SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
Narsapur, West Godavari District, A.P. 534280
DEPARTMENT OF ROBOTICS

# TEACHINGPLAN

| Course Code | Course Title | Semester | Branches | Contact Periods /Week | Academic Year | Dateof commencement of Semester |
|---|---|---|---|---|---|---|
| 23RB6T02 | ARTIFICIAL INTELLIGENCE IN ROBOTICS | VI | ROBOTICS | 05 | 2025-26 | 10-12-2025 |

**COURSEOUTCOMES**

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|---|---|
| CO1 | Identify problems that are amenable to solution by AI methods.. [K4] |
| CO2 | Explain different planning methods used in AI for acting in real world. [K4] |
| CO3 | Analyze probabilistic reasoning using various methods. [K4] |
| CO4 | Demonstrate awareness and a fundamental understanding of AI techniques in Learning. [K4] |
| CO5 | Summarize the mapping, movements, and dynamics. [K4] |
| CO6 | Demonstrate proficiency developing applications in AI techniques in robots[K4] |

| UNIT | Outcomes / Bloom'sLevel | Topics No. | Topics/Activity | Text Book/ Reference | Contact Hour | Delivery Method |
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| | | | **INTRODUCTION** | | | |
| I | Identify problems that are amenable to solution by AI methods. [K4] | 1.1 | History of AI, State of the art | T1,T2 | 1 | Chalk &Talk, PPT, Active Learning |
| | | 1.2 | Need for AI in robotics | T1,T2 | 1 | |
| | | 1.3 | Thinking and acting humanly | T1,T2 | 1 | |
| | | 1.4 | Intelligent agents and structure of agents. | T1,T2 | 1 | |
| | | 1.5 | Solving problems by searching, Informed search and exploration | T1,T2 | 1 | |
| | | 1.5.1 | Greedy best-first search algorithm | T1,T2 | 1 | |
| | | 1.5.2 | A*search algorithm | T1,T2 | 1 | |
| | | 1.5.3 | Constraint satisfaction problem | T1,T2 | 1 | |
| | | 1.5.4.1 | Adversarial search-Minimax Algorithm | T1,T2 | 1 | |
| | | 1.5.4.2 | Alpha Beta Pruning | T1,T2 | 1 | |
| | | 1.6 | Knowledge and reasoning | T1,T2 | 1 | |
| | | 1.6.1 | Knowledge representation-Approaches | T1,T2 | 1 | |
| | | 1.6.2 | First order logic | T1,T2 | 1 | |

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| | | | | **Total** | **13** | |
| **PLANNING** | | | | | | |
| **II** | Explain different planning methods used in AI for acting in real world. [K4] | 2.1 | Planning and state space search | T1,R3 | 1 | Chalk &Talk, PPT, Video |
| | | 2.1.1 | Forward state space search with example | T1,R3 | 1 | |
| | | 2.1.2 | Backward state space search | T1,R3 | 1 | |
| | | 2.1.3 | Heuristics for planning | T1,R3 | 1 | |
| | | 2.2 | Partial order planning | T1,R3 | 1 | |
| | | 2.3 | Planning graphs | T1,R3 | 1 | |
| | | 2.3.1 | Planning graphs for heuristic estimation | T1,R3 | 1 | |
| | | 2.3.2 | The GRAPHPLAN algorithm, Termination of GRAPHPLAN | T1,R3 | 1 | |
| | | 2.4 | Planning with propositional logic | T1,R3 | 1 | |
| | | 2.5 | Planning and acting in real world | T1,R3 | 1 | |
| | | 2.5.1 | Hierarchical planning | T1,R3 | 1 | |
| | | 2.5.2 | Planning and acting in non deterministic domains, | T1,R3 | 1 | |
| | | 2.5.3 | Multiagentplanning | T1,R3 | 1 | |
| | | | | **TOTAL** | **13** | |
| **REASONING** | | | | | | |
| **III** | Analyze probabilistic reasoning using various methods. [K4] | 3.1 | Uncertainty-acting under uncertainty | T1,R3 | 1 | Chalk &Talk, PPT |
| | | 3.2.1 | Probabilistic reasoning | T1,R3 | 1 | |
| | | 3.2.2 | Conditional probability, Joint probability, marginal Probability | T1,R3 | 1 | |
| | | 3.2.3 | Bayes'theorem | T1,R3 | 1 | |
| | | 3.2.4 | Filtering and prediction | T1,R3 | 1 | |
| | | 3.2.5 | Hidden Markov models | T1,R3 | 1 | |
| | | 3.2.6 | Kalman filters | T1,R3 | 1 | |
| | | 3.2.7 | Dynamic Bayesian networks | T1,R3 | 1 | |
| | | 3.2.8 | Bayesian Network example problems | T1,R3 | 2 | |
| | | 3.3 | Speech recognition | T1,R3 | 1 | |
| | | 3.4 | Making decisions | T1,R3 | 1 | |
| | | | | **Total** | **12** | |
| **LEARNING** | | | | | | |
| | | 4.1 | Learning-Introduction | T1 | 1 | |
| | | 4.2 | Forms of learning | T1 | 1 | |

