

DEPARTMENT OF COMPUTER APPLICATIONS
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	M.Sc. (Computer Science)		
Course Title	Problem Solving Lab using Python and R		
Course Code	CAS753	No. of Credits	2
Course Code of Pre-requisite subject(s)	NIL		
Session	July 2022	Section (if, applicable)	NA
Name of Faculty	Mamata Das (Research Scholar)	Department	Computer Applications
Email	405120008@nitt.edu	Telephone No.	
Name of PAC Chairman	Dr. S. Domnic		
E-mail	domnic@nitt.edu	Telephone No.	0431-2503745
Course Type	Core course		
Syllabus (approved in BoS)			
<p>Problems solving fundamentals, Python: variables, expressions, statements, precedence of operators; Data structures: list, Dictionary, tuples. Lists: list slices, list methods, mutability, cloning lists, List comprehension. Tuples: tuple assignment, tuple as return value. Dictionaries: operations and methods; Conditional constructs; Iterative constructs. Strings: string slices, immutability, string functions and methods; Functions: parameters, return values, local and global scope, function composition, recursion, and lambda functions; Object orientation – Classes, Objects, methods, Operator overloading, and Inheritance. Files and exception: text files, reading and writing files, format operator; errors and exceptions, handling exceptions; creating modules and packages. Python Modules and Packages: Python Standard Library, Numpy, Pandas, Matplotlib, GUITkinter, wxWidgets ; Database- MySQLDB, Scikit-Learn, NLTK R Programming - Control Structures - Functions - Data Manipulation - String Operations- Data Visualization – R for Statistical computing.</p> <ol style="list-style-type: none"> 1. References: 1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd edition, Updated for Python 3, O'Reilly Publishers, 2016 2. Zed Shaw's , "Learn Python the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code, Addison-Wesley Professional; 3 edition, 2013. 3. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An 			

Inter - disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

4. Paul Teetor, R Cookbook- Proven Recipes for Data Analysis, Statistics, and Graphics, O'Reilly Media, 2011
5. Wesley J Chun, Core Python Programming, 2nd edition, Prentice Hall ,2009

COURSE OBJECTIVE(S)

- To write simple Python programs using Python data structures.
- To develop object-oriented programs in Python.
- To manipulate files using Python.
- To work on few python packages.
- To write simple R programs for statistical computing.

COURSE OUTCOMES (CO)

Course Outcomes

Aligned Programme Outcomes (PO)

After successful completion of the course, students should be able to:

1. Demonstrate the basic concepts of python programming with the help of data types, operators and expressions, console input/output Understand
2. Make use of control statements for altering the sequential execution of programs in solving problems.
3. Demonstrate operations on built-in container data types (list, tuple, set, dictionary) and strings.
4. Make use of operations and applications on strings with the help of built in functions and solve the problems by using modular programming concepts through functions.
1. Write simple R programs for statistical computing.

COURSE PLAN – PART II

COURSE OVERVIEW

The course begins with the fundamentals of problem solving where the typical procedure that must be followed to approach real time complex problems. This is followed by the introduction to Python programming where the basic concepts required to convert a basic algorithm to a Python script are covered.

This is followed by the Python data structures – list, dictionaries and tuples which is used for handling a sequence of elements or a collection of objects. The course includes the study of build in functions associated with these data structures which would enable one to rapidly implement algorithms. The concepts of functions and functional programming are introduced next which is essential for developing applications with manageable modules.

The object-oriented concepts are discussed which would enable to develop modules and packages in addition to the existing packages and python in-built functions. The existing packages for various mathematical operations, machine learning algorithms, natural language processing and data visualization are discussed.

The course finally introduces R programming language which is advantageous over Python for implementations that iterate over huge datasets. The course concludes with data visualization and statistical computing using the R programming language.

COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week/ Contact Hours	Topic	Mode of Delivery
1	Week 1 (3 Hrs)	Introduction to IDE, Anaconda, Jupyter notebook and PyCharm and demo programs	Hard copy document, Chalk and Board
2	Week 2 (3 Hrs)	Variables, Expressions, Statements, Operators.	Hard copy document, Chalk and Board
3	Week 3 (3 Hrs)	Exploring the Control Structures, Strings	Hard copy document, Chalk and Board
4	Week 4 (3 Hrs)	Working with List and examples	Hard copy document, Chalk and Board
5	Week 5 (3 Hrs)	Exploring the concepts on Tuples with Example programs	Hard copy document, Chalk and Board
6	Week 6 (3 Hrs)	Exploring the concepts on SET with Example programs	Hard copy document, Chalk and Board
7	Week 7 (3 Hrs)	Exploring the concepts on Dictionaries with Example programs	Hard copy document, Chalk and Board
8	Week 8 (3 Hrs)	R – Data Sets, Data Visualization, Vector functions, Matrices and Arrays	Hard copy document, Chalk and Board
9	Week 9 (3 Hrs)	Exploring the functions concepts and Recursion	Hard copy document, Chalk and Board
10	Week 10 (3 Hrs)	Working with File handling and Error Handling exceptions,	Hard copy document, Chalk and Board
11	Week 11 (3 Hrs)	R for Statistical Computing-Classical Tests, Statistical Modelling	Hard copy document, Chalk and Board

12	Week 12 (3 Hrs)	Working on Data Science Libraries with Pandas and Numpy, R example	Hard copy document, Chalk and Board	
COURSE ASSESSMENT METHODS				
S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Lab Activities	Periodic	--	30
2	Evaluation-I	7 th Week	120 Minutes	20
3	Evaluation-II	11 th week	120 Minutes	20
CPA	Compensation Assessment*	As per the academic schedule	120 Minutes	20
4	Final Assessment	As per the academic schedule	120 Minutes	30
Total Marks				100
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				
<ul style="list-style-type: none"> The students through the class representative may give their feedback at any time to the course coordinator which will be duly addressed. The students may give their feedback during class committee meetings. 				
COURSE POLICY (including compensation assessment to be specified)				
<u>MODE OF CORRESPONDENCE</u> By Email: 405120008@nitt.edu				
<u>COMPENSATION ASSESSMENT POLICY</u> The compensation assessment will be conducted for absentees in assessments (other than final assessment) only after the submission of medical or On-duty certificates signed by the competent authority.				
<u>ATTENDANCE POLICY</u> (A uniform attendance policy as specified below shall be followed)				
<ul style="list-style-type: none"> ➤ At least 75% attendance in each course is mandatory. ➤ A maximum of 10% shall be allowed under On Duty (OD) category. ➤ 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

NIL

FOR APPROVAL

Course Faculty Mamata Das CC-Chairperson



HOD

