UNIVERSITY OF CALICUT

THENHIPALAM, CALICUT UNIVERSITY P.O

SYLLABUS

COMPUTER SCIENCE-DATA MANAGEMENT

(COMPLEMENTARY) for

BA Econometrics & Data Management Programme

(CHOICE BASED CREDIT AND SEMESTER SYSTEM FOR UNDER GRADUATE CURRICULUM)

UNDER THE

FACULTY OF SCIENCE

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2020– 21 ONWARDS

BOARD OF STUDIES IN COMPUTER SCIENCE (UG)

THENHIPALAM, CALICUT UNIVERSITY P.O
KERALA, 673 635, INDIA

DECEMBER, 2020

REGULATIONS

FOR

COMPUTER SCIENCE- DATA MANAGEMENT

COMPLEMENTARY

(Choice Based Credit and Semester System for Under Graduate Curriculum)
EFFECTIVE FROM THE ACADEMIC YEAR 2020-21

COURSE EVALUATION:

Total marks for each complementary theory course is 75 marks and lab course shall be 100 marks. The evaluation scheme for each course shall contain two parts (1) Internal evaluation (2) external evaluation. 15 marks shall be given to the internal evaluation of theory course. The remaining 60 marks shall be for the external evaluation.

INTERNAL EVALUATION

The internal assessment shall be based on a predetermined transparent system involving writtentest, assignments, seminars and attendance in respect of theory courses and on test/record/viva/ attendance in respect of lab courses. 15 marks in each theory course, 20 for lab, are for internal examinations. Components with percentage of marks of Internal Evaluation of Theory Courses are:

Test paper	–	6 Marks
Attendance	–	3 Marks
Assignment	–	3 Marks
Seminar	–	3 Marks

Components with percentage of marks of Internal Evaluation of Lab Courses are:

Test paper (50%)	–	10 Marks
Attendance (20%)	–	4 Marks
Assignment/Lab involvement (30%)	–	6 Marks

Split up of marks for Test paper:

	Theory	Practical
85% -100%	6	10
65% -85%	5	8
55% - 65%	4	6
45% - 55%	3	5
35%- 45%	2	4
Less than 35%	1	2

Attendance of each course will be evaluated as below

	Theory	Practical
85 % and above	3	4
75% $\leq$ CRP <85%	2	2
50% $\leq$ CRP <75%	1	1

(If a fraction appears in the final internal marks awarded, nearest whole number is to be taken)

To ensure transparency of the evaluation process, the internal assessment marks awarded to the students in each course in a semester shall be notified on the notice board at least one week before the commencement of external examination. There shall not be any chance for improvement for internal marks. The course teacher(s) shall maintain the academic record of each student registered for the course, which shall be forwarded to the University by the college Principal after obtaining the signature of both course teacher and HOD. The marks secured for internal examination only need be sent to university, by the colleges concerned.

EXTERNAL EVALUATION:

There shall be University examinations for each theory course at the end of each semester. Practical examinations shall be conducted by the University at the end of fourth semester. External evaluation carries 60 Marks for each theory course, 80 Marks for lab course. External evaluation of even (2 and 4) semesters will be conducted in centralized valuation camps immediately after the examination. Answer scripts of odd semester (1 and 3) examination will be evaluated by home

valuation. All question papers shall be set by the university. The model of the question paper for external examination (theory courses) of 2 Hrs. duration. The students can answer all the questions in Sections A and B. But there shall be Ceiling in each section.

Section A: Short answer type carries 2 marks each - 12 questions **(Ceiling - 20)**
Section B: Paragraph/ Problem type carries 5 marks each - 7 questions **(Ceiling - 30)**
Section C: Essay type carries 10 marks (1 out of 2) - **(Ceiling - 10)**

The external examination in theory courses is to be conducted with question papers set by external experts. The evaluation of the answer scripts shall be done by examiners based on a well-defined scheme of valuation and answer keys shall be provided by the University. The external examination in practical courses shall be conducted by two examiners, one internal and an external, appointed by the University.

