



Programme Specifications

M.Sc. Programme

Programme:
Applied Mathematics

Department:
Mathematics

Faculty of Mathematical & Physical Sciences
M.S. Ramaiah University of Applied Sciences

Programme Specifications: M.Sc. Applied Mathematics

Faculty	Faculty of Mathematical and Physical Sciences (FMPS)
Department	Mathematics
Course	M.Sc.(Applied Mathematics)
Dean of Faculty	Dr. Deepak A S
HOD	Dr. Deepak A S

1. Title of the Award

M.Sc.(Applied Mathematics)

2. Modes of StudyFull-Time **3. Awarding Institution /Body**

M.S. Ramaiah University Of Applied Sciences – Bangalore, India

4. Joint Award

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5. Teaching Institution

Faculty of Mathematical and Physical Sciences (FMPS)

M.S. Ramaiah University Of Applied Sciences – Bangalore, India

6. Date of Programme Specifications

August 2019

7. Date of Programme Approval by the Academic Council of MSRUAS

August 2019

8. Next Review Date

August 2021

9. Programme Approving Regulatory Body and Date of Approval

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10. Programme Accrediting Body and Date of Accreditation

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11. Grade Awarded by the Accreditation Body

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12. Programme Accreditation Validity

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13. Programme Benchmark

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14. Rationale for the Programme

In the present day, the application of mathematical methods to solve real life problems in a wide variety of disciplines such as physics, chemistry, information science, business management, finance, economics and various branches of engineering has become a necessity. Apart from being an indispensable problem-solving and decision-making tool, Mathematics is at the heart of advances in science, engineering and technology. The large scale use of computers in education and industry has given an impetus to the wide use of numerical methods and simulation. There is a need for qualified and competent mathematicians with a sound knowledge in applied mathematics. In our country, teaching/research in Mathematics is being carried out in a number of Universities. However, a vast majority of post graduate degree courses in Mathematics offer more conventional, content-based academic curriculum which inherently lacks application oriented approach, which is essential to make the degree programme more fulfilling and professional from the career perspective.

The Faculty of Mathematical and Physical Sciences of MSRUAS offers the M.Sc.(Applied Mathematics) course with an outcome based curriculum emphasizing the Critical, Analytical and Problem Solving skills to equip the students to pursue their scientific and research career with better preparedness and matured professional outlook. The presence of other allied Faculties of the University provides additional exposure to students the multi-disciplinary approach which is emerging as a key differentiator in the success of modern scientific and engineering endeavors. An expanding job market is open for applied mathematicians since employers value the intellectual rigour and reasoning skills that mathematicians have. Mathematician's familiarity with numerical and symbolic thinking and the analytic approach to problem-solving is highly valued in industry.

15. Programme Aim

The aim of the course is to train postgraduates with advanced knowledge and understanding of Applied Mathematics with higher order critical, analytical, problem solving and research skills; ability to think rigorously and independently to meet higher level expectations of academia and research with sufficient transferrable skills.

16 Programme Objectives

The course objectives of M. Sc. (Applied Mathematics) are to :

- Impart higher level knowledge and understanding of Applied Mathematics
- Apply the principles of mathematics for practical applications
- Enable students to analyse mathematical models of physical systems for enhancement of system performance and arrive at limitations of physical systems
- Enhance students' ability to develop mathematical models of defined physical systems
- Prepare students to evaluate the soundness of mathematical concepts proposed
- Hone students' skills to pursue physics as a teaching and research career
- Train students in team work and in lifelong learning for continuous professional development

17. Intended Learning Outcomes of the Programme

The intended learning outcomes are listed under four headings:

1. Knowledge and Understanding, 2. Cognitive Skills 3. Practical Skills and 4. Capability/ Transferable Skills.

17.1 Knowledge and Understanding

After undergoing this course, a student will be able to:

- KU1: Describe the fundamental and advanced concepts in Real Analysis, Complex Analysis, Functional analysis, Abstract Algebra and Differential Geometry
- KU2: Describe the fundamental and advanced concepts in ordinary and partial differential equations, linear algebra and numerical analysis
- KU3: Describe the fundamental and advanced in statistics, probability and stochastic process
- KU4: Describe the fundamental and advanced concepts in applied mathematics in mechanics/machine learning

17.2 Cognitive Skills

After undergoing this course, a student will be able to:

- CS1: Prove theorems arising in real analysis, complex analysis, functional analysis, abstract algebra and differential geometry
- CS2: Solve problems using ordinary and partial differential equations, linear algebra and numerical analysis
- CS3: Solve problems using statistics, probability and stochastic process
- CS4: Solve real world problems using mechanics/machine learning

17.3 Practical Skills

After undergoing this course, a student will be able to:

- PS1: Assimilate advanced abstract mathematical ideas and arguments
- PS2: Formulate mathematical problems of real life situations
- PS3: Use appropriate programming language to solve a practical problem
- PS4: Visualize complex mathematical relationships using plotting tools

17.4 Capability /Transferable Skills

After undergoing the course, a student will be able to

- TS1: Communicate and present ideas clearly and concisely
- TS2: Perform under constraints to meet the desired objectives
- TS3: Build, work and lead teams effectively
- TS4: Adopt a reflective approach to personal development and embrace the philosophy of continual professional development

18. Programme Structure

The M.Sc. Applied Mathematics programme will be delivered in semester scheme.

