आंध्रप्रदेश केंद्रीय विश्वविद्यालय
CENTRAL UNIVERSITY OF ANDHRA PRADESH
Ananthapuramu

**Postgraduate Programme Structure
as per the UGC Credit Framework (NEP 2020)**

VidyaDadatiVinayam
(EducationGivesHumility)

M.Sc. Mathematics and Computing

Numbers have life; they're not just symbols on paper
- Shakunthala Devi

Programme Structure
(With effect from 2024-2025Batch)

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M.Sc. Mathematics and Computing

Introduction to the programme

The Department of Mathematics has started in the academic year 2021-22 offers a 2-year M.Sc. programme in Mathematics and Computing renamed from the traditional M.Sc. Mathematics program, this updated curriculum reflects the growing importance and intersection of mathematics and computing in various fields including science, engineering, finance, and technology. This programme blends relevant mathematics and computer science courses covering theoretical, computational and practical aspects. Whereas the core mathematics courses are aimed at building a strong foundation in the subject, the laboratory based courses give the exposure and training in application-oriented practical subjects. Students are exposed to advanced research topics through electives and a mandatory one-semester project work. It concentrates on areas where mathematics and computing are most relevant to each other. This is an interdisciplinary programme aiming to provide the strong Maths and computing skills required for the industries.

At the end of the programme, students acquire sound analytical and practical knowledge to formulate and solve challenging problems and are well prepared to take up jobs in software industries, research and development organizations or to pursue higher studies in mathematical and computing sciences.

While preparing the syllabus of the core courses and the basket of elective courses one has to take into account to provide the following points:

a) The core courses should help the students to write the competitive examinations (like CSIR-UGC net) to pursue mathematics at the later years.
b) The course Statistics and Probability should contain more of applied probabilities rather than concepts involving deeper analysis.
c) The course Number Theory can have topics like cryptography.
d) The elective courses should facilitate the student to seek for the jobs in case he/she does not want to continue mathematics.
e) The course also encourages the department to float elective courses that are inter-disciplinary.
f) The student-centric approach of the curriculum has been designed to equip learners with appropriate knowledge, skills and values of the discipline.

ProgrammeVision

It aims to bridge the gap between theoretical mathematical concepts and their practical applications

in computing, equipping students to tackle complex real-world problems in various fields. Produce graduates who are adept at leveraging mathematical principles and computational tools to address complex challenges, innovate, and make meaningful contributions to academia, industry, and society.

ProgrammeObjectives

Upon completion of the M.Sc. programme, the graduate will

- Have professional and ethical responsibility and able to adopt new skills andtechniques.

- Be able to plan, organize, lead and work in team to carry out tasks to the success of theteam.

- Understand the need for continuous learning and prepare himself/ herself with relevantinter–personal skills as an individual, as a member or as a leader throughout theprofessional career.

- Be motivated to prepare himself/ herself to pursue higher studies and research to meetout academic demands of the country.

- Communicate mathematical ideas with clarity and able to identify, formulate and solvemathematical problems.

- Have knowledge in wide range of mathematical techniques and application ofmathematical methods/tools in scientific and engineering domains.

- Have both analytical and computational skills in mathematical sciences.

LearningOutcomes

On successful completion of the programme students should be able to:

- Solve diverse mathematical problems and capable of analyzing the obtained results.

- Analyze and interpret the outcomes and develop new ideas based on the issues inbroader social context.

- Apply the knowledge and design the methodology to the real world problems.

- Use the learned techniques, skills and modern mathematical tools suitable to theproblem encountered.

- Acquire problem solving skills, analytical thinking, creativity and mathematicalreasoning.

- Write effective reports and documents, prepare effective presentations andcommunicate the findings efficiently.

- Develop confidence to crack the competitive exams like NET, GATE, SET, etc.

Pedagogy of the programme

The pedagogy of an M. Sc program in Mathematics and computing typically combines traditional lectures with interactive seminars, workshops, practical sessions, Student-centric learning, Group discussions, Guest lectures, Independent Studies and Interactive sessions, Project based learning, Research orientation, Seminars & workshops on current topics, Tutorial & assignments, Class test / Open book test. Overall, it emphasizes active learning, problem-solving, collaboration, and research, equipping students with the knowledge, skills, and mindset required for success in academia, industry, and beyond.

