KANNUR UNIVERSITY

(Abstract)

M.Sc. Mathematics Programme (CBCSS) - Open Elective Courses Modified in the Scheme and Syllabus - implemented in the University Department w .e.f. 2021 Admission - Approved -Orders issued.

ACADEMIC C SECTION

Acad/C4/13135/2020 Dated: 04.02.2023

Read:-1. U.O. No. Acad/C4/13135/2020 dated 20.01.2021
2. U.O. No Acad/C4/13135/2020 dated 28.12.2022
3. U.O. No Acad/C4/13135/2020 dated 20.01.2023
4. Minutes of the meeting of the Department Council, Dept. of Mathematical Sciences dated 06.10.2022
5. Letter from HoD, Dept. of Mathematical Sciences Dtd. 12.01.2023 forwarding the Scheme, Syllabus of MSc Mathematics programme CBCSS

ORDER

1. As per paper read (1) above the revised Scheme, Syllabus and Model Question Papers of M.Sc. Mathematics Programme (CBCSS) implemented in the University Department w.e.f 2020 admission and certain modifications were effected to the same as per paper read(2) and (3) above.

2. As per paper read (4) above, the Department Council, Dept. of Mathematical Sciences, resolved to incorporate a new Open course "MSMAT03O09- Calculus with an introduction to Linear Algebra" in addition to the 8 Open Elective Courses in the Syllabus of M.Sc. Mathematics Programme (CBCSS) for implementation from 2021 admission onwards

3. Accordingly, HoD, Dept. of Mathematical Sciences submitted the modified Scheme, Syllabus of M.Sc. Mathematics Programme (CBCSS) for implementation with effect from 2021 admission as per paper read(5) above,

4. The Vice Chancellor after considering the matter in detail and in exercise of the powers of the Academic Council conferred under section 11 (1) Chapter III of Kannur University Act 1996 accorded sanction to implement the modified Scheme and Syllabus of M.Sc. Mathematics Programme (CBCSS) in the Department of Mathematical Sciences, Mangattuparamba Campus as detailed in para (2) above, with effect from 2021 admission, and to report the same to the Academic Council.

5.The modified Scheme & Syllabus of M.Sc. Mathematics Programme (CBCSS) implemented with effect from 2021 admission are appended and uploaded on the University Website.**(www.kannuruniversity.ac.in)**.

6.The UO read (1) (2)& (3) above stand modified to this effect

7. Orders are issued accordingly.

Sd/-
Narayanadas K
DEPUTY REGISTRAR (ACAD)
For REGISTRAR

To: 1. The Head, Dept of Mathematical Sciences
Mangattuparamba Campus, Kannur University

Copy To: 1. The Examination Branch (through PA to CE).
2. PS to VC / PA to PVC / PA to R
3. DR / AR 1/ AR II (Acad), EXCI, EP-IV
4. The Web Manager (for uploading in the Website), Computer Programmer
5. SF / DF /FC

KANNUR UNIVERSITY CIVIL STATION P.O. KANNUR Pin-670 002 THAVAKKARA

Forwarded / By Order

SECTION OFFICER

KANNUR UNIVERSITY

DEPARTMENT OF MATHEMATICAL SCIENCES
Choice Based Credit &Semester System (CBCSS)

M.Sc. MATHEMATICS SYLLABUS
(Effective from M.Sc. Admission 2021onwards)

CONTENTS

1. ABOUT THE DEPARTMENT

The Department of Mathematical Sciences which was started in 2008 at the Mangattuparamba Campus of Kannur University. It was established with a vision to promote quality education and innovative research in Mathematical Sciences in Kerala, especially in the northern part of Kerala. So far 7 students completed Ph.D from this department. Presently 11 research scholars are doing research in the department. The department offers M. Sc. and Ph.D programs in Mathematics. The department has an NBHM funded library ,with more than 3000 volumes of books.

2. INTRODUCTION TO CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill-based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Grading system provides uniformity in the evaluation and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations which enables the student to move across institutions of higher learning. The uniformity in evaluation system also enable the potential employers in assessing the performance of the candidates.