Semester 1

Sl. No.	Course Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Max. Marks	Total Credits
1	19MTH511A	Linear Algebra	4			100	4
2	19MTH512A	Theory of ODE	4			100	4
3	19MTH513A	Mathematical Analysis	4			100	4
4	19MTH514A	Numerical Analysis – 1	3		2	100	4
5	19MTH515A	Seminar – 1			4	50	2
Total			15		6	450	18

Semester 2

Sl. No.	Course Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Max. Marks	Total Credits
1	19MTH521A	Complex Analysis	4			100	4
2	19MTH522A	Theory of PDE	4			100	4
3	19MTH523A	Abstract Algebra	4			100	4
4	19MTH524A	Numerical Analysis – 2	3		2	100	4
5	19MTH525A	Intro to Statistics and Probability	3		2	100	4
6	19MTH526A	Seminar – 2			4	50	2
Total			15		8	500	22

Semester 3

Sl. No.	Course Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Max. Marks	Total Credits
1	19MTH531A	Measure Theory and Integration	4			100	4
2	19MTH5XXA	Elective – 1	4			100	4
3	19MTH532A	Differential Geometry	4			100	4
4	19MTH533A	Functional Analysis	4			100	4
5	19MTH534A	Seminar – 3			4	50	2
6	19MTH590A	Research Methodology	2			50	2
Total			18		4	600	20

Semester 4

Sl. No.	Course Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Max. Marks	Total Credits
1	19MTH5XXA	Elective – 2	4			100	4
2	19MTH5XXA	Elective – 3	4			100	4
3	19MTH598A	Internship*			4	100	2
	19MTH599A	Seminar – 4					
4	19MTH600A	Dissertation			20	300	10
Total			8		24	600	20

* Internship can be done during the vacation period for a maximum period of 8 weeks

Electives			
Group 1		Group 2	
Course Code	Course Title	Course Code	Course Title
19MTH551A	Mechanics	19MTH561A	Machine Learning – 1
19MTH552A	Fluid Mechanics	19MTH562A	Machine Learning – 2
19MTH553A	Magnetohydrodynamics	19MTH563A	Probability and Stochastic Process

19. Assessment and Grading

Performance in every theory course will be assessed on the following two components:

Theory Courses with 4 and 3 credits**Component - 1: 50 Marks**

Part A: Two term tests will be conducted. Average of 2 tests will be considered (25% weightage).

Part B: A student needs to submit assignment/s (25% weightage).

Component - 2: 50 Marks

A Written Examination for 100 marks will be conducted. Obtained marks out of 100 are scaled down to 50 marks.

Theory Courses with 3 or 4 credits with laboratory component integrated**Component - 1: 50 Marks**

Part A: Two term tests will be conducted. Average of 2 tests will be considered (25% weightage).

Part B: A student needs to submit assignment/s (15% weightage) and perform laboratory examination (10% weightage).

Component - 2: 50 Marks

A Written Examination and a Laboratory Examination totaling 100 marks will be conducted. The weightage for the Written Examination and a Laboratory Examination will be as decided by the course leader in consultation with the Head of the Department. Obtained marks out of 100 are scaled down to 50 marks.

Theory Courses with 1 or 2 credits**Component - 1: 25 Marks**

A student needs to submit assignment/s (50% weightage).

Component - 2: 25 Marks

A Written Examination for 50 marks will be conducted. Obtained marks out of 50 are scaled down to 25 marks.

Seminars with 1, 2 or 4 credits**Component - 1: 25 Marks**

A student needs to submit a report on the seminar topic given (50% weightage).

Component - 2: 25 Marks

A student is required to give a presentation on the topic given (50% weightage).

Laboratories with 1 or 2 credits**Component - 1: 25 Marks**

A student needs to submit a record for the experiments conducted (50% weightage).

Component - 2: 25 Marks

Laboratory examination will be conducted at the end of semester (50% weightage).

Internship**Component - 1: 50 Marks**

A student is required to submit a report on learning at an Industry with a certificate from the concerned Industry

Component - 2: 50 Marks

A student is required to give a presentation on the topic given (50% weightage).

