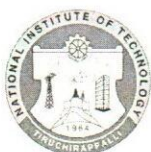


DEPARTMENT OF COMPUTER APPLICATIONS

COURSE PLAN – PART I			
Name of the programme and specialization	M.Sc. (Computer Science)		
Course Title	Problem Solving using Python and R		
Course Code	CAS717	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL		
Session	July / January 2023	Section (if, applicable)	NA
Name of Faculty	Dr. Jitendra Kumar	Department	Computer Applications
Email	jitendra@nitt.edu	Telephone No.	0431-2503734
Name of PAC Chairman	Dr. U. S. Reddy		
E-mail	usreddy@nitt.edu	Telephone No.	0431-2503746
Course Type	Core Course		
Syllabus (approved in BoS)			
Python: variables, expressions, statements, operators, strings, Data structures: List, Dictionary, Tuples Functions: parameters, return values, local and global scope, recursion, lambda functions and function composition.			
Object orientation – Classes, Objects, methods, Operator overloading, and Inheritance, Method resolution order. Files: Text files, reading and writing, Handling CSV, Json files, Object serialization, Errors, and Exception handling.			
Python Modules and Packages: Python Standard Library- Libraries for Data science: Numpy, Pandas, Matplotlib, Scikit-Learn, SQLite.			
R–Data sets - Data Visualization -Vector functions- Matrices and arrays- Matrix algebra- Random numbers- sampling and shuffling- Probability functions.			
R for Statistical computing- Classical tests -Statistical modelling- Regression- Analysis of Variance- Analysis of Covariance- Bayesian Statistics.			
Reference Books			
1. John V. Guttag, "Introduction to Computation and Programming Using Python: with Application to Computational Modelling and Understanding Data". 3rd Edition- MIT press- 2021.			
2. Paul J. Deitel, and Harvey Deitel, "Python for Programmers" 1st Edition, Pearson, 2020.			
3. Martin C. Brown, "Python: The Complete Reference", Mc-Graw Hill, 2018.			
4. Michael J. Crawley, "The R Book", 2nd Edition, Wiley, 2013.			



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5. Thulin, Måns, "Modern Statistics with R: From Wrangling and Exploring Data to Inference and Predictive Modelling", Eos Chasma Press, 2021.
6. Dalgaard, Peter, "Introductory Statistics with R", Springer, 2008.

COURSE OBJECTIVE(S)

- To introduce Python data structures, functions, and object-orientation concepts.
- To manipulate files using Python.
- To use Python packages for data science.
- To adopt R for statistical computing

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
Students will be able to:	
1. Develop solutions to real world problems using Python data structures, Functions and Object orientation concepts	I, II, III
2. Read and write data from/to files for processing using Python	II, III, IV
3. Make use of Python Modules and Packages to solve complex problems	II, IV, V
4. Perform statistical modelling using R	III, IV, V

COURSE PLAN – PART II

COURSE OVERVIEW

The course begins with the fundamentals of problem solving where the typical procedure that has to be followed to approach real time complex problems. The students will be introduced to Python programming where the basic concepts required to convert a basic algorithm to a Python script are covered. The course includes the discussion on data structure – list, dictionaries, and tuples to handle the sequence of elements or objects. Subsequently, the students will be introduced to functions, object oriented programming, exception handling, file handling, and various packages available with Python.

The course finally introduces R programming language which is advantageous over Python for implementations that iterate over huge datasets. The course concludes with data visualisation 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 (2 Lectures + 1 Tutorials)	Variables, Expressions, Statements, Operators	PowerPoint, Chalk and Board
2	Week 2 (2 Lectures + 1 Tutorials)	Decision Control Statements	PowerPoint, Chalk and Board