2.1. DEFINITIONS:

(i) **Academic Programme** means an entire course of study comprising its programme structure, course details, evaluation schemes etc. designed to be taught and evaluated in a teaching Department/Centre or jointly under more than one such Department/ Centre.

(ii) **Course** means a segment of a subject that is part of an Academic Programme.

(iii) **Programme Structure** means a list of courses (Core, Elective, Open Elective) that makes up an Academic Programme, specifying the syllabus, Credits, hours of teaching, evaluation and examination schemes, minimum number of credits required for successful completion of the programme etc. prepared in conformity to University Rules, eligibility criteria for admission.

(iv) **Core Course** means a course that a student admitted to a particular programme must successfully complete to receive the degree and which cannot be substituted by any other course.

(v) **Elective Course** means an optional course to be selected by a student out of such courses offered in the same or any other Department/Centre.

(vi) **Open Elective** means an elective course which is available for students of all programmes including students of same department. Students of other Department will opt these courses subject to fulfilling of eligibility of criteria as laid down by the Department offering the course.

(vii) **Credit** means the value assigned to a course which indicates the level of

instruction; One-hour lecture per week equals 1 Credit, 2 hours practical class per week equals 1 credit. Credit for a practical could be proposed as part of a course or as a separate practical course.

(viii) **SGPA** means Semester Grade Point Average calculated for individual semester.

(ix) **CGPA** is Cumulative Grade Points Average calculated for all courses completed by the students at any point of time. CGPA is calculated each year for both the semesters clubbed together.

2.2. PROGRAMME OBJECTIVES:

The main objective of this program is to provide a quality educationand problem solving skills in Mathematics to young minds through teaching and learning process. In addition, the course focuses on laying a strong foundation for quality research in Mathematics and related areas .

2.3. PROGRAMME OUTCOMES :

On successful completion of the course a student will be able to:

1. Gain sound knowledge in Mathematics.
2. a good researcher/teacher in Mathematics.

3. M.SC. MATHEMATICS PROGRAMME DETAILS

M.Sc. Mathematics programme is a two-year course divided into four-semesters. A student is required to complete 80 credits for the completion of course and the award of degree.

3.1. PROGRAMME STRUCTURE

		Semester	Semester
Part-I	First Year	Semester I	Semester II
Part-II	Second Year	Semester III	Semester IV

COURSE CREDIT SCHEME:

Sem-ester	Core courses			Elective Courses			Open Courses			Dissertation credits	Viva credits	Total credits
	No. of Papers	Credit (L+T+P)	Total Credits	No. of Papers	Credits (L+T+P)	Total Credits	No. of Papers	Credits (L+T+P)	Total Credits			
I	5	18+0+0	18	0		0	0		0		2	20
II	5	18+0+0	18	0		0	0		0		2	20
III	2	8 +0+0	08	1	4+0+0	4	1	4+0+0	4	0	0	16
IV	0	0+0+0	0	4	16+0+0	16	0		0	8	0	24
			44			20			4	8	4	80

SEMESTER WISE DETAILS:

SEMESTER -I					
Number of Core Courses: 5					
Sl. No	Course Code	Course Title	Theory	Tutorial	Credits
1	MSMAT01C01	Algebra I	3	0	3
2	MSMAT01C02	Linear Algebra	4	0	4
3	MSMAT01C03	Differential Equations I	3	0	3
4	MSMAT01C04	Real Analysis	4	0	4
5	MSMAT01C05	Topology	4	0	4
6	MSMAT01C06	Viva voce			2
	Total credit in core courses				20
	Number of elective courses: 0				
	Credits in each course		Theory	Tutorial	Credits
	Total credits in elective courses		0	0	0
	Number of open elective courses: 0				
	Total credits in open elective courses		0	0	0
	Total credits in Semester –I				20

