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

DEPARTMENT OF ROBOTICS

LESSON PLAN

Course Code	Course Title	Semester	Branch	Contact Periods /Week	Academic Year	Dateof Commencement of Semester
20RB6T01	ARTIFICIAL INTELLIGENCE IN ROBOTICS	VI	ROBOTICS	05	2024-25	18-11-2024

COURSEOUTCOMES

CO1	Identify problems that are amenable to solution by AI methods.[K1]
CO2	Explain different planning methods used in AI for acting in real world.[K3]
CO3	Analyze probabilistic reasoning based on uncertainty.[K4]
CO4	Explain the learning methods of AI.[K2]
CO5	Explain the usage of AI techniques in robots.[K2]

UNIT	Outcomes / Bloom'sLevel	Topics No.	Topics/Activity	Text Book/ Reference	Contact Hour	Delivery Method
			INTRODUCTION			
I	Identify problems that are amenable to solution by AI methods. [K1]	1.1	History of AI, State of the art	T1,T2	1	Chalk &Talk, PPT, Flipped learning, Quiz
		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-Mini max 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	
				TOTAL	**13**	

PLANNING						
II	Explain different planning methods used in AI for acting in real world. [K3]	2.1	Planning and state space search	T1,R3	1	Chalk & Talk, PPT, GD, Quiz
		2.1.1	Forward state space search with example	T1,R3	1	
		2.1.2	Backward state space search with example, Sussman Anomaly	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 nondeterministic domains,	T1,R3	1	
		2.5.3	Multi agent planning	T1,R3	1	
				TOTAL	**13**	
REASONING						
III	Analyse probabilistic reasoning based on uncertainty. [K4]	3.1	Uncertainty-acting under uncertainty	T1,R3	1	Chalk &Talk, PPT, Active Learning
		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	1	
		3.3	Speech recognition	T1,R3	1	
		3.4	Making decisions	T1,R3	1	
				Total	**11**	
LEARNING						
		4.1	Learning-Introduction	T1	1	
		4.2	Forms of learning	T1	1	

IV	Explain the learning methods of AI.[K2]	4.3	Knowledge in learning	T1	1	Chalk& Talk, PPT, 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	Explain the usage of AI techniques in robots. [K2]	5.1	Robotic perception	T1	1	Chalk &Talk, PPT, Quiz
		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	2	
	Content beyond Syllabus		**Latest Innovations in Robotics**			
				Total	**11**	
CUMULATIVE PROPOSED PERIODS					**60**	

Text Books:	
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",2nd edition,Springer,2017

Reference Books:	
S.No.	**AUTHORS,BOOKTITLE,EDITION,PUBLISHER,YEAROFPUBLICATION**
R1	MiroslavKubat,"AnIntroductiontoMachineLearning",3rdeditionSpringer, 2016
R2	Christopher M.Bishop,ChristopherM.Bishop,"PatternRecognitionandMachineLearning"1st edition, Springer, 2016.
R3	StephenLucciandDannyKopec,"ArtificialIntelligenceinthe21st 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. Francis Luther King M	
ii.	Course Coordinator	Mr.N. Bulli Raju	
iii.	Module Coordinator	Mr.B. Mahesh Krishna	
iv.	Programme Coordinator	Dr. Francis Luther King M	

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

Principal