CSC3MN202- Introduction to AI and Machine Learning(Minor)

Programme	B. Sc. Computer Science				
Course Code	CSC3MN202				
Course Title	Introduction to AI and Machine Learning				
Type of Course	**Minor**				
Semester	III				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	1. Fundamental Mathematics Concepts: Sets 2. Fundamentals of Python Programming				
Course Summary	This course provides an introduction to the ideas, techniques, and applications of artificial intelligence (AI) is given in this course. The fundamentals of knowledge representation, machine learning, and problem solving will be taught to the students.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Explain the basic concepts of Artificial Intelligence	Understand	C	Instructor-created exams / Quiz
CO2	Explain standard problem-solving techniques used in AI and describe how they are applied to address typical AI problems	Understand	C	Practical Assignment / Observation of Practical Skills
CO3	Explain the purpose and functionality of various packages used in developing AI and machine learning applications	Understand	C	Seminar Presentation / Group Tutorial Work/ Viva Voce
CO4	Describe the fundamental concepts of Machine Learning algorithms and Deep Learning techniques, and explain their applications and working principles	Understand	C	Instructor-

				created exams / Home Assignments
CO5	Implement and analyse Machine learning algorithms to solve practical problems and Apply Concepts in Real-World Projects	Create	M	Writing assignments/ Exams/ Practical

* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)

\# - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)

Detailed Syllabus:

Module	Unit	Content	Hrs	Marks(70)
I		**Introduction to Artificial Intelligence & Problem Solving**	**15**	**12**
	1	Introduction to AI – Evolution of AI, AI problems, AI Techniques, AI Applications	4	
	2	Various AI Domains (Introduction only)	2	
	3	Problem Solving Techniques - Search Algorithms, Knowledge representation and reasoning (Concepts only)	3	
	4	Problem Solving Techniques - constraint satisfaction problems, Game playing (Concepts only)	3	
	5	Problem Solving Techniques - Machine learning, Simulated Annealing (Concepts only)	3	
II		**Introduction to Neural Networks**	**8**	**12**
	6	Introduction to Artificial Neural Network	2	
	7	Understanding Brain & Perceptron Model	2	
	8	Single Layer Perceptron Model & Learning in Single layer Perceptron Model	2	
	9	Multi-Layer Perceptron Model & Learning in Multi-layer Perceptron Model	2	
III		**Python Packages for AI**	**15**	**10**

	10	Pandas	3	
	11	MatplotLib	3	
	12	Keras	3	
	13	Scikit-learn:	3	
IV		**Machine Learning Fundamentals**	**7**	**16**
	15	Introduction to Machine learning-	1	
	16	Applications of Machine Learning	1	
	17	Supervised machine learning- Classification, regression (concepts only)	2	
	18	Unsupervised machine learning	1	
	19	clustering, Dimensionality Reduction (concepts only)	1	
	20	Basics of reinforcement learning	1	
	21	Definition and history of deep learning	1	
	22	Key differences between traditional machine learning and deep learning	1	
V		**Hands-on Artificial Intelligence & Machine Learning using Python:** **Practical Applications, Case Study and Course Project**	**30**	**20**
	1	**1. Neural Network** Building a single layer perceptron using Keras **2. Multi-layer Neural Network** Setting up a multi-layer perceptron model **4. Supervised machine learning** Linear regression Decision tree **5. Unsupervised machine learning** K means clustering	20	

| | | PCA

6. Feature Engineering

Feature selection from a dataset | | |
|---|---|---|---|---|
| | 2 | Case study – AI tools / Use of AI in any movie | 3 | |
| | 3 | **Implementation of Comparison of any two machine learning algorithms on a dataset** | 7 | |

References

● Elaine Rich, Kevin Knight, Shivsankar B Nair, "Artificial Intelligence", Third Edition, Tata McGraw Hill Publisher

● Tom M. Mitchell, Machine Learning, McGraw-Hill, 1st Ed.

● Ethem Alpaydin, Introduction to Machine Learning- 3rd Edition, PHI.

Mapping of COs with PSOs and POs :

	PSO1	PSO2	PSO3	PSO4	PO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	-	-	-	-	-	-	2	1	1	1	1	_	1
CO 2	-	-	-	-	-	-	3	1	1	2	2	_	2
CO 3	-	-	-	-	-	-	3	1	1	2	2	_	2
CO 4	-	-	-	-	-	-	3	3	3	3	3	3	3
CO 5	-	-	-	-	-	-	3	3	3	3	3	3	3

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar

- Midterm Exam

- Programming Assignments (20%)

- Final Exam (70%)

Mapping of COs to Assessment Rubrics :

	Internal Exam	Assignment	Practical Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓		✓
CO 4	✓	✓		✓
CO 5	✓	✓	✓	✓
CO 6	✓	✓	✓	

CSC3MN203- Data Visualisation using Python

Programme	B. Sc. Computer Science				
Course Code	CSC3MN203				
Course Title	Data Visualisation using Python				
Type of Course	**Minor**				
Semester	III				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Have an understanding about algorithms and flowchart				
Course Summary	This course explores the versatility of Python language in programming and teaches the application of various data structures using Python.				

