NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF COMPUTER APPLICATIONS

COURSE PLAN – PART I

Name of the programme and specialization	**MCA**		
Course Title	**Computational Intelligence**		
Course Code	CA723	**No. of Credits**	3
Course Code of Pre-requisite subject(s)	-		
Session	July 2023	**Section (if, applicable)**	A
Name of Faculty	Dr. MICHAEL AROCK	**Department**	Computer Applications
Email	michael@nitt.edu	**Telephone No.**	0431-2503736
Name of PAC Chairperson	Dr. L.Sindhia		
E-mail	sindhia@nitt.edu	**Telephone No.**	-
Course Type	Core course		

Syllabus (approved in BoS)

Introduction: Applications, Agents, Types pf Agents, Intelligent Agent, Agent Environment, Problem Solving by Searching Techniques, Uninformed Search, Informed Search, hill climbing, simulated annealing, genetic algorithm search, heuristic search, A* algorithm, Adversarial Search, AO* algorithm, Minimax and game trees, Alpha – Beta pruning.

Knowledge Representation and Reasoning: Knowledge representation, Propositional Logic, Rules of inference, First order logic, Inference in First order logic, resolution, unification, deduction system, Forward chaining, Backward chaining, refutation, PROLOG, semantic networks, frame system, Ontologies, Planning: Partial order planning.

Handling uncertainty: Bayes Theorem, Bayesian Belief Network, Inference in Bayesian Networks, Fuzzy rules, Fuzzy inference, Fuzzy logic controller.

Evolutionary Algorithms: Genetic programming - Evolution strategies - Evolutionary neural network - Metaheuristics - Swarm Intelligence - Ant colony systems – case studies.

Applications: Optimization, Control Systems, Expert Systems, Natural Language Processing and Decision making.

COURSE OBJECTIVES

• To know about basic concepts of NLP and Machine Learning

- To obtain a thorough knowledge of various knowledge representation schemes
- To have an overview of various AI applications
- To study about various heuristic and game search algorithms
- To know about various Expert System tools and applications

Mapping of COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
• Know how to build simple knowledge-based systems	1,3
• Apply knowledge representation and machine learning techniques to solve real world problems	1,2,3,4
• Apply Computational Intelligence techniques to solve real-world problems	1,2,3,4,5

COURSE PLAN – PART II

COURSE OVERVIEW

This course introuduces the concept of artificial intelligence and deals the problem solving methods. It discusses the ways to represent knowledge and how to reason logically with that knowledge. It describes machine learning and computational intelligence techniques for solving the real world problems. Finally, the course discusses various applications of artificial intelligence.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1	Introduction to CI, AI vs CI, Applications of CI	PPT, Chalk & Board
2	2	Problem Solving by Searching Techniques – Uninformed Search	PPT, Chalk & Board
3	3	Informed search, hill climbing, simulated annealing, heuristic search, Best first search, A* algorithm	PPT, Chalk & Board
4	4	AO* algorithm, Minimax and game trees, refining minimax, Alpha – Beta pruning	PPT, Chalk & Board
5	5	Intelligent Agents: rational, reflex, model-based, goal-based, and utility-based agents, Knowledge Representation: Propositional calculus, First order predicate calculus	PPT, Chalk & Board

6	6	resolution, unification, natural deduction system, refutation, reasoning - forward and backward chaining, logic programming	PPT, Chalk & Board
7	7	semantic networks, frame system, Ontologies, Planning	PPT, Chalk & Board
8	8	Handling uncertainty: Bayes Theorem, Bayesian Belief Network, Inference in Bayesian Networks	PPT, Chalk & Board
9	9	Fuzzy rules, Fuzzy inference, Fuzzy logic controller.	PPT, Chalk & Board
10	10	Evolutionary Algorithms: Genetic programming - Evolution strategies - Evolutionary neural network	PPT, Chalk & Board
11	11	Metaheuristics - Swarm Intelligence - Ant colony systems – case studies	PPT, Chalk & Board
12	12	Applications	PPT, Chalk & Board
13	13	Applications	PPT, Chalk & Board

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle test1	**Week 7**	**1 Hr**	20
2	Cycle test2	**Week 11**	**1 Hr**	20
3	Assignment	**Week 12**	-	10
4	Compensation Assessment	**Week 12**	**1 Hr**	20
5	Final Assessment	**At the end of course**	**3 hrs**	50

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

- The students through the class representative may give their feedback at any time to the course faculty which will be duly addressed.
- The students may also give their feedback during Class Committee meeting.

COURSE POLICY (including compensation assessment to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)

The students can get the availability of faculty member over phone and email. They can get their doubts clarified at any time with their faculty member with prior appointment.

COMPENSATION ASSESSMENT

One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

➢ **At least 75% attendance in each course is mandatory.**

➢ Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

➢ Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.

➢ Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.

➢ The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

FOR APPROVAL

Course Faculty _____ CC-Chairperson _____ HOD _____