The model of the question paper for external examination (lab courses) of 3 Hrs. duration shall be:

1. **Section A**: One marked question of 30 Marks from Programming Lab Part A (MS EXCEL,SPSS) is to be attempted (Design - Algorithm/Flowchart/Interface: 10 Marks, Code: 10 Marks, Result: 10 Marks. **Total 30 Marks**)
2. **Section B**: One marked question of 30 Marks from Programming Lab Part B (PYTHON AND R PROGRAMMING) is to be attempted (Design - Algorithm/Flowchart/Interface: 10 Marks, Code: 10 Marks, Result: 10 Marks. **Total 30 Marks**)
3. **Section C**: Lab viva voce (**Total 10 Marks**)
4. **Section D**: Lab Record (**Total 10 Marks**)

Number of students in one batch for practical Examination must be limited to 14.

REVALUATION:

In the new system of grading, revaluation is permissible. The prevailing rules for revaluation are applicable. Students can apply for photocopies of answer scripts of external examinations. Applications for photocopies/scrutiny/revaluation should be submitted within 10 days ofpublication of results. The fee for this shall be as decided by the university.

IMPROVEMENT COURSE

A maximum of two courses (Common, Core, Complementary or Open) can be improved in each semester. Improvement of a particular semester can be done only once. The student shall avail the improvement chance in the succeeding year after the successful completion of the semester concerned. The internal marks already obtained will be carried forward to determine the

grades/marks in the improvement examination. If the candidate fails to appear for the improvement examination after registration, or if there is no change in the results of the improvement examination appeared, the marks/grades obtained in the first appearance will be retained. Improvement and supplementary examinations cannot be done simultaneously.

CURRICULUM FOR B.Sc. COMPUTER SCIENCE-

DATA MANAGEMENT

(COMPLEMENTARY)

(for BA Econometrics & Data Management Programme)

(2020-21 ACADEMIC YEAR ONWARDS – As per the CBCSSUG 2019 Regulations)

Total Courses: 3									Total Credits: 8	
Semester	Course No	Course Code	**Course Title**	Marks			Contact Hours			Credits
				Internal	External	Total	Theory	Lab	Total	
II(I)	1	CSC2(1)C06	**COMPUTER FUNDAMENTALS, MS EXCEL AND SPSS**	15	60	75	4	2	6	2
III(IV)	2	CSC3(4)C07	**PYTHON & R PROGRAMMING**	15	60	75	4	2	6	2
III(IV)	3	CSC3(4)C08	Programming Lab: EXCEL, SPSS, PYTHON PROGRAMMING and R PROGRAMMING	20	80	100	0	0	0	4

Total (3 Courses)					**250**		**8**			

Item	Description
L	Lab Hours
T	Theory Hours

Detailed Syllabi

Semester I

Course Category:	Complementary 1(Type 1) Course 1
Course Code and Title:	CSC2(1)C06-**COMPUTER FUNDAMENTALS, MS EXCEL AND SPSS**
No. of Credits:	2
No. of Contact Hours:	(4T+2L) 6 Hours per week

OBJECTIVE OF THE COURSE

☐ **To learn the basics of computer fundamentals**
☐ **To acquire basic application skills**

Course Outcome

At the end of the course, the student will be able to
  CO1.Explain the application package of MS Excel
  CO2.Implementation of SPSS package,.
  CO3. Implement GUI applications.

CSC2(1)C06- COMPUTER FUNDAMENTALS, MS EXCEL AND SPSS

MODULE 1: COMPUTER FUNDAMENTALS

Introduction To Computer System, Features, Limitations, Types- Number Systems and Character Representation, Binary Arithmetic- Computer Software Types –Utility Program- Operating Systems Functions and Types - Basic Components of Computer - Input and Output Devices - Primary Memory and Secondary Storage - Overview of Emerging Technologies: Cloud Computing, Big Data, Data Mining, Mobile Computing and Embedded Systems. Use of Computers in Education and Research: Data Analysis, Heterogeneous Storage, E-Library, Google Scholar, Domain Specific Packages such as MATLAB, Mathematica etc

MODULE 2: INTRODUCTION TO MS EXCEL

Introduction to Spread Sheet –MS Excel - Creating & Editing Worksheet, Formatting and Essential Operations - Formulas and Functions – Charts - Advanced Features: Vlookup, Hlookup, Index, Address, Match, Offset, Transpose, Conditional Formatting, Data Sorting and Filtering, Pivot Table & Pivot Chart, Linking and Consolidation.

