



DEPARTMENT OF MATHEMATICS

MUHAMMED ABDURAHIMAN MEMORIAL ORPHANAGE (MAMO) COLLEGE

[Govt. Aided First Grade College & Affiliated to University of Calicut.
Re-Accredited by NAAC with A Grade]

CURRICULUM FOR CERTIFICATE COURSE

CERMA008: INTRODUCTION TO R PROGRAMMING

OFFERED DURING THE
ACADEMIC YEAR 2020-21
[APPROVED BY ACADEMIC COMMITTEE, MAMO COLLEGE]



MANASSERY, MUKKAM POST,
KOZHIKODE, KERALA, INDIA, 673 602.
EMAIL: MAMOCOLLEGE@GMAIL.COM



OFFICE: 0495-2297319
PRINCIPAL: 0495-2295121



www.mamocollege.org



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Kozhikode, Kerala, India, 673 602.
email: mamocollege@gmail.com



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INSTITUTIONAL VISION, MISSION & OBJECTIVES 01



VISION: Build Scientifically Oriented, Intellectually Accomplished, Morally Upright and Socially Committed youth who can play a constructive role in Nation Building.



MISSION: Intellectual, social and economic empowerment of the youth in general and women, minorities, orphans and the destitute in particular by providing quality, value-based higher-education.



OBJECTIVES: Pursuit of Excellence, Harnessing technology, Thrust on value-based education, Nurturing Excellence and Moulding the youth for Nation Building



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VISION, MISSION, OBJECTIVES & CORE VALUES OF THE DEPARTMENT

02



VISION

VISION: Educating students to excel in all their endeavours for the betterment of the society and nation



MISSION

MISSION: Empowers students to fulfil their moral, professional, social and economic financial responsibilities



OBJECTIVES: (a) Develop a positive attitude towards Mathematics and to appreciate its practical applications in life, (b) Develop problem solving skills and the ability to use mathematics in everyday life, (c) Develop problem solving skills and the ability to use mathematics in everyday life and (d) Use mathematical language effectively and accurately.



VALUES

CORE VALUES: Practical Orientation, Intellectual Enlightenment, Social Commitment, Moral Uprightness, Ethical Self-Fashioning, Cultural Enrichment, International Outlook, Aesthetic Sensibility, Vocational Excellence and Psychological Stability.



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B.Sc. MATHEMATICS: PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) 03

After 4 to 5 years of graduation, the career and professional accomplishments attained by the B.Sc Mathematics Graduates would reflect that the programme really prepared the graduates to deal with the real world, where they could apply and use the skills and knowledge they have learned to good use

Specifically, the graduate would be able to:



PEO1: Have significant opportunities in various service domains at National and International levels like banking, insurance, government jobs, consultancy, teaching, defense, industry, research and entrepreneurial pursuit.



PEO2: Have leadership quality to handle all kind of circumstances in diversities by providing interdisciplinary and multidisciplinary learning environment.



PEO3: Inculcate value system while working in a team assigned with a important targets they will contribute through their critical thinking and



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mathematical competence holding the ethical values.



PEO4: Achieve peer recognition as an individual or as a team member having specialized knowledge and expertise to investigate, formulate, analyse and implement on the problems of pure, applied and computational mathematics to compete at global level.



PEO4: Have continuous learning attitude to adopt new skills and techniques to overcome the problems related with new technologies.



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B.Sc MATHEMATICS: PROGRAMME SPECIFIC OUTCOME (PSOs) 04

On the successful completion of the B.Sc. Mathematics Programme, the graduates would be able to:



PSO1: Understand the mathematical concepts and applications in the field of algebra, real and complex analysis, optimization, differential equations, Vector calculus etc.



PSO2: Adopt changing scientific environment in the process of sustainable development by using mathematical tools



PSO3: Handle the advanced techniques in algebra, analysis, optimization, differential equations, engineering, finance and actuarial science to analyse and design algorithms solving variety of problems related to real life problems.