Programme Structure

- The M. Sc Mathematics and Computing is a two-year programdivided into four semesters with a total of around 96 credits.

- The program is designed with the combination of Core Courses, DisciplineSpecificElectives, Common Compulsory Courses, Multi-disciplinaryCourses, and MOOCS.

- In Semester-II and Semester-III, students will select 1 Discipline Specific Elective as their functional specialization and will study all the courses mentioned.

- In Semester II and III,1 multi-disciplinary elective offered by other departments will be selected by the students.

- Students needtocomplete1 MOOCS Course in each I, II and III Semester.

- In semester IV students will undergo for 6 months Project Work/Dissertation work, allowing them to apply their acquired knowledge and skills in a practical setting and contribute meaningfully to the field of education.

Semester and Course wise Credits

Semester	Discipline Core (DSC) (L+T+P)	Discipline Elective (DSE) / Elective (EL)	Common compulsory course(CCC)	Inter-Disciplinary Elective(IDE)	Project Work / Dissertation	Lab	Total Credits
I	DSC 1 (3) DSC 2 (3) DSC 3 (3) DSC 4 (3) DSC 5 (3)	DSC(MOOC-I)(2)	-	-	-	DSC 5 (1)	**18**
II	DSC 6 (3) DSC 7 (3) DSC 8 (3) DSC 9 (3)	DSC(MOOC-II)(2) DSE 1(3)	CCC 1(2)	IDE 1 (3)	-	DSC 9 (1) CCC 1 (2)	**25**
III	DSC 10 (3) DSC11 (3) DSC 12 (3) DSC 13 (3)	DSC(MOOC-II)(2) DSE 2 (3)	CCC 2(4)	IDE 2 (3)	-	DSC 12 (1)	**25**
IV	DSC 14 (3)	-	-	-	DSC 16 (16) Project Work/ Dissertation	-	**19**
Total	**42**	**12**	**6**	**6**	**16**	**5**	**87**
Percentage	**48.28**	**13.80**	**6.89**	**6.89**	**18.40**	**5.74**	**100**

Programme Structure with Course Titles

Sl. No.	Course Code	Title of the Course	Credit Points	Credit Distribution		
				L*	T*	P*
Semester I						
1	MAT101	Linear Algebra	3	2	1	
2	MAT102	Real Analysis	3	2	1	
3	MAT103	Abstract Algebra	3	2	1	
4	MAT104	Ordinary Differential Equations	3	2	1	
5	MAT105	Computer Programming in Python	4	2	1	1
		Lab: Computer Programming in Python				
6	MAT106	MOOCS-I/Online/Elective #	2	2		
		Total	**18**	**12**	**5**	**1**
Semester II						
1	MAT201	Linear Programming	3	2	1	
2	MAT202	Topology	3	2	1	
3	MAT203	Complex Analysis	3	2	1	
4	MAT204	Probability and Statistics	4	3		1
		Probability and Statistics with R Programming				
5	MAT205	MOOCS-II/Online/Elective #	2	2		
6	**Discipline Specific Elective-I (any *One* of the paper from below list)** [@]		$3^{\#}$	**2**	**1**	
	MAT211	Number Theory				
	MAT212	Measure and Integration				
	MAT213	Calculus of Variations and Integral Equations				
	MAT214	Modules and Fields				
7	MAT215	Inter-Disciplinary Elective-I	**3**	2	1	
8	MAT216	AI & ML(CCC1)	4	2		2
		Total	**25**	**17**	**5**	**3**

Note: # as per the choice of the student and the instructor
   * Core/Generic Elective
   @ The number of elective courses may increase
Note: According to students choice the Discipline Specific elective contact hours per week may change for #Theory.