MODULE 3: INTRODUCTION TO SPSS

Introduction to SPSS –Features – Data View – Variable View – Output Viewer Window – Syntax Editor Window - Open Data File – Save – Import from other Data Source – Data Entry – Labeling for Dummy Numbers - Recode in to Same Variable – Recode in to Different

Variable – Transpose of Data – Insert Variables and Cases – Merge Variables and Cases -Split – Select Cases – Compute Total Scores – Table Looks – Changing Column - Font Style and Sizes -Diagrammatic Representation

MODULE 4: DATA ANALYSIS USING EXCEL & SPSS (only Practical)

Estimation of Mean, Median and Mode-Standard Deviation and Coefficient of Variation- Descriptive Statistics - Parametric Tests T-Test (Paired or Unpaired), ANOVA (One-Way-Two-Way), Pearson Rank Correlation, Linear Regression - Non Parametric Tests: Mann Whitney U Test, Wilcoxon Signed Rank Test – Kruskall Wallis Test –Chi- Square Test

References:

1. A. Goel, Computer Fundamentals, Pearson Education, 2010.

2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006

3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007

4. Excel Functions and Formulas Paperback by Bernd Held

5. Microsoft Excel 2010 Data Analysis and Business Modeling Paperback by Winsto

6. Jeremy J. Foster (2001). Data analysis using SPSS for windows. New edition. Versions 8-10. Sage publications. London.

7. Michael S. Louis – Beck (1995). Data analysis an introduction, Series: quantitative applications in the social sciences. Sage, Publications. London.

Semester IV

Course Category:	Complementary (Type 1-Course 2)
Course Title and Code:	CSC3(4)C07 **-** PYTHON & R PROGRAMMING
No. of Credits:	2
No. of Contact Hours:	**(4T+2L) 6 Hours per week**

To impart the students with problem solving skills , dividing the problem into subtasks and solving developing programming skills, logical thinking.

OBJECTIVE OF THE COURSE

☐ **To learn the basics of computer programming and logic**
☐ **To acquire basic soft skills**

Course Outcome

At the end of the course, the student will be able to

CO1.Explain basic principles of Python programming language

CO2.Implement object oriented concepts,.

CO3. Implement GUI applications.

CO4 . Understand the R Programming and its statistical implementation

Course Outline

CSC3(4)C07 **-** PYTHON &   R PROGRAMMING

Contact Hours: 3 Theory+ 2 Lab   **Number of Credits: 2**

Module 1:

Introduction to Python – Variables, Data Types, Expressions and Statements, Evaluation of Expressions, Operators and Operands, Order of Precedence, String Operations, Control Statements, Boolean. Expressions and Logical Operators, Conditional and Alternative Executions, Nested Conditionals, Recursion. Iteration - Multiple Assignment, While Statement, Tables, Two Dimensional Tables. Encapsulation and generalization, Local Variables. Introduction to NumPy: The Basics of NumPy Arrays, Computation on NumPy Arrays: Universal Functions, Aggregations: Min, Max, and Everything in Between, Computation on Arrays: Broadcasting, Comparisons, Masks, and Boolean Logic, Fancy Indexing, Sorting Arrays, Structured Data: NumPy's Structured Arrays

Module 2:

Functions, Calling functions, Type conversion and coercion, composition of functions, Mathematical functions, User-defined Functions, Parameters and Arguments. Strings and Lists – string traversal and comparison with List operations with Examples, Tuples and dictionaries – Operations and Examples Files and exceptions - Text files, Directories, Python – Modules, Python – JSON, Python- PIP, Lambda. Classes/Objects-Create class, Create Object, The __init_() Function, Python Object Oriented Principles, Object Methods, Self-Parameter, Python Exception Handling, Python MySQL, Python MongoDBA

