SHREE MUTHUKUMARASWAMY COLLEGE CHENNAI-118

DEPARTMENT OF SOFTWARE APPLICATIONS

UNIVERSITY OF MADRAS

SEMESTERS -VI SYLLABUS

III B.SC (SA) – SEMESTER-VI

SUBJECT : R PROGRAMMING

Year: III **Semester: VI**

R-Programming Common for B.C.A. , B.Sc.-SA , B.Sc.-CSc-wDS	**341C6A**
Credits 4	**Lecture Hours:6 per week**

Learning Objectives: (for teachers: what they have to do in the class/lab/field) To understand and able to use basic programming concepts

- To automate data analysis, working collaboratively and openly on code
- To know how to generate dynamic documents

Course Outcomes: (for students: To know what they are going to learn)

CO1: To understand the problem solving approaches
CO2: To learn the basic programming constructs in R Programming CO3: To learn the basic programming constructs inR Programming CO4: To use R Programming data structures - lists, tuples, dictionaries.
CO5: To do input/output with files in R Programming.

Units	Contents
I	Introduction to R programming: What is R? - Installing R and R Studio – R Studio Overview - Working in the Console - Arithmetic Operators – LogicalOperations - Using Functions - Data structures, variables, and data typesin R: Creating Variables - Numeric, Character and Logical Data - Vectors -Data Frames Factors -Sorting Numeric, Character, and Factor Vectors -Special Values.

II	CONTROL STRUCTURES AND VECTORS -Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations
III	Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions Data Visualization using R: Scatter Plots - Box Plots - Scatter Plots and Box and-Whisker Plots Together -Customize plot axes, labels, add legends, and add colours
IV	Descriptive statistics in R: Measures of central tendency - Measures of variability - Skewness and kurtosis - Summary functions, describe functions,and descriptive statistics by group. Testing of Hypothesis using R: T-test, Paired Test, correlation, Chi Square test, Analysis of Variance and Correlation
V	Predictive Analytics: linear Regression model, Non-Linear Least Square, multiple regression analysis, Logistic Regression, Panel Regression Analysis,ARCH Model, GARCH models, VIF model

Learning Resources:

Recommended Texts

1. Roger D. Peng," R Programming for in", 2012
2. Norman Matloff,"The Art of R Programming- A Tour of Statistical Software Design",
   2011

Reference Books

1. Garrett Grolemund, Hadley Wickham,"Hands-On Programming with R: Write Your Own Functions and Simulations" , 1st Edition, 2014
2. Venables , W.N.,and Ripley,"S programming", Springer, 2000.

SUBJECT : R-PROGRAMMING LAB

Year: III **Semester: VI**

R-Programming Practical Common for B.C.A. , B.Sc.-SA , B.Sc.-CSc-wDS	**341C61**
Credits 4	**Lecture Hours:6 per week**

Learning Objectives: (for teachers: what they have to do in the class/lab/field)

- Acquire programming skills in core R Programming
- Acquire Object-oriented programming skills in R Programming.
- Develop the skill of designing graphical-user interfaces (GUI) in R Programming
- Acquire R Programmingskills to move into specific branches

Course Outcomes: (for students: To know what they are going to learn)

CO1: To understand the problem solving approaches
CO2: To learn the basic programming constructs in R Programming
CO3: To practice various computing strategies for R Programming -based solutions to real world problems
CO4: To use R Programming data structures - lists, tuples, dictionaries.
CO5: To do input/output with files in R Programming

List of Exercises

1. Data In R
2. Reading And Writing Data
3. R And Databases
4. Dates
5. Factors
6. Subscribing
7. Character Manipulation
8. Data Aggregation
9. Reshaping DataBasics
10. The R Environment
11. Probability And Distributions
12. Descriptive Statistics And Graphics
13. One- And Two-Sample Tests
14. Regression And Correlation
15. Analysis Of Variance And The Kruskal–Wallis Test
16. Tabular Data
17. Power And The Computation Of Sample Size
18. Advanced Data Handling
19. Multiple Regression
20. Linear Models
21. Logistic Regression
22. Survival Analysis
23. Rates And Poisson Regression
24. Nonlinear Curve Fitting

Learning Resources:

Recommended Texts

1. Roger D. Peng," R Programming for Data Science ", 2012
2. Norman Matloff,"The Art of R Programming- A Tour of Statistical Software Design", 2011

Reference Books

1. Garrett Grolemund, Hadley Wickham,"Hands-On Programming with R: Write Your Own Functions and Simulations" , 1st Edition, 2014
2. Venables , W.N.,and Ripley,"S programming", Springer, 2000.