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PSO4: Have necessary language skills and expertise in the field of research and developments through seminar and project.



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B.Sc MATHEMATICS: PROGRAMME OUTCOMES (POs) 05

On the successful completion of the B.Sc. Mathematics Programme, the graduates would be able to:



PO1: KNOWLEDGE DOMAIN: Demonstrate an understanding of the basic concepts in mathematics, statistics, operations research and their importance in the solution of some real- world problems.



PO2: PROBLEM ANALYSIS: Analyse and solve the well-defined problems in mathematics statistics, and operations research. Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decision. Find, analyse, evaluate and apply information systematically and shall make defensible decisions.



PO3: PRESENTATION AND INTERPRETATION OF DATA: Demonstrate the ability to manipulate and visualize data and to compute standard statistical summaries.



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-  **PO4: ETHICS:** Analyse relevant academic, professional and research ethical problems and commit to professional ethics and responsibilities with applicable norms of the data analysis and research practices.
-  **PO5: MODERN TOOL USAGE:** Learn, select, and apply appropriate methods and procedures, resources and computing tools with an understanding of the limitations.
-  **PO6: COMMUNICATION:** Effectively communicate about their field of expertise on their activities, with their peer and society at large. Such as, being able to comprehend and write effective reports and design documentation, make effective presentations.
-  **PO7: PROJECT MANAGEMENT:** Apply Knowledge and understanding of principles of mathematics and statistics effectively as an individual, and as a member or leader in diverse teams to manage projects in multidisciplinary environment.
-  **PO8: INDIVIDUAL AND TEAM WORK:** Work effectively as an individual, as a member or leader of various teams, and in multi-disciplinary settings.
-  **PO9: DESIGN/DEVELOPMENT OF SOLUTIONS:** Model the real-world problems in to mathematical equations and draw the inferences by finding appropriate solutions.



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PO10: LIFE-LONG LEARNING: Continue to acquire mathematical knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematics.



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CERTIFICATE COURSE

CERMA008: QUANTITATIVE APTITUDE IN COMPETITIVE EXAMS **06**

COURSE CURRICULUM

Course Name	Quantitative Aptitude In Competitive Exams
Course Code	CERMA008
Year	2020-21
Course Designer	Mr. Mohiyudheen N
Course Duration	30 Hrs
Course Schedule	November to February
Maximum Students Intake	60 Students



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1. COURSE LEVEL

Foundational, skill-oriented certificate programme.

2. PREREQUISITE

None.

3. COURSE INTAKE & ADMISSION

Maximum 60 students will be given admission to the course based on First-Come-First-Serve basis. All the students of the MAMO College are eligible for free enrolment for the course. The enrolment notification will be issued for the course well in advance of the commencement of the course.

4. COURSE COORDINATOR

Mr. Mohiyudheen N, Assistant Professor, Department of Mathematics

5. COURSE PREAMBLE

In this course, you will learn how to program in R and how to use R for effective data analysis. You will learn how to install and configure software necessary for a statistical programming environment and describe generic programming language concepts as they are implemented in a high-level statistical language. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, profiling R code, and organizing and commenting R code. Topics in statistical data analysis will provide working examples.



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6. DURATION

Total Duration: 30 Hrs. [Contact Hrs. 20 Hrs., Lab Hours: 6 Hrs. and Assessment Works: 4]

7. CURRICULUM FOCUS

Enhance the employability of the learners through curriculum enrichment for additional skill development.

8. COURSE OBJECTIVES

Learners are exposed to

- Understand critical programming language concepts.
- Configure statistical programming software
- Make use of R loop functions and debugging tools
- Collect detailed information using R profiler.

9. SKILL EXPECTED

On the successful completion of the course, learners will be able to:

- Data Analysis
- Debugging
- R Programming
- R Studio.