Module 3: Overview of R Environment – R editor – Workspace – Data type – Importing and Exporting Data – Basic Computational Ideas – Merges in R .Matrix Determinant – Inverse – Transpose – Trace – Eigen Values and Eigen Vectors – Construction of Bar, Pie, Histogram, Line Chart, Box Plot, Scatter Plot

Module 4: Parametric and Non Parametric testing of Statistical Hypothesis – One Sample t test – two group t tests – paired t test – one way ANOVA- two way ANOVA – Wilcoxon – MannWitney – Kruskal Wallis Simple Correlation - Linear Regression – Multiple Linear Regression – Testing for overall significance of Model Coefficients – Testing for Individual Regression Coefficients – Outliers Detection Control Charts – Variable Control Chart - x, R,

S. Attribute Control Chart- p, np, c, u. CUSUM Control Chart, EWMA Control Chart, Process Capability Analysis.

References:

1. Downey, A. et al., How to think like a Computer Scientist: Learning with Python, John Wiley, 2015
2. Lambert K. A., Fundamentals of Python - First Programs, Cengage Learning India, 2015
3. Sprankle , M., Problem Solving & Programming Concepts, Pearson India
4. Learning Statistics using R By Rndall E.Schumacker, Sage Publication
5. R for Everyone By Jared P.Lander, Pearson Education

Semester IV

CSC3(4)C08- Programming Lab: EXCEL, SPSS, PYTHON PROGRAMMING and R PROGRAMMING

Course Category:	Complementary (Type 1-Course 2)
Course Title and Code:	CSC3(4)C08- Programming Lab: EXCEL, SPSS, PYTHON PROGRAMMING and R PROGRAMMING

No. of Credits:	4
No. of Contact Hours:	

Course Outline

PROGRAM CYCLE

EXCEL

1. Create a chart

2. Measures of *Central Tendency* & Descriptive Statistics

3. Parametric Tests T-Test

4. Correlation & Linear Regression

5. Chi- Square Test

SPSS

6. Descriptive Statistics

7. Paired –Samples T Test

8. One-Way ANOVA

9. Correlation & Linear Regression

10. Chi- Square Test

PYTHON PROGRAMMING

11. Program to read a file and display its contents

12. Program to demonstrate basic data types in python

13. Program to demonstrate operators in python

14. Program to demonstrate list and tuple in python

15. Program to demonstrate database connectivity in python

R PROGRAMMING

16. Simple Correlation

17. Linear Regression

18. One- Way ANOVA

19. Paired T test

20. Plotting Bar Chart

FOURTH SEMESTER B.A. DEGREE EXAMINATION NOVEMBER 2020
(CBCSS-UG)

BA Econometrics & Data Management Programme

COMPLEMENTARY COURSE – COMPUTER SCIENCE- DATA MANANAGEMENT

2 hrs   **60 marks**

CSC3(4)C07 **– Python & R Programming**

Section A – Short Answer type questions

(Answer all questions, each correct answer carries a maximum of 2 Marks. Ceiling 20 marks)

1. What you meant by operator precedence?
2. What is the difference between list and tuples in Python?
3. What is an identifier? Give examples
4. What is Python? What are the benefits of using Python?
5. Write a short note on global keyword in Python.
6. What is Random Number Generator in Python?
7. Write a Python program to calculate the length of a string?
8. What is a set in Python?
9. What is default parameter in Python?
10. How do you write comments in Python?
11. What is eval( ) in python? What is its syntax?
12. Write a Python program to check given number is Prime or not.

Section B – Short Essay type questions

(Answer all questions, each correct answer carries a maximum of 5 marks. Ceiling 30marks)

13. What are the different data types available in Python?
14. Write a Python program to remove an item from a set if it is present in theset.
15. Explain the use of functions in Python in detail.
16. What is a tuple? Explain different tuple operations in Python.
17. Write a short note on Python IDLE.
18. Write a Python program to sum all the items in a list.
19. Explain recursion in Python with suitable examples?

Section C – Essay type questions

(Answer any one questions, correct answer carries a maximum of l0 marks)

20. What is a function? Explain different functions available inPython with suitable examples.
21. What is Parametric and Non Parametric testing of Statistical Hypothesis