

Department of Statistics

Advanced Diploma on Python Software

Preamble:

The goal of syllabus is to make the study of Statistics popular and interesting and the students achievements. This course introduces statistical computing using Python. The emphasis is on manipulating data sets and basic statistical procedures. The syllabus is prepared after discussion at number of faculty members of the subject and experts from industries and research fields. The units of the syllabus are well define, taking into consideration the level and capacity of students.

Program Objectives of the Course:

1. To provide knowledge about implementation of statistical tools on data
2. The purpose here is to get students acquainted with how the application works
3. To develop hands-on skills of students.
4. To increase employment opportunities of students.

Program Outcomes:

After successful completion of advance diploma course student will be able to:

1. Implement a given algorithm as a computer program in Python
2. Adapt and combine standard algorithms to solve a given problem
3. Develop soft skills needed
4. Get knowledge of self employability

Syllabus Structure

Year	Semester	Paper No.	Paper Code	Contact Hours	Credits (1Credit=15 H)	Marks			
						Semester Exam	Internal	Attendance	Total
1	I	ST I	ADST 101	30	2	50	20	5	75
		SL I	ADSL 101	60	2	120	20	10	150
	II	ST II	ADST 202	30	2	50	20	5	75
		SL II	ADSL 202	60	2	120	20	10	150
	Annual	SPI	ADSP 101	60	2	150	-		150
	Total				240	10	490	80	30
2	III	ST III	ADST 303	30	2	50	20	5	75
		SL III	ADSL 303	60	2	120	20	10	150
	IV	ST IV	ADST 404	30	2	50	20	5	75
		SL IV	ADSL 404	60	2	120	20	10	150

Advanced Diploma/Diploma Courses

	Annual	SP II	ADSP 202	60	2	150	-		150
	Industrial/Incubation Training			30	2	-	-		-
	Total			270	12	490	80	30	600
	Total			510	22	980	160	60	1200

AD: Advanced Diploma, S: Statistics,

C: Course, T: Theory, L: Lab (Practical), P: Project

Total No. of Papers: 10 (Theory: 04, Practical: 04, Project: 02) Theory and Practical:

Semester, Project: **Annual**

Ist Year Advanced Diploma Course

1. Title: **Statistical Data Analysis Using Python**

2. Year of Implementation: 2020-21

3. Duration: One Year

4. Pattern: Semester

5. Medium of Instruction: English

6. Contact hours: 8 hours/week

Semester I

ASDST 101: Python Basics

(Contact Hrs: 30, Credits: 2)

Learning Objectives:

Students will be able to learn to

1. Design and program Python applications
2. Use lists, tuples and dictionaries in Python programs
3. Read and write files in Python

Unit I: Basics of Python

(15)

1.1 Introduction to Python

1.2 Environment Set-Up | Jupyter Anaconda | IDE Variables

1.3 Basics of Python

1.4 Data Types, Operators, Control Statements Data Structures

1.5 File Handling: Import, Export, and File Handling

Unit II: NumPy and Pandas

(15)

2.1 Function, Lambda function, Class and Functional Programming

2.2 Function, Recursion, Exception handling, Map, Reduce

2.3 NumPy: Introduction, NumPy Array, Array Indexing, NumPy Operations

2.4 Pandas : Introduction, Series, Data Frame, Indexing and Slicing of Data Frame,

Missing Data, Group By, Merge Join and Concatenate, Data Input Output, Pandas Build in visualization

2.5 Matplotlib, Plotly, cufflinks and other visualization packages

Learning Outcomes:

Students will able to

1. Understand and visualize data using Python
2. Understand importance of numpy and pandas in python programming

Reference Books:

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning
2. Think Python First Edition, by Allen B. Downy

ADSL 101: Practical – I
(Contact Hrs: 60, Credits: 02)

Learning Objectives:

Students will be able to learn to

1. Interpret the results of the analyzed data.
2. Apply advanced techniques to create reports and plot graphs.

List of Practical's (15)

1. Strings and String Method
2. Operators and Expression
3. List
4. Tuples
5. Dictionary
6. Sets
7. If and If else loop
8. For loop
9. While loop
10. Break, Continue and Pass Statements
11. Functions
12. Classes
13. File Handling
14. NumPy: arrays and Matrices
15. Pandas: Data Manipulations

Learning Outcomes:

Student will be able to

1. Import, manipulate and handle data.
2. Identify and repair coding errors in a program

Reference Books:

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning
2. Think Python First Edition, by Allen B. Downy

Semester II

**ADST 202: Inferential Statistics Using Python
(Contact Hrs: 30, Credits: 2)**

Learning Objectives:

Students will be able to learn to

1. Write loops and decision statements in Python
2. Visualize statistical data using different plotting function in Python

Unit I: Understanding and Visualizing Data with Python (15)

1.1 Introduction to Data

1.2 Univariate Data

1.3 Multivariate Data

1.4 Populations and Samples

Unit II: Inferential Statistical Analysis (15)

2.1 Overview and Inference procedures

2.2 Confidence Interval

2.3 Hypothesis Testing

2.4 Applications of the inferential procedure

Learning Outcomes:

Student will be able to

1. Understand about Python software
2. Apply various Statistical tests using Python

Reference Books:

1. Think Python First Edition, by Allen B. Downy

2. Starting Out with Python plus My Programming Lab with Pearson Text 3rd edition Tonay Gaddis

ADSL 202: Practical - II
(Contact Hrs: 60, Credits: 02)

Learning Objectives:

1. Visualize data using python software
2. Perform parametric as well non-parametric test through python

List of Practical's (15)

1. Data Visualization
2. Univariate Data Analysis
3. Multivariate Data Analysis
4. Probability and Non-Probability Sampling
5. Random Number Generation
6. Confidence Interval
7. Z test – one sample and two sample
8. One Sample T - test
9. Two Sample T -test
10. Paired T-Test
11. Chi – Square test
12. Test For equality of variance
13. Non – Parametric Tests – I (Sign Test, Wilcoxon signed rank test)
14. Non – Parametric Test -II (Median Test, MW test, KS test)
15. Analysis of Variance (ANOVA)

Learning Outcomes:

Student will able to

1. Perform hypothesis testing in Python
2. Apply statistical tools such as ANOVA using Python

Reference Books:

1. Think Python First Edition, by Allen B. Downy
2. Starting Out with Python plus My Programming Lab with Pearson Text 3rd edition Tonay Gaddis

ADSP 101 (Project):
(Contact Hrs. 30, Credits: 1)

Students should have to submit project on secondary data using Python software

BOS Sub Committee:

Dr. S. M . Nimbale

Mr. P. H. Mahadik

BOS Expert Committee:

Mr. Sujit Kadam, Senior Data Analyst at Emtec

Dr. A. A. Muley , Asst. Prof., Department of Statistics, School of Mathematical Sciences,
S.R.T.M.University, Nanded