SEMESTER –II					
Number of Core Courses: 5					
Sl. No	Course Code	Course Title	Theory	Tutorial	Credits
1	MSMAT02C01	Complex Analysis	4	0	4
2	MSMAT02C02	Functional Analysis I	4	0	4
3	MSMAT02C03	Algebra II	3	0	3
4	MSMAT02C04	Differential Equations II	3	0	3
5	MSMAT02C05	Measure and Integration	4	0	4
6	MSMAT02C06	Viva voce			2
	Total credit in core courses				20
	Number of elective courses: 0				
	Credits in each course		Theory	Tutorial	Credits
	Total credits in elective courses		0	0	0
	Number of open elective courses: 0				
	Total credits in open elective courses		0	0	0
	Total credits in Semester –II				20

SEMESTER –III					
Number of Core Courses: 2					
Sl. No	Course Code	Course Title	Theory	Tutorial	Credits
1	MSMAT03C01	Differential Geometry	4	0	4
2	MSMAT03C02	Functional Analysis II	4	0	4
	Total credit in core courses		08	0	08
	Number of elective courses: 1				
Credits in each course			Theory	Tutorial	Credits
MSMAT03E01/ 02/03		Elective Course 1	4	0	4
Total credits in elective courses			4	0	4

Number of open elective courses: 1				
MSMAT03O01 To MSMAT03O09	Open elective course	4	0	4
Total credits in open elective courses		4	0	4
Total credits in Semester III		16	0	16

SEMESTER -IV					
Number of Core Courses: 0					
Sl. No	Course Code	Course Title	Theory	Tutorial	Credits
	Total credit in core courses		0	0	00
	Number of elective courses: 4				
Credits in each course			Theory	Tutorial	Credits
MSMAT04E01 to MSMAT04E17		Elective Course 1	4	0	4
MSMAT04E01 to MSMAT04E17		Elective Course 2	4	0	4
MSMAT04E01 to MSMAT04E17		Elective Course 3	4	0	4
MSMAT04E01 to MSMAT04E17		Elective course 4	4	0	4
Total credits in elective courses			16	0	16
Number of open elective courses: 0					
Total credits in open elective courses			0	0	0
MSMAT04C01		**Project/ Dissertation**			
		Total credits for Dissertation		**4**	8
		Total credits in Semester IV			24

Selection of Elective Courses:

For selection of open course, a student may choose one course in semester III and four course in semester IV from the lists of options being offered by the department.

Elective courses		
COURSE CODE	COURSE TITLE	L-T-P
MSMAT03E01	Fuzzy Mathematics	4-0-0
MSMAT03E02	Operation Research	4-0-0
MSMAT03E03	Stochastic Process	4-0-0

MSMAT04E01	Algebraic Geometry	4-0-0
MSMAT04E02	Projective Geometry	4-0-0
MSMAT04E03	Advanced Complex Analysis	4-0-0
MSMAT04E04	Analytical Mechanics	4-0-0
MSMAT04E05	Fluid Mechanics	4-0-0
MSMAT04E06	Algebraic Topology	4-0-0
MSMAT04E07	Numerical Analysis and computing	4-0-0
MSMAT04E08	Graph Theory	4-0-0
MSMAT04E09	Fractal Geometry	4-0-0
MSMAT04E10	Coding Theory	4-0-0
MSMAT04E11	Cryptography	4-0-0
MSMAT04E12	Harmonic Analysis	4-0-0
MSMAT04E13	Operator Algebras	4-0-0
MSMAT04E14	Representation Theory of Finite Groups	4-0-0

MSMAT04E15	Number Theory	4-0-0
MSMAT04E16	Analytic Number Theory	4-0-0
MSMAT04E17	Algebraic Number Theory	4-0-0

Open Elective Courses:

Students can join for the open course depending on their choice and availabilityof seats in the departments offering such courses.

COURSE CODE	COURSE TITLE	L-T-P
MSMAT03O01	Probability Theory	4-0-0
MSMAT03O02	Basic Topology and Modern Analysis	4-0-0
MSMAT03O03	Basic Algebra	4-0-0
MSMAT03O04	Basic Linear Algebra	4-0-0
MSMAT03O05	Basic Differential Equations	4-0-0
MSMAT03O06	Basic Real Analysis	4-0-0
MSMAT03O07	Basic Topology	4-0-0
MSMAT03O08	Applied Fuzzy Topology	4-0-0
MSMAT03O09	Calculus with an introduction to Linear Algebra.	4-0-0

Teaching:

The faculty of the Department is primarily responsible for organizing lecture work of M.Sc. Mathematics. There shall be 90 instructional daysexcluding examination in a semester.

