



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
DEPARTMENT OF COMPUTER APPLICATIONS

COURSE PLAN – PART I			
Name of the programme and specialization	M.SC. Computer Science		
Course Title	Problem Solving using Python and R		
Course Code	CAS768	No. of Credits	3
Course Code of Pre-requisite subject(s)	-		
Session	January 2019	Section (if, applicable)	-
Name of Faculty	Dr. S. Sangeetha	Department	Computer Applications
Official Email	sangeetha@nitt.edu	Telephone No.	0431-2503743
Name of Course Coordinator(s) (if, applicable)	Dr. Michael Arock		
Official E-mail	michael@nitt.edu	Telephone No.	0431-2503736
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective 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;</p> <p>Functions: parameters, return values, local and global scope, function composition, recursion, and lambda functions;</p> <p>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;</p> <p>Python Modules and Packages: Python Standard Library, Numpy, Pandas, Matplotlib, GUI- Tkinter, wxWidgets ; Database- MySQLDB, Scikit-Learn, NLTK</p> <p>R Programming - Control Structures - Functions - Data Manipulation - String Operations- Data Visualization – R for Statistical computing.</p>			
COURSE OBJECTIVES			
<ul style="list-style-type: none"> • 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.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO)
1. Write programs using Python data structures	1, 5
2. Develop solutions to real world problems using object-oriented concepts	1,2,3,5
3. Read and write data from/to files using Python.	1,2,3,5
4. Make use of Python Modules and Packages to solve complex problems	2,3,4,5
5. Write simple R programs for statistical computing.	1,2,3,4,5

COURSE PLAN – PART II

COURSE OVERVIEW

This course introduces the concepts of problem solving to the students using python. It begins with the various data structures such as lists, dictionary and tuples along with the methods and comprehension. It introduces functions, especially lambda functions to solve real world problems.

The course provides in-depth coverage of object-oriented programming principles and techniques using python. It starts with creation of individual classes, objects with information hiding. The course then moves ahead with the concept of operator overloading, inheritance and exceptions. It introduces some of the libraries such Numpy, Pandas, Matplotlib, Scikit learn and NLTK that support recent computing technologies like data analytics and data mining. It then introduces the basics of R and R for statistical programming to the students.

COURSE TEACHING AND LEARNING ACTIVITIES

(Add more rows)

Week	Contact Hours	Topic	Mode of Delivery
1	1	Problems solving fundamentals	Chalk and Talk
	2	Problems solving fundamentals	-do
	3	Python: variables, expressions, statements Precedence of operators; Data structures: list, Dictionary, tuples;	--do-
2	1	Lists: list slices, list methods, mutability, cloning lists, List comprehension; Tuples: tuple assignment, tuple as return value;	--do-
	2	Dictionaries: operations and methods	-do
	3	Problem Solving session	Problem Solving
3	1	Strings: string slices, immutability, string functions and methods	Chalk and Talk
	2	Conditional constructs; Iterative constructs.	--do-
	3	Functions: parameters, return values, local and global scope, function composition	-do
	4	Problem Solving session	Problem Solving
4	1	recursion	Chalk and Talk
	2	lambda functions	-do
	3	Problem Solving session	Problem Solving
5	1	Object orientation Classes, Objects, methods	--do-
	2	Classes, Objects, methods	-do
	3	Problem Solving session	Problem Solving
6	1	Operator overloading	--do-
	2	Inheritance	-do
	3	Problem Solving session	Problem Solving
7	1	Errors and exceptions,	Chalk and Talk

	2	handling exceptions	--do-
	3	Problem Solving session	Problem Solving
8	1	Files and text files reading and writing files	Chalk and Talk
	2	creating modules and packages	Demo
	3	Problem Solving session	Problem Solving
9	1	Python Standard Library	Demo
	2	Numpy,	Demo
	3	Pandas,	Demo
	4	Matplotlib, NLTK	Demo
10	1	GUI-Tkinter, wxWidgets	Demo
	2	Database- MySQLDB,	Demo
	3	Scikit-Learn	Demo
	4	Problem Solving session	Problem Solving
11	1	R Programming - R Control Structures	Demo
	2	Functions –Data Manipulation Data Visualization	Demo
	3	R for Statistical computing	Demo
	4	R for Statistical computing	Demo

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Test 1	Week 4	1 Hr	15
2	Test 1	Week 8	1 Hr	15
3	Programming Assignment	Week 6	3 Weeks	30
CPA	Compensation Assessment*	At the end of the course	1 Hr	15
4	Final Assessment *	At the end of the course	3 Hrs	40

ESSENTIAL READINGS :

1. AllenB. 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 EXIT SURVEY

- The students may also give their feedback during Class Committee meeting.
- Feedback from the students will be duly addressed in the subsequent classes.
- COs will be computed for the assessments.

COURSE POLICY

- One compensations assessment will be conducted before the final assessment for those who missed test 1 or test 2.

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

- 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.
- The students are expected to come out with their original solution for problems given as assignment, and tests/examinations.

ADDITIONAL INFORMATION, IF ANY

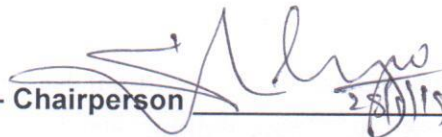
The Course faculty is available for consultation in office from 4 pm to 5 pm on Monday and Wednesday every week.

FOR APPROVAL

Course Faculty



CC- Chairperson


28/11/19

HOD

