



# Programme Specifications

M.Sc. Programme

Programme:  
Organic Chemistry

Department:  
Chemistry

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

University House, New BEL Road, MSR Nagar, Bangalore – 560 054

[www.msruas.ac.in](http://www.msruas.ac.in)

## Programme Specifications: M.Sc. Chemistry with Specialization in Organic Chemistry

Faculty	Faculty of Mathematical and Physical Sciences (FMPS)
Department	Chemistry
Programme	M.Sc. Chemistry with Specialization in Organic Chemistry
Dean of Faculty	Dr. Deepak A.S.
HOD	Dr. T. Niranjana Prabhu

**1. Title of the Award**

M.Sc. (Organic Chemistry)

**2. Modes of Study**Full-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**

Aug 2019

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

Aug 2019

**8. Next Review Date**

Aug 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**

Chemistry is always viewed as a scientific tool which could harness natural resources to enhance our lives in different ways. Among which Organic Chemistry started as the chemistry of life, later it became chemistry of compounds and today it is the study of structure, properties, composition, reactions and preparation of carbon containing including other elements such as nitrogen, oxygen, halogens, phosphorus, silicon, and sulfur. As the society is progressing, it requires various materials such as monomers to produce various polymers and drug molecules that caters to the human need in curing enormous number of diseases. The demand for oils, fats, surfactants and synthesis of these type of molecules in greener routes is ever increasing with the increasing population. Organic chemistry is also used in making of agrochemicals, dyestuff, clothes, food stuffs, perfumes, metals for various applications, explosives, etc. It has become an interdisciplinary subject for the synthesis of various materials with wide applications among which sustainable energy source is one, where many organic compounds are synthesised for photovoltaic cells, light emitting diodes etc. as alternative high energy sources.

Paper, pulp, adhesives, personal care, paints and coatings are some of the other areas where organic chemists will contribute in providing new materials and improving existing materials. Prominent players operating in the global Specialty Monomer market include NOF America Corporation, BASF SE, Arkema Group, Evonik Industries AG, Solvay S.A., IsleChem LLC, Deltech Corporation, Bimax Chemicals Ltd., and so on. India is the 3rd largest producer of chemicals in Asia by volume and 6th largest producer in the world, which is highly diversified covering more than 80,000 commercial products. It is broadly classified into Basic chemicals, Specialty chemicals, and Agrochemicals. India's proximity to the Middle East, the world's source of petrochemicals feedstock, makes for economies of scale. Mitsubishi Chemicals, BASF, ADEKA, AkzoNobel, Dupont, Syngenta, Dyestar, Henkel, Rhodia, Wacker, Croda and SABIC are some of the major chemical industries investing in India.

The Faculty of Mathematical and Physical Sciences of MSRUAS offers the M.Sc. Chemistry with Specialization in Organic Chemistry programme 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 a mature professional outlook. The presence of other allied Faculties of the University provides for a multi-disciplinary approach which is emerging as a key differentiator in the success of modern scientific and engineering endeavors.

In the coming years, the government intends to boost up funds for basic sciences. There is an acute shortage of qualified teaching staff. The job prospects for candidates with M.Sc. (Industrial Chemistry) look good in academia and industry.

**15. Programme Aim**

The aim of the programme is to train postgraduates with advanced knowledge and understanding of Organic Chemistry 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 programme objectives of M. Sc. Chemistry with Specialization in Organic Chemistry are to:

- Impart higher level knowledge and understanding of Organic chemistry
- Prepare students to evaluate the soundness of chemical concepts proposed
- Train students to perform chemical experiments using the standard laboratory equipment/modern instrumentation and gather reliable data
- Enable students carry out synthesis of organic molecule, data processing, computation, data analysis and numerical simulations
- Teach students proper procedures and regulations for safe handling and use of chemicals
- Hone students' skills to pursue chemistry 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 programme, a student will be able to:

- KU1: Identify methods and mechanisms to synthesize organic compounds that are industrially important
- KU2: Describe chemical properties, methods of preparation/ purification of these molecules and compounds
- KU3: Outline various assaying methods for chemical compounds
- KU4: Select appropriate physical and chemical techniques for processing and characterization of organic compounds

**17.2 Cognitive Skills**

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

- CS1: Model and Explore alternative methods/mechanisms to synthesize organic compounds
- CS2: Develop a strategy for the commercial viability of a chemical process
- CS3: Apply chromatographic techniques for chemical separation and Manage safe handling of toxic pollutants
- CS4: Design ways to recycle industrial waste

**17.3 Practical Skills**

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

- PS1: Synthesize, purify and assay compounds of industrial importance
- PS2: Device methods for safe handling of toxic pollutants
- PS3: Perform qualitative/quantitative chemical analysis with spectroscopic instruments
- PS4: Carry out necessary computational and simulation work

**17.4 Capability /Transferable Skills**

After undergoing the programme, 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 following are the courses a student is required to successfully complete for the award of the degree. The programme is delivered as per the Time-Table for every batch.