3.2. ELIGIBILITY FORADMISSION:

BSc Mathematics with minimum of 50% marks or equivalent grade in core course

RELAXATION & WEIGHTAGE:

As prescribed in the university regulation.

NUMBER OF SEATS -20

MODE OFSELECTION:

The selection will be based on the marks obtained in the entrance test, which is to be conducted by the Kannur University.

3.3. ASSESSMENT OF STUDENTS PERFORMANCE AND SCHEME OF EXAMINATIONS

ATTENDANCE

The minimum attendance required for each Course shall be 60% of the total number of classes conducted for that semester. Those who secure the minimum attendance in a semester alone will be allowed to register for the End Semester Examination. Condonation of attendance to a maximum of 10 days in a Semester subject to a maximum of two spells within a Programme will be granted by the Vice-Chancellor. Benefit of Condonation of attendance will be granted to the students on health grounds, for participating in University Union activities, meetings of the University Bodies and participation in extra-curricular activities on production of genuine supporting documents with the recommendation of the Head of the Department concerned. A student who is not eligible for Condonation shall repeat the Course along with the subsequent batch.

EVALUATION

There shall be two modes of evaluation - the Continuous Evaluation (CE) and the End Semester Evaluation (ESE). The total mark for each course including the Project shall be divided into 40% for CE and 60% for ESE. Continuous Evaluation includes Assignments, Seminars, periodic written examinations etc. The component wise division of the 40% CE mark are as follows

Theory	
Components	% of marks
Test papers	40% (16 marks)
Tutorial with viva, Seminar presentations, Discussion, Debate etc.	40% (16 marks)
Assignment	20% (8 marks)
Total Internal marks	40

The ESE shall be made based on examinations for each course conducted by Controller of Examinations. as per the common norms under the CCSS. The question paper for ESE for Theory Examinations shall contain three sections. The Question paper should contain minimum 3 questions from each unit and should not contain more than 5 questions from the same unit.. The distribution of the number of questions and marks are given in the following table.

Part	Marks	Number of questions to be answered	Number of questions in the question paper	Type of questions (Level - Bloom's Taxonomy)
A	15	5	6	1 Remembering 2 Understanding
B	15	3	5	6. creating
C	30	3	5	3. Applying 4. Analysing 5. Evaluating
Total	60	11	16	

SCHEME OF END SEMESTER EXAMINATIONS:

SEMESTER –I

External						Total
Sl. No	Course Code	Title of the Course	Credits	Duration of Exam	Max. Marks	Max Marks (internal and external)
1	MSMAT01C01	Algebra 1	3	3hrs	60	100
2	MSMAT01C02	Linear Algebra	4	3hrs	60	100
3	MSMAT01C03	Differential equations 1	3	3hrs	60	100
4	MSMAT01C04	Real Analysis	4	3hrs	60	100
5	MSMAT01C05	Topology	4	3hrs	60	100
6	MSMAT01C06	Viva voce	2		30	50

SEMESTER –II

External						Total
Sl. No	Course Code	Title of the Course	Credits	Duration of Exam	Max. Marks	Max Marks (internal and external)
1	MSMAT02C01	Complex Analysis	4	3hrs	60	100
2	MSMAT02C02	Functional Analysis 1	4	3hrs	60	100
3	MSMAT02C03	Algebra II	3	3hrs	60	100
4	MSMAT02C04	Differential Equations II	3	3hrs	60	100
5	MSMAT02C05	Measure and Integration	4	3hrs	60	100
6	MSMAT02C06	Viva voce	2		30	50

SEMESTER –III

External						Total
Sl. No	Course Code	Title of the Course	Credits	Duration of Exam	Max. Marks	Max Marks (internal and external)
1	MSMAT03C01	Differential Geometry	4	3hrs	60	100
2	MSMAT03C02	Functional Analysis II	4	3hrs	60	100
3	MSMAT03O01 to MSMAT03O09	Open Elective	4	3hrs	60	100
4	MSMAT03E01/02/03	Elective Course 1	4	3hrs	60	100