SUBJECT : MINI PROJECT

Year: III Semester: VI

Project with Viva voce Common for B.Sc.-SA , B.Sc.-CSc	341C62
Credits 4	Lecture Hours:6 per week

OBJECTIVES:

The aim of the mini project is that the student has to understand the real time software development environment. The student should gain a thorough knowledge in the problem, he/she has selected and the language / software, he/she is using.

Project planning:

B.Sc (Computer Science / Software Application)/BCA Major Project is an involved exercise, which has to be planned well in advance. The topic should be chosen in the beginning of final year itself. Related reading training and discussions of first internal project viva voce should be completed in the first term of final year. I. Selection of the project work Project work could be of three types.

a) Developing solution for real life problem

In this case a requirement for developing a computer-based solution already exists and the different stages of system development life cycle is to be implemented successfully. Examples are accounting software for particular organization, computerization of administrative function of an organization, web based commerce etc.

b) System Software Project

Projects based on system level implementation. An example is a Tamil language editor with spell checker, compiler design.

b) Research level project

These are projects which involve research and development and may not be as a structured and clear cut as in the above case. Examples are Tamil character recognition, neural net based speech recognizer etc. This type of projects provides more challenging opportunities to students.

II Selection of team

To meet the stated objectives, it is imperative that major project is done through a team effort. Though it would be ideal to select the team members at random and this should

be strongly recommended, due to practical consideration students may also be given the choice of forming themselves into teams with three members. A team leader shall be selected. Team shall maintain the minutes of meeting of the team members and ensure that tasks have been assigned to every team member in writing. Team meeting minutes shall form a part of the project report. Even if students are doing project as groups, each one must independently take different modules of the work and must submit the report.

III Selection of Tools

No restrictions shall be placed on the students in the choice of platform/tools/languages to be utilized for their project work, though open source is strongly recommended, wherever possible. No value shall be placed on the use of tools in the evaluation of the project.

IV Project management Head of the Department / Principal of the college should publish the list of student's project topic, internal guide and external organization and teams agreed before the end of July. Changes in this list may be permitted for valid reasons and shall be considered favorably by the Head of the department / Principal of the college any time before commencement of the project. Students should submit a fortnightly report of the progress, which could be indication of percentage of completion of the project work. The students should ideally keep a daily activity book. Team meeting should be documented and same should be submitted at the end of the project work.

V Documentation

Three copies of the project report must be submitted by each student (one for department library, one for the organization where the project is done and one for the student himself/herself). The final outer dimensions of the project report shall be 21cm X 30 cm. The color of the flap cover shall be light blue. Only hard binding should be done. The text of the report should be set in 12 pt, Times New Roman, 1.5 spaced.

Headings should be set as follows: CHAPTER HEADINGS 16 pt, Arial, Bold, All caps, Centered.

1. Section Headings 14 pt Bookman old style, Bold, Left adjusted.

1.1 Section Sub-heading 12 pt, Bookman old style.

Title of figures tables etc are done in 12 point, Times New Roman, Italics, centered.

Content of the Project should be relevant and specify particularly with reference to the work. The report should contain the requirement specification of the work, Analysis, Design, Coding, testing and Implementation strategies done.

- Organizational overview (of the client organization, where applicable)
- Description of the present system
- Limitations of the present system
- The Proposed system - Its advantages and features
- Context diagram of the proposed system
- Top level DFD of the proposed system with at least one additional level of expansion
- Program List (Sample code of major functions used)
- Files or tables (for DBMS projects) list. List of fields or attributes (for DBMS projects) in each file or table.
- Program – File table that shows the files/tables used by each program and the files are read, written to, updated, queried or reports were produced from them.
- Screen layouts for each data entry screen.

• Report formats for each report.

Some general guidelines on documentation are:

1. Certificate should be in the format: ”Certified that this report titled…….is a bonafide record of the project work done by Sri/ Kum …….under our supervision and guidance, towards partial fulfillment of the requirement for award of the Degree of B.Sc Computer Science/BCA/BSc Software Applications of XXX College” with dated signature of internal guide, external guide and also Head of the Department/ College.

2. If the project is done in an external organization, another certificate on the letterhead of the organization is required: “Certified that his/her report titled …….is a bonafide record of the project work done by Sri/Kum…….under my supervision and guidance, at the ……..department of…… (Organization) towards partial fulfillment of the requirement for the award of the Degree of B.Sc (Computer Science/Software Applications) / BCA of XXX College.