Sl. No.	Course Code	TitleoftheCourse	Credit Points	Credit Distribution		
				L*	T*	P*
SemesterIII						
1	MAT301	Functional Analysis	3	2	1	
2	MAT302	Partial Differential Equations	3	2	1	
3	MAT303	Numerical Analysis and Scientific Computing **Lab:** Numerical Analysis and Scientific Computing with Python	4	3		1
4	MAT304	Fluid Mechanics	3	2	1	
5	MAT305	MOOCS-III/Online/Elective #	2			
6	**Discipline Specific Elective-II (any *One* of the paper from below list) @**		$3^{\#}$	2	1	
	MAT311	Discrete Mathematics				
	MAT312	Statistical Inference				
	MAT313	Optimization Techniques				
	MAT314	Numerical Linear Algebra				
7.	MAT315	Inter-Disciplinary Elective	3	2	1	
8.	MAT316	Building Mathematical Ability and Financial Literacy (CCC-II)	4	3	1	
		Total	**25**	**17**	**6**	**2**
Semester-VI						
1	MAT401	Numerical Solutions for Differential Equations	3	2	1	
2	MAT402	Dissertation	16		4	12
		Total	**19**	**2**	**5**	**12**

@ The number of elective courses may increase

Note: According to students choice the elective-I and II contact hours per week may change for #Theory.

#As per the choice of the student and the instructor* Discipline Elective /Generic Elective

Students can be done additional MOOC courses, if they want to acquire additional credits

The students can take core courses in MOOCs

Note :*As per the choice of the students and the instructor

L: Lectures; S: Seminars; P: Praticals; T: Tutorials

Semester-Wise Credit Distribution

Semester	Total Credits	Cumulative credit at the end of the semester
I	18	18
II	25	43
III	25	68
IV	19	87

End Semester Examination

MaximumMarks:60   Time:3Hours

Dissertation

Dissertation/Projectreport:Evaluation-60marks
Viva-Voce-40marks

Important Information to Students

Programme: M.Sc. Mathematics and Computing

I. Eligibility: Bachelor's degree with a minimum of 60% marks in the aggregate of optional subjects with Mathematics/ Statistics as one of the subjects; OR with at least 55% of marks for those students who have done B.A. /B.Sc. (Hons) course in Mathematics / Statistics.

II. The minimum duration for completion of the programme is four semesters (two academic years) and the maximum duration is eight semesters (four academic years) or as per amendments made by the regulatory bodies from time to time.

III. A student should attend at least 75% of the classes, seminars, practicals in each course of study.

IV. All theory courses in the programme carry a Continuous Internal Assessment (CIA) component to a maximum of 40 marks and End Semester Examination (ESE) for a maximum of 60 marks. The minimum pass marks for a course is 40%.

V. All lab components carry a Continuous Internal Assessment (CIA) component to a maximum of 60 marks and End Semester Practical Examination (ESE) for maximum of 40 marks. The minimum pass marks for a course in 40%

VI. A student should pass separately in both CIA and the ESE, i.e., a student should secure 16 (40% of 40) out of 40 marks for theory and 24 (40% of 60) out of 60 marks for lab components in the CIA. Therefore, a student should secure 24 (40% of 60) out of 60 marks for theory and 16 (40% of 40) out of 40 marks for lab components in the end semester examination.

VII. The student is given 3 Continuous Internal Assessment (CIA) tests per semester in each course from which the best 2 performances are considered for the purpose of calculating the marks in CIA. A record of the continuous assessment is maintained by the academic unit. The 3 internal tests are conducted for 15 Marks each, out of the best 2 tests scores are considered for 30 marks. Out of the remaining 10 marks, 5 marks are awarded for assignments, class presentations and class participation of the students and the remaining 5 marks are awarded for punctuality, and attendance of the student.

Marks for the Attendance will be considered as follows:

S.NO	ATTENDANCE %	MARKS
1	95% or more	5
2	90-94%	4
3	85-89%	3
4	80-84%	2
5	75-79%	1

VIII. A student failing to secure the minimum pass marks in the CIA is not allowed to take the end semester examination of that course. S/he has to redo the course by attending special classes for that course and get the pass percentage in the internal tests to become eligible to take the end semester examination.

IX. Students failing a course due to lack of attendance should redo the course.

X. Re-evaluation is applicable only for theory papers and shall not be entertained for other components such as practicals/thesis/dissertation/internship, etc.

XI. An on-campus elective course is offered only if a minimum of ten or 40% of the students registered, whichever is higher, exercise their option for that course.