SEMESTER –IV

External						Total
Sl. No	Course Code	Title of the Course	Credits	Duration of Exam	Max. Marks	Max. marks (Internal and external)

1	MSMAT04E01 to MSMAT04E17	Elective- 2	4	3hrs	60	100
2	MSMAT04E01 to MSMAT04E17	Elective- 3	4	3hrs	60	100
3	MSMAT04E01 to MSMAT04E17	Elective -4	4	3hrs	60	100
4	MSMAT04E01 to MSMAT04E17	Elective - 5	4	3hrs	60	100
5	MSMAT04C01	Dissertation and Viva Voce	8		60	100

Project work

Each M. Sc. Student has to carry out a research project during third and fourth semesters. The project work should be started in the third semester and should go continuously for the third and fourth semesters. Project work has **8** credits. The project evaluation, comprising of internal (total40 marks) and external (total 60 marks) will be carried out during fourth semester. The scheme of evaluation of project is as follows.

Total marks :100

Content : 30% = 30 marks (18 external &12 internal)

Methodology and presentation : 50% = 50 marks (30 external &20 internal)

Dissertation Viva-voce : 20 % = 20 marks (12 external &08 internal)

External project evaluation has to be done by two external examiners

End semester Viva:

End of semesters I and II,there will be a viva voce examination, based on the topics, taught in the respective semesters.

Total Marks : 50 (20 internal & 30 external)

External Viva Voce examination has to be done by two external examiners

3.4 SPAN PERIOD

No students shall be admitted as a candidate for the examination for any of the Years/Semesters after the lapse of 4 years from the date of admission to the first year of the M.A./M.Sc. programme.

3.5 CONVERSION OF MARKS INTO GRADES

An alphabetical Grading System shall be adopted for the assessment of a student's

performance in a Course. The grade is based on a 6 point scale. The following table gives the range of marks %, grade points and alphabetical grade.

Range of Marks%	Grade Points	Alphabetical Grade
90-100	9	A+
80-89	8	A
70-79	7	B+
60-69	6	B
50-59	5	C
Below 50	0	F

A minimum of grade point 5 (Grade C) is needed for the successful completion of a Course. A student who has failed in a Course can reappear for the End Semester Examination of the same Course along with the next batch without taking re-admission or choose another Course in the subsequent Semesters of the same Programme to acquire the minimum credits needed for the completion of the Programme. There shall not be provision for improvement of CE and ESE.

SGPA means Semester Grade Point Average calculated for individual semester.

3.6 GRADE POINTS. CUMULATIVE GRADE POINT AVERAGE (CGPA)

Performance of a student at the end of each Semester is indicated by the Grade Point Average (CGPA) and is calculated by taking the weighted average of grade points of the Courses successfully completed. Following formula is used for the calculation. The average will be rounded off to two decimal places.

$$CGPA = \frac{\text{Sum of (grade points in a course multiplied by its credit)}}{\text{Sum of Credits of Courses}}$$

3.7 CGPA CALCULATION

At the end of the Programme, the overall performance of a student is indicated by the Cumulative Grade Point Average (CGPA) and is calculated using the same formula given above. Empirical formula for calculating the percentage of marks will be **(CGPA x 10)+5.** Based on the CGPA overall letter grade of the student and classification shall be in the following way.

CGPA	**Overall Letter Grade**	**Classification**

8.5 and above	A+	First Class with Distinction
7.5 and above but less than 8.5	A	
6.5 and above but less than 7.5	B+	First Class
5.5 and above but less than 6.5	B	
5 and above but less than 5.5	C	Second Class

Appearance for Continuous Evaluation (CE) and End Semester Evaluation (ESE) are compulsory and no Grade shall be awarded to a candidate if he/she is absent for CE/ESE or both.

A student who fails to complete the Programme/Semester can repeat the full Programme/ Semester once, if the Department Council permits to do so.