10. COURSE OUTCOMES

Upon the successful completion of the course, learners will be able to:



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CO No	Course Outcome(CO)	Skill/Knowledge Attainment Level Based on Revised Bloom's Taxonomy
CO1	Understand the basics in R programming in terms of constructs, control statements, string functions	Understand
CO2	Understand the use of R for Big Data analytics	Understand
CO3	Learn to apply R programming for Text processing	Apply
CO4	Able to appreciate and apply the R programming from a statistical perspective	Apply

11. MAPPING OF COs WITH PSOs AND POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	1	1	1	1	3	1	2	1	1	1	1	2	1	1
CO2	2	2	2	1	1	1	3	1	2	1	1	1	3	1
CO3	2	1	1	2	1	2	1	1	1	2	1	1	2	1
CO4	1	1	1	1	1	2	1	2	1	1	2	1	1	2
AVG	1.5	1.3	1.3	1.3	1.5	1.5	1.8	1.3	1.3	1.3	1.3	1.3	1.8	1.3



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12. MODULE-WISE COURSE CONTENTS

MODULE 1

MODULE DURATION: 14 Hrs. [Contact Hrs. 10 Hrs. Lab Hours: 2 Hrs., and Assessment Works: 2]

MODULE CONTENT: Introducing to R – R Data Structures – Help functions in R – Vectors – Scalars – Declarations –recycling – Common Vector operations – Using all and any – Vectorized operations – NA and NULL values – Filtering – Vectorised if-then else – Vector Equality – Vector Element names

MODULE OUTCOME: On successful completion of the module, learners can familiarize with the fundamentals of R programming such as variables, control structures, functions and many others..

MODULE 2

MODULE DURATION: 16 Hrs. [Contact Hrs. 10 Hrs., Lab Hours: 4 Hrs. and Assessment Works: 2]

MODULE CONTENT: Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Avoiding Dimension Reduction –Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists.

MODULE OUTCOME: On successful completion of the module, learners will learn the powerful support of R programming for working with matrices.



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1. Norman Matloff, *The Art of R Programming: A Tour of Statistical Software Design*, Publisher: No Starch Press, 2011.
2. Jared P. Lander, *R for Everyone: Advanced Analytics and Graphics*, Addison-Wesley Data & Analytics Series, 2013.

ADDITIONAL REFERENCES & STUDY MATERIALS:

3. Mark Gardener, “*Beginning R – The Statistical Programming Language*”, Wiley, 2013
4. Robert Knell, “*Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R*”, Amazon Digital South Asia Services Inc, 2013.

13. DELIVERY MODE

The course employs multi-mode delivery mechanism including contact lecture and online classes.

14. DELIVERY SCHEDULE

November to February.

15. DETAILED COURSE DELIVERY PLAN

Hour	Delivery Mode and Activity	Topics to be Covered
1	Contact Hour - 1: Classroom Discussion	Introducing the Course
2	Contact Hour - 2: Classroom Discussion	Introducing to R, R Data Structures, Help functions in R



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Hour	Delivery Mode and Activity	Topics to be Covered
3	Contact Hour - 3: Classroom Discussion	Vectors, Scalars
4	Contact Hour - 4: Classroom Discussion	Declarations, recycling
5	Contact Hour - 5: Classroom Discussion	Common Vector operations, Using all and any
6	Assessment Hour - 1	Assignment to Create R-Programming
7	Contact Hour - 6: Classroom Discussion	Vectorized operations, NA and NULL values
8	Contact Hour - 7: Classroom Discussion	Filtering – Vectorised if-then else
9	Lab Hour - 1	Using all and any, NA and NULL values
10	Contact Hour - 8: Classroom Discussion	Vector Equality
11	Contact Hour - 9: Classroom Discussion	Vector Element names
12	Lab Hour - 2	Vectorised if-then else, Vector Equality
13	Assessment Hour - 2	Assignment to Create R-Programming
14	Contact Hour - 10: Classroom Discussion	Review of Module 1
15	Contact Hour - 11: Classroom Demonstration	Creating matrices, Matrix operations
16	Contact Hour - 12: Classroom Demonstration	Applying Functions to Matrix Rows and Columns