3. Page numbers shall be set at right hand bottom, paragraph indent shall be set as 3.

4. Only 1.5 space need be left above a section or subsection heading and no space may be left after them.

5. References shall be IEEE format (see any IEEE magazine for detail) While doing the project keep note of all books you refer, in the correct format and include them in alphabetical order in your reference list.

VI Project Evaluation:

Internal Assessment

There shall be six components that will be considered in assessing a project work with weightage as indicated.

1. Timely completion of assigned tasks as evidenced by team meeting minutes 20%
2. Individual involvement, team work and adoption of industry work culture 10%
3. Quality of project documentation (Precision, stylistics etc) 10%
4. Achievement of project deliverables 20%

5 Effective technical presentation of project work 10%

6. Viva 30%

Based on the above 6 components internal mark 40 can be awarded.

External Assessment

Dissertation/Project submitted at the end of third year shall be valued by two examiners appointed by the Controller for the conduct of practical exam. The board of examiners shall award 60 marks based on the following components.

1. Achievement of project deliverables - 20 Marks
2. Effective technical presentation of project work - 20 Marks
3. Project Viva - 20 Marks

There shall be a common written examination conducted for all the candidates in each group together for a minimum of 10 minutes.

(i) Requirement Specification of Project

(ii) Design of Project

(iii) Testing and Implementation of Project

SUBJECT : COMPUTER NETWORK

Year: III **Semester: V**I

Computer Networks Common for B.Sc.-SA , B.Sc.-CSc , B.Sc.-CSc-wAI , B.Sc.-CSc-wDS	**341E6C**
Credits 3	**Lecture Hours:5 per week**

Learning Objectives: (for teachers: what they have to do in the class/lab/field) To understand the concept of Data communication and Computer network To get a knowledge on routing algorithms.

- To impart knowledge about networking and inter networking devices
- To gain the knowledge on Security over Network communication

Course Outcomes: (for students: To know what they are going to learn)

CO1: To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models

CO2: To gain knowledge on Telephone systems and Satellite communications

CO3: To impart the concept of Elementary data link protocols

CO4: To analyse the characteristics of Routing and Congestion control algorithms

CO5: To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS

Units	**Contents**
I	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media
II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.
III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth
IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.
V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography.

Learning Resources:

Recommended Texts

1. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.

Reference Books

1. B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2015.
2. F. Halsall, "Data Communications, Computer Networks and Open Systems", Pearson Education, 2008.
3. D. Bertsekas and R. Gallagher, "Data Networks", 2nd Edition, PHI, 2008.
4. Lamarca, "Communication Networks", Tata McGraw- Hill, 2002

SUBJECT : NETWORK SECURITY

Year: III **Semester: VI**

Network Security Common for B.C.A. , B.Sc.-SA	**341E6F**
Credits 3	**Lecture Hours:5 per week**

Learning Objectives: (for teachers: what they have to do in the class/lab/field)

- To study the number theory used for network security
- To understand the design concept of cryptography and authentication
- To develop experiments on algorithm used for security

Course Outcomes: (for students: To know what they are going to learn)

1. Identify the security issues in the network and resolve it.
2. Analyse the vulnerabilities in any computing system and hence be able to design a security solution.
3. Evaluate security mechanisms using rigorous approaches by key ciphers and Hash functions.
4. Demonstrate various network security applications, IPSec, Firewall, IDS, Web Security, Email Security and Malicious software etc

Units	**Contents**
I	Model of network security – Security attacks, services and attacks –OSI security architecture – Classical encryption techniques – SDES – Block cipher PrinciplesDES – Strength of DES – Block cipher designprinciples– Block cipher mode of operation – Evaluation criteria for AES – RC4 - Differential and linear cryptanalysis – Placement of encryption function – traffic confidentiality.
II	Number Theory – Prime number – Modular arithmetic – Euclid's algorithm - Fermet's and Euler's theorem – Primality – Chineseremaindertheorem– Discrete logarithm – Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography.
III	Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC– SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS.
IV	Authentication applications – Kerberos – X.509 Authentication services - E- mail security – IP security - Web security

V	Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security

Learning Resources:

Recommended Texts

1. William Stallings, "Cryptography & Network Security", Pearson Education, Fourth Edition 2010.

Reference Books

1. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security, Private communication in public world", PHI Second Edition, 2002.
2. Bruce Schneier, Neils Ferguson, "Practical Cryptography", Wiley Dreamtech India Pvt Ltd, First Edition, 2003.
3. Douglas R Simson "Cryptography – Theory and practice", CRC Press, First Edition, 1995.

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