भारतीय संगणक प्रौद्योगिकी संस्थान आई आई सी टी
INDIAN INSTITUTE OF COMPUTING AND TECHNOLOGY IICT

Artificial Intelligence and Space Science with Python Programming

Duration: -- 6 Months (1800 hrs.)

Basic Introduction of Subjective Mathematics

Course Duration: -- 1 Month

S. No	Topic	No Hours
1.	Overview of Number Systems	6 hrs.
2.	Overview of Algebra	6 hrs.
3.	Overview of Coordinate Geometry	6 hrs.
4.	Overview of Geometry	6 hrs.
5.	Overview of Mensuration	6 hrs.
6.	Statistics & Proability	6 hrs.

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Python Programming Course Duration : -- 60 hours(2 Months)		
S.No	Topics	Hours
1.	**Introduction to Python** • Why Python • Application areas of python • Python implementations -Cpython -Jython -Ironpython -Pypy • Python Versions • Installing Python • Python Interpreter Architecture **Writing and Executing First Python program** • Using Interactive mode • Using script mode • Understanding print() function • How to compile python program explicitly **Python Language Fundamentals** • Character set • Keywords • Comments • Variables • Literals • Operators • Reading input from console • Data types • Type Casting	6 Hrs.
2.	**Python Conditional Statements** • If statement • Elif statement • Else statement • Short hand if statement • Short hand if..else statement • Nested if statement **Looping Statement** • While loop • For loop • Nested loops • Pass, break and continue keywords	8 Hrs.

	String Handling • What is string • String representation • Unicode string • String functions methods • String indexing and slicing • String formatting	
3.	**Python List** • CRUD Operation • Indexing and slicing list • Looping in List • Nested List **Python Tuple** • CRUD Operation • Immutability of tuple **Python Dictionary** • CRUD Operation • Iterating dictionary **Python Set** • How to create a set • Iteration over sets • Python set methods • Python frozenset	5 Hrs.
4.	**Python Function** • Defining a function • Calling a function • Types of function • Function arguments -Positional arg ,keywordarg - Default arg , non-default arg -Arbitrary arg , keyword arbitrary arg • Function return statement • Nested function • Function as argument • Function as return statement	5 Hrs.
5.	**Advance Function** • Lambda	5 Hrs.

	• Map • Filter • Reduce • List Comprehension	
6.	**Advance python** • OOPS(Class and Object) • Inheritance	4 Hrs.
7.	**Modules & Package** • Why modules • Script vs module • Importing module • Standard vs third party modules • Why packages • Understanding pip utility **File I/O** • Introduction to file handling • File modes • Function and methods related to file handling	2 Hrs.
8.	**Minor project**	10 Hrs.

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	Artificial Intelligence with Python Course Duration: 1.5 Months (45 Hours)	
S.No	Topics	Hrs.
1.	AI with Python – Primer Concepts Basic Concept of Artificial Intelligence (AI) 1 The Necessity of Learning AI What is Intelligence? What is Intelligence Composed Of? Learning – l What's Involved in AI Application of AI Cognitive Modeling: Simulating Human Thinking Procedure Agent & Environment	3 Hrs.
2.	AI with Python – Getting Started Why Python for AI Features of Python Installing Python Setting up PATH Running Python Script from the Command-line Integrated Development Environment	3 Hrs.
3.	AI with Python – Machine Learning Types of Machine Learning (ML) Most Common Machine Learning Algorithms	4 Hrs.
4.	AI with Python – Data Preparation Preprocessing the Data Techniques for Data Preprocessing Labeling the Data	3 Hrs.
5.	AI with Python – Supervised Learning: Classification Steps for Building a Classifier in Python Building Classifier in Python Logistic Regression Decision Tree Classifier Random Forest Classifier Performance of a classifier Class Imbalance Problem Ensemble Techniques	4 Hrs.
6.	AI with Python – Supervised Learning: Regression Building Regressors in Python	4 Hrs.
7.	AI with Python – Logic Programming How to Solve Problems with Logic Programming	4 Hrs.