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3	Week 3 (2 Lectures + 1 Tutorials)	Functions, Scope, Recursion, Lambda Functions	PowerPoint, Chalk and Board
4	Week 4 (2 Lectures + 1 Tutorials)	Strings, List	PowerPoint, Chalk and Board
5	Week 5 (2 Lectures + 1 Tutorials)	Dictionary, Tuples, Set	PowerPoint, Chalk and Board
6	Week 6 (2 Lectures + 1 Tutorials)	Object Oriented Programming Concepts	PowerPoint, Chalk and Board
7	Week 7 (2 Lectures + 1 Tutorials)	File Handling, Errors and Exception Handling	PowerPoint, Chalk and Board
8	Week 8 (2 Lectures + 1 Tutorials)	Python Standard Library Libraries for Data science-I	PowerPoint, Chalk and Board
9	Week 9 (2 Lectures + 1 Tutorials)	Libraries for Data science-II	PowerPoint, Chalk and Board
10	Week 10 (2 Lectures + 1 Tutorials)	R – Data Visualization, Vector functions, Matrices and arrays	PowerPoint, Chalk and Board
11	Week 11 (2 Lectures + 1 Tutorials)	Matrix Algebra, Random Numbers, Probability Functions,	PowerPoint, Chalk and Board
12	Week 12 (2 Lectures + 1 Tutorials)	R for Statistical Computing - Classical Tests, Statistical Modelling	PowerPoint, Chalk and Board
13	Week 13 (2 Lectures + 1 Tutorials)	Regression, Analysis of Variance	PowerPoint, Chalk and Board
14	Week 14 (2 Lectures + 1 Tutorials)	Analysis of Covariance, Bayesian Statistics.	PowerPoint, Chalk and Board


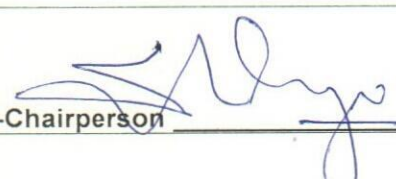
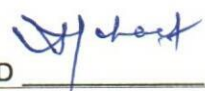

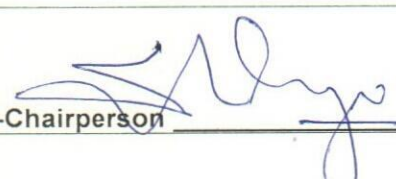
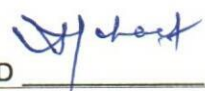

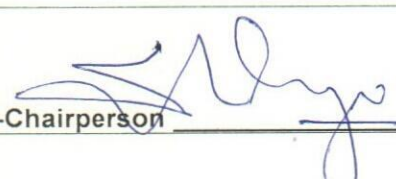
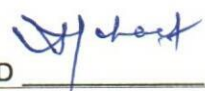
COURSE ASSESSMENT METHODS

Course Assessment Methods: Theory

S. No.	Mode of Assessment	Week/Date	Duration	Marks
1	Cycle Test 1	As per academic schedule	60 Minutes	20
2	Cycle Test 2	As per academic schedule	60 Minutes	20
3	Assignment/Quiz	7-9 Week	-	10
CPA	Compensation Assessment*	As per academic schedule	60 Minutes	20
3	Final Assessment	As per academic schedule	120 Minutes	50
Total Marks				100



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*mandatory; refer to guidelines on page 5			
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed) 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)			
MODE OF CORRESPONDENCE Anytime during working hours (preferably through appointments) jitendra@nitt.edu			
COMPENSATION ASSESSMENT POLICY Compensation assessment will be conducted for absentees in cycle test I or cycle test II only after the submission of medical or On-Duty certificates signed by competent authority.			
ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed) Institute guidelines will be followed.			
ACADEMIC DISHONESTY & PLAGIARISM <ul style="list-style-type: none">➤ 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			
<table border="0"><tr><td style="text-align: center;">Course Faculty </td><td style="text-align: center;">CC-Chairperson </td><td style="text-align: center;">HOD </td></tr></table>	Course Faculty 	CC-Chairperson 	HOD 
Course Faculty 	CC-Chairperson 	HOD 	



Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.
- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.