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Hour	Delivery Mode and Activity	Topics to be Covered
17	Contact Hour - 13 Classroom Demonstration	Adding and deleting rows and columns, Vector/Matrix Distinction
18	Contact Hour - 14 Classroom Demonstration	Avoiding Dimension Reduction
19	Contact Hour - 15 Classroom Demonstration	Higher Dimensional arrays
20	Lab Hour - 3	Creating matrices, Matrix operations.
21	Lab Hour - 4	Applying Functions to Matrix Rows and Columns, Adding and deleting rows and columns.
22	Contact Hour -16 Classroom Discussion	Vector/Matrix Distinction, Lists, Creating lists
23	Assessment Hour - 3	Assignment to Create R-Programming
24	Contact Hour - 17: Classroom Demonstration	General list operations, Accessing list components and values
25	Contact Hour - 18: Classroom Demonstration	Applying functions to lists
26	Lab Hour - 5	Creating lists, General list operations
27	Contact Hour - 19: Classroom Discussion	Recursive lists.
28	Lab Hour - 6	Applying functions to lists, recursive lists.
29	Contact Hour - 20: Classroom Discussion	Review of Module 2
30	Assessment Hour - 4	Course End Assessment



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16. ASSESSMENT COMPONENTS

Total Marks: 100

CLASSROOM AND GROUP PARTICIPATION: 20 Marks. This component aims at testing the course content understanding and the reflection skills and their attainment levels.

COURSE WORK: 30 Marks. This component aims at testing the skill attainment levels of the learners in analysing and implementing the real-world problem.

MID-COURSE ASSIGNMENT: 20 Marks. This component aims at testing the module-wise attainment levels of the course objectives and course outcome and module outcomes.

END-COURSE ASSESSMENT: 30 Marks. This component aims at testing overall attainment levels of the course with respect to course objectives, course outcome and module outcomes.

17. COURSE EVALUATION & GRADING

The course evaluation is done/coordinated entirely by the course coordinator. The following 10-point Indirect Grading System is used for awarding grades to students:

Percentage of Mark	Letter Grade	Interpretation	Class
95 and above	O	Outstanding	First Class with Distinction
85 to below 95	A+	Excellent	First Class with Distinction
75 to below 85	A	Very good	First Class with Distinction
65 to below 75	B+	Good	First Class
55 to below 65	B	Satisfactory	First Class



Manassery, Mukkam Post,
Kozhikode, Kerala, India, 673 602.
email: mamocollege@gmail.com



Office: 0495-2297319
Principal: 0495-2295121



www.mamocollege.org

COORDINATOR
ACADEMIC COMMITTEE
MUHAMMED ABDURAHIMAN MEMORIAL
ORPHANAGE COLLEGE
P.O. MANASSERY, MUKKAM - 673602



MUHAMMED ABDURAHIMAN MEMORIAL ORPHANAGE (MAMO) COLLEGE

[Govt. Aided First Grade College & Affiliated to University of Calicut.
Re-Accredited by NAAC with A Grade]

DEPARTMENT OF MATHEMATICS

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Percentage of Mark	Letter Grade	Interpretation	Class
45 to below 55	C	Average	Second Class
35 to below 45	P	Pass	Third Class
Below 35	F	Failure	Fail
Incomplete	I	Incomplete	Fail
Absent	Ab	Absent	Fail

The grade is awarded by the course-coordinator by considering the overall performance of the learner in all the assessment component of the course.

18. GRIEVANCE REDRESSAL

The grievances, if any, can be submitted to the Head of the Department for its redressal. Those grievances that cannot be redressed by HoD can be forwarded to Academic Council of the College for final decision on the matter.

19. ISSUANCE OF CERTIFICATES

The Course Completion Certificate will be issued to all the successful candidates showing the Total Marks and Grade Obtained.



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