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| IV | Demonstrate awareness and a fundamental understanding of AI techniques in Learning. [K4] | 4.3 | Knowledge in learning | T1 | 1 | Chalk& Talk, Active Learning |
| | | 4.4 | Statistical learning methods | T1 | 1 | |
| | | 4.5 | Reinforcement learning | T1,T2 | 1 | |
| | | 4.5.1 | Active and Passive Reinforcement learning | T1,T2 | 1 | |
| | | 4.5.2 | Applications of Reinforcement learning | T1,T2 | 1 | |
| | | 4.6 | Communication, Perceiving and acting | T1 | 1 | |
| | | 4.6.1 | Natural language Processing | T1,R3 | 1 | |
| | | 4.6.2 | Probabilistic language processing | T1,R3 | 1 | |
| | | 4.6.3 | Speech recognition | T1,R3 | 1 | |
| | | 4.6.4 | Perception using vision | T1 | 1 | |
| | | | | **Total** | **12** | |
| **AIINROBOTICS** | | | | | | |
| V | Summarize the mapping, movements, and dynamics. [K4] Demonstrate proficiency developing applications in AI techniques in robots[K4] | 5.1 | Robotic perception | T1 | 1 | Chalk &Talk, Seminar |
| | | 5.1.1 | Localization | T1 | 1 | |
| | | 5.1.2 | Mapping | T1 | 1 | |
| | | 5.2 | Planning to Move-Configuration space | T1 | 1 | |
| | | 5.3 | Planning uncertain movements | T1 | 1 | |
| | | 5.3.1 | Robust Methods | T1 | 1 | |
| | | 5.5 | Moving- Dynamics and control of movement | T1 | 1 | |
| | | 5.5.1 | Potential field control | T1 | 1 | |
| | | 5.5.2 | Reactive Control, Reinforcement learning Control | T1 | 1 | |
| | | 5.6.5 | Ethics and risks of artificial intelligence in robotics | T1 | 1 | |
| | | | | **Total** | **10** | |
| **CUMULATIVEPROPOSEDPERIODS** | | | | | **60** | |

**TextBooks:**

| S.No. | AUTHORS,BOOKTITLE,EDITION,PUBLISHER,YEAROFPUBLICATION |
|---|---|
| T1 | Stuart Russell, Peter Norvig, Stuart Russell, Peter Norvig, "Artificial Intelligence,A modern approach", 3rdedition, Prentice Hall, 2016. |
| T2 | WolfgangErtel,"IntroductiontoArtificialIntelligence",2ndedition,Springer,2017 |

| ReferenceBooks: | |
|---|---|
| **S.No.** | **AUTHORS,BOOKTITLE,EDITION,PUBLISHER,YEAROFPUBLICATION** |
| R1 | Miroslav Kubat," An Introduction to Machine Learning",3rd edition Springer,2016 |
| R2 | Christopher M. Bishop, Christopher M. Bishop, "Pattern Recognition and Machine Learning"1stedition, Springer, 2016. |
| R3 | Stephen Lucci and Danny Kopec,"Artificial Intelligence in the 21st Century" 2nd Edition, Mercury Learning and Information, 2015. |
| **WebDetails** | |
| 1 | https://nptel.ac.in/courses/106105078 |
| 2 | https://nptel.ac.in/courses/106105079 |

| SNO | Details | Name | Signature |
|---|---|---|---|
| i. | Faculty | Dr.M.Francis Luther King M | |
| ii. | Course Coordinator | Mr.N.Bulli Raja | |
| iii. | Module Coordinator | Mr.B.MaheshKrishna | |
| iv. | Programme Coordinator | Dr.M.Francis Luther King M | |

Swarnandhra College of Engineering & Technology * Seetharampuram * MECH Dept.

**Principal**