	Installing Useful Packages Examples of Logic Programming Checking for Prime Numbers Solving Puzzles	
8.	AI with Python – Unsupervised Learning: Clustering What is Clustering? Algorithms for Clustering the Data Measuring the Clustering Performance Calculating Silhouette Score Finding Nearest Neighbors K-Nearest Neighbors Classifier	4 Hrs.
9.	AI with Python – Natural Language Processing Components of NLP Difficulties in NLU NLP Terminology Steps in NLP	4 Hrs.
10.	AI with Python – NLTK package Importing NLTK Downloading NLTK's Data Installing Other Necessary Packages Concept of Tokenization, Stemming, and Lemmatization Chunking: Dividing Data into Chunks Types of chunking Bag of Word (BoW) Model Concept of the Statistics Building a Bag of Words Model in NLTK Solving Problems Topic Modeling: Identifying Patterns in Text Data Algorithms for Topic Modeling	4 Hrs.
11.	AI with Python – Speech Recognition Building a Speech Recognizer 9 Visualizing Audio Signals - Reading from a File and Working on it Characterizing the Audio Signal: Transforming to Frequency Domain Generating Monotone Audio Signal Feature Extraction from Speech Recognition of Spoken Words	4 Hrs.
12.	AI with Python – Gaming Search Algorithms Combinational Search Minimax Algorithm Alpha-Beta Pruning Negamax Algorithm Building Bots to Play Games	4 Hrs.

	A Bot to Play Last Coin Standing A Bot to Play Tic Tac Toe	
13.	AI with Python – Computer Vision Computer Vision Computer Vision Vs Image Processing Installing Useful Packages Reading, Writing and Displaying an Image Color Space Conversion Edge Detection Face Detection Eye Detection	4 Hrs.

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	Python with Space Science Course Duration : -- 1.5 Months (45 Hours)	
S.No	Topics	Hrs.
1.	Space Science with Python — An Introduction	1 Hr.
2.	Space Science with Python — Setup and first steps	1 Hr.
3.	Space Science with Python — A look at Kepler's first law	1 Hr.
4.	Space Science with Python — The Solar System centre	1 Hr.
5.	Space Science with Python — The dance of Venus	1 Hr.
6.	Space Science with Python — Space maps	1 Hr.
7.	Space Science with Python — Around the Sun	2 Hrs.
8.	Space Science with Python: Comets — Visitors from afar	2 Hrs.
9.	Space Science with Python — The Origin of Comets	2 Hrs.
10.	Space Science with Python — A Rendezvous with Jupiter	2 Hrs.
11.	Space Science with Python — Supplements for Papers	2 Hrs.
12.	Space Science with Python — Did we observe everything?	2 Hrs.
13.	Space Science with Python — A comet in 3 D	2 Hrs.
14.	Space Science with Python — Turbulent times of a comet	2 Hrs.
15.	Space Science with Python — An Invisible Visitor	2 Hrs.
16.	Space Science with Python - The Solar Orbiter and comet ATLAS	2 Hrs.
17.	Space Science with Python - Bright Dots in the Dark Sky	2 Hrs.
18.	Space Science with Python — Uncertain Movements of an Asteroid	2 Hrs.
19.	Space Science with Python — Density Estimators in the Sky	2 Hrs.
	Space Science with Python - A very bright Opposition	2 Hrs.

20.		
21.	Space Science with Python - Ceres in the Sky	2 Hrs.
22.	Space Science with Python - Ceres in the Sky	2 Hrs.
23.	Space Science with Python - Asteroid Project (Part 1)	2 Hrs
24.	Asteroid Project (Part 2) — Test Driven Development	2 Hrs.
25.	Space Science with Python — Asteroid Project (Part 3)	2 Hrs.
26.	Space Science with Python - ASteroid Project (Part 4)	2 Hrs.