Dissertation**Component - 1: 100 Marks**

Part A: A student is required to give a pre-project presentation (40% weightage).

Part B: A student is required to give a mid-term project presentation (60% weightage).

Component - 2: 200 Marks

Part A: A student is required to give a final project presentation (50 Marks) and is required to submit a report on the work carried out (100 Marks)

Part B: A student is required to submit a journal article in the given format from the work carried out (50 marks)

Pass Criteria

A student is required to score a minimum of 40% marks in Semester end examination and 40% marks overall in each course for successful completion of a course and for earning the corresponding credit(s).

20. Teaching and Learning Methods

The course delivery comprises of combination of few or all of the following:

1. Face to Face Lectures using Audio-Visuals
2. Workshops, Group Discussions, Debates, Presentations
3. Demonstrations
4. Guest Lectures
5. Laboratory/Field work
6. Industry Visit
7. Seminars/Conferences
8. Group Exercises
9. Project Exhibitions
10. Management Festivals

21. Student Support for Learning

Student are given the following support:

1. Module Notes
2. Reference Books in the Library
3. Magazines and Journals
4. Internet Facility
5. Computing Facility
6. Laboratory Facility
7. Workshop Facility
8. Staff Support
9. Lounges for Discussions
10. Any other support that enhances their learning

22. Quality Control Measures

The following are the Quality Control Measures:

1. Review of Module Notes
2. Review of Question Papers and Assignment Questions
3. Student Feedback
4. Moderation of Assessed work
5. Opportunities for the students to see their assessed work
6. Review by External Examiners and External Examiners Reports
7. Staff Student Consultative Committee Meetings
8. Student Exit Feedback
9. Subject Assessment Board
10. Programme Assessment Board

23. Curriculum Map

Course Code	Intended Learning Outcomes											
	Knowledge and Understanding				Cognitive (Thinking) Skills (Critical, Analytical, Problem Solving, Innovation)				Practical skills			
	KU1	KU2	KU3	KU4	CS1	CS2	CS3	CS4	PS1	PS2	PS3	PS4
19MTH511A		X				X				X	X	X
19MTH512A		X				X				X	X	X
19MTH513A	X				X				X			
19MTH514A		X				X				X	X	X
19MTH521A	X				X				X			
19MTH522A		X				X				X	X	X
19MTH523A	X				X				X			
19MTH524A		X				X				X	X	X
19MTH525A			X				X			X	X	X
19MTH531A		X				X				X	X	X
19MTH532A		X				X				X	X	X
19MTH533A		X				X				X	X	X
19MTH600A	X	X	X	X	X	X	X	X	X	X	X	X
19MTH551A				X				X	X	X	X	X
19MTH552A				X				X	X	X	X	X
19MTH553A				X				X	X	X	X	X
19MTH561A				X				X	X	X	X	X
19MTH562A				X				X	X	X	X	X
19MTH563A			X				X		X	X	X	X

24. Capability/ Transferable Skills Map

Course Code	Group work	Self learning	Research Skills	Written Communication Skills	Verbal Communication Skills	Presentation Skills	Behavioral Skills	Information Management	Personal management/ Leadership Skills
19MTH511A	X	X		X					X
19MTH512A	X	X		X					X
19MTH513A	X	X		X					X
19MTH514A	X	X		X					X
19MTH515A	X	X	X	X	X	X	X	X	X
19MTH521A	X	X		X					X
19MTH522A	X	X		X					X
19MTH523A	X	X		X					X
19MTH524A	X	X		X					X
19MTH525A	X	X		X					X
19MTH526A	X	X	X	X	X	X	X	X	X
19MTH531A	X	X		X					X
19MTH532A	X	X		X					X
19MTH533A	X	X		X					X
19MTH534A	X	X	X	X	X	X	X	X	X
19MTH590A	X	X	X	X	X	X	X	X	X
19MTH598A	X	X	X	X	X	X	X	X	X
19MTH599A	X	X	X	X	X	X	X	X	X
19MTH600A	X	X	X	X	X	X	X	X	X
19MTH551A	X	X	X	X					X
19MTH552A	X	X	X	X					X
19MTH553A	X	X	X	X					X
19MTH561A	X	X	X	X					X
19MTH562A	X	X	X	X					X
19MTH563A	X	X	X	X					X

25. Co-curricular Activities

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposium, paper writing, attending industry exhibitions, project competitions and related activities for them to enhance their knowledge and network.

26. Cultural and Literary Activities

To remind and ignite the creative endeavors annual cultural festivals are held and the students are made to plan and organise the activities.

27. Sports and Athletics

Students are encouraged to develop a habit of taking part in outdoor and indoor games on daily basis.

