositional Logic: A Very Simple Logic</li> <li>• Propositional Theorem Proving</li> <li>• Effective Propositional Model Checking</li> <li>• Agents Based on Propositional Logic</li> </ul>
<b>Weeks 12 to 14</b> <b>First-Order Logic</b> + <b>Inference in First-Order Logic</b>	Lectures 23-28/04  Lectures 30/04 & 05/05	<ul style="list-style-type: none"> <li>• Representation Revisited</li> <li>• Syntax and Semantics of First-Order Logic</li> <li>• Using First-Order Logic</li> <li>• Knowledge Engineering in First-Order Logic</li> <li>• Propositional vs. First-Order Inference</li> <li>• Unification and Lifting</li> <li>• Forward Chaining</li> <li>• Backward Chaining</li> <li>• Resolution</li> </ul>
<b>Week 15</b> <b>Classical Planning</b> + <b>(Planning and Acting in the Real World</b> <b>Depending on advancement in the course coverage)</b>	Lectures 07-12-14-19/05  <b>Saturday 10/05</b>	<ul style="list-style-type: none"> <li>• Definition of Classical Planning</li> <li>• Algorithms for Planning as State-Space Search</li> <li>• Planning Graphs</li> <li>• Other Classical Planning Approaches</li> <li>• Analysis of Planning Approaches</li> <li>• Time, Schedules, and Resources</li> <li>• Hierarchical Planning</li> <li>• Planning and Acting in Nondeterministic Domains</li> <li>• Multi-agent Planning</li> </ul> <p style="text-align: right;"><b>Mini project due</b></p>
<b>Last day of classes 22/05/2025</b>		
<b>Final Exams Period:      Saturday 27/05/2025 - 03/06/2025</b>		