Course Outcomes (CO):

CO	CO Statement	Cognitie Level*	Knowledge	Evaluation Tools used
CO1	Discuss the basic concepts of Python programming including datatypes and operators	Understand	C	Instructor- created exams / Quiz
CO2	Apply problem solving skills using different control structures and loops	Apply	P	Coding Assignments/ Code reading and review
CO3	Discuss various data structures and operations on it using Python	Understand	C	Coding Assignments/ exams

CO4	Apply modular programming using functions	Apply	P	Instructor-created exams / Case studies
CO5	Design Python programs to solve basic computational problems and data visualization techniques.	Create	P	Instructor- created exams / Quiz

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Detailed Syllabus:

Module	Unit	Content	Hrs	Marks
I	**Introduction to Python**		**12**	18
	1	Features of Python, Different methods to run Python,Python IDE	2	
	2	Comments, Indentation, Identifiers, Keywords, Variables	2	
	3	Standard Data Types	2	
	4	Input Output Functions, Import Functions, range function	1	
	5	Operators and Operands, Precedence of Operators, Associativity	2	
	6	Type Conversion, Multiple Assignment	1	
	7	Expressions and Statements, Evaluation of Expressions	1	
	8	Boolean Expressions	1	
	Control Structures		**12**	19
	9	Decision Making- if statement, if…else statement, if…elif…else statement, Nested if statement	5	

II	10	Loops - for loop, for loop with else, while loop, while loop with else, Nested Loops	5	
	11	Using indentation in Python to define code blocks	1	
	12	Control Statements- break, continue, pass	1	
III	**Data Structures in Python**		**12**	19
	13	Working with strings and string manipulation	3	
	14	List - creating list, accessing, updating and deleting elements from a list	2	
	15	Basic list operations	1	
	16	Tuple- creating and accessing tuples in python	2	
	17	Basic tuple operations	1	
	18	Dictionary, built in methods to create, access, and modify key-value pairs	2	
	19	Set and basic operations on a set	1	
	Functions		**9**	18
IV	20	Built-in functions - mathematical functions, date time functions, random numbers	1	
	21	Writing user defined functions - function definition, function call, flow of execution, parameters and arguments, return statement	6	
	22	Recursion. Introduction to basic Python libraries (e.g., math, random)	2	
	Hands-on Data Structures: **Practical Applications, Case Study and Course Project**		**30**	
	Design programs from the concepts listed below. Select the topics and programs suited for your domain			

V	1	• Read input, include casting that input to the appropriate type • Select from one of several alternatives by using an if-elif or if-elif-else statement • Use the range() function in a form loop • Call and use functions residing in the math module		
		Case study: ● Design a basic calculator application in Python that can perform addition, subtraction, multiplication, and division. ● Create a Python program that retrieves weather data from an API (e.g., OpenWeatherMap) and displays it.		
	4	**Data Structures in Python** • String - Create a string , Indexing / Looping / Slicing • Lists - Create a list , Indexing /Looping / Slicing , Adding items / Modifying items / Removing items • Tuples - Create a tuple , Indexing / Looping / Slicing / Adding items to a tuple • Dictionary - Create a dictionary and access values with key / Adding a key- value pair / Adding to an empty dictionary /Modifying values in a dictionary / Removing key-value pair		

		Function		
	5	• Call functions residing in the math module • Define a function for later use • Pass one or more values into a function • Return one or more results from a function • Call a function that you have defined previously		

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CO 2	-	-	-	-	-	-	3	1	3	3	3	1	3
CO 3	-	-	-	-	-	-	3	1	3	3	3	1	3
CO 4	-	-	-	-	-	-	3	1	3	3	3	1	3
CO 5	-	-	-	-	-	-	3	1	3	3	3	1	3

Correlation Levels:

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CO 3	✓		✓	✓
CO 4	✓	✓	✓	✓
CO 5	✓			✓
CO 6	✓			✓

Reference Books:

1. Jose, Jeeva. Taming Python By Programming. Khanna Book Publishing, 2017. Print.

2. Downey, Allen. Think Python. Green Tea Press, 2nd ed. 2009