**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	19CHY511A	Physical Chemistry 1	4			100	4
2	19CHY512A	Inorganic Chemistry 1	4			100	4
3	19CHY513A	Organic Chemistry 1	4			100	4
4	19CHY514A	Instrumental Methods of Analysis	4			100	4
5	19CHY515A	Chemistry Laboratory 1			4	50	2
6	19CHY516A	Chemistry Laboratory 2			4	50	2
7	19CHY517A	Seminar 1			2	50	1
<b>Total</b>			<b>16</b>		<b>10</b>	<b>550</b>	<b>21</b>

**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	19CHY521A	Physical Chemistry 2	4			100	4
2	19CHY522A	Inorganic Chemistry 2	4			100	4
3	19CHY523A	Organic Chemistry 2	4			100	4
4	19CHY524A	Computational Chemistry	4			100	4
5	19CHY525A	Chemistry 3 Laboratory			4	50	2
6	19CHY526A	Chemistry Laboratory 4			4	50	2
7	19CHY527A	Seminar 2			2	50	1
<b>Total</b>			<b>16</b>		<b>10</b>	<b>550</b>	<b>21</b>

**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	19CHY551A	Retrosynthetic, Stereochemical and Spectroscopic Analysis	3			100	3
2	19CHY552A	Photochemical, Pericyclic and Organocatalytic Reactions	3			100	3
3	19CHY553A	Natural Products and Green Synthetic Methods	3			100	3
4	19CHY554A	Advanced Heterocyclic Chemistry and Pharmaceutical Products Synthesis	3			100	3
5	19CHY590A	Research Methodology	2			50	2
6	19CHY555A	Advanced Organic Chemistry Laboratory 1			4	50	2
7	19CHY556A	Advanced Organic Chemistry Laboratory 2			4	50	2
8	19CHY537A	Seminar 3			2	50	1
<b>Total</b>			<b>14</b>		<b>10</b>	<b>600</b>	<b>19</b>

**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	19CHY598A	Internship*			8	100	4
	19CHY599A	Seminar**					
2	19CHY600A	Dissertation Work ***			30	300	15
<b>Total</b>					<b>38</b>	<b>400</b>	<b>19</b>

\* Internship can be done during the vacation period for a maximum period of 8 weeks, where the student needs to submit a report along with the presentation.

\*\*A student can opt for seminar instead of internship, where a student in consultation with his/her project supervisor is expected to conduct review of literature related to their project work, write a review article and submit along with a presentation on the same topic.

\*\*\* A student in consultation with allotted supervisor is required to conduct research on a topic, submit a dissertation report along with an article in a prescribed journal format.

**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 for 100 marks will be conducted. 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 or 2 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).

**Seminars with 3 or 4 credits****Component - 1: 50 Marks**

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

**Component - 2: 50 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 Marks).

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

**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

**21. Student Support for Learning**

Students are given the following support:

1. Course 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 Course 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

Module 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
19CHY511A	X	X	X		X							
19CHY512A	X	X		X	X							
19CHY513A	X	X			X	X	X	X				
19CHY514A	X	X	X		X	X	X	X				
19CHY521A	X	X	X		X							
19CHY522A	X	X		X	X							
19CHY523A	X	X			X	X	X	X				
19CHY524A	X	X	X		X	X	X	X				
19CHY551A	X	X	X		X							
19CHY552A	X	X		X	X							
19CHY553A	X	X			X	X	X	X				
19CHY554A	X	X	X		X	X	X	X				
19CHY590A	X	X	X	X	X	X	X	X				
19CHY515A	X	X		X	X	X	X		X	X	X	X
19CHY516A	X	X		X	X	X	X		X	X	X	X
19CHY525A	X	X		X	X	X	X		X	X	X	X
19CHY526A	X	X		X	X	X	X		X	X	X	X
19CHY555A	X	X		X	X	X	X		X	X	X	X
19CHY556A	X	X		X	X	X	X		X	X	X	X
19CHY517A	X		X				X	X				
19CHY527A	X		X				X	X				
19CHY537A	X		X				X	X				
19CHY598A	X	X	X	X	X	X	X	X	X	X	X	X
19CHY599A		X		X	X	X	X					
19CHY600A	X	X	X	X	X	X	X	X	X	X	X	X

**24. Capability/ Transferable Skills Map**

Module Code	Group work	Self learning	Research Skills	Written Communication Skills	Verbal Communication Skills	Presentation Skills	Behavioral Skills	Information Management	Personal management/ Leadership Skills
19CHY511A	X	X	X	X	X			X	
19CHY512A	X	X	X	X	X			X	
19CHY513A	X	X	X	X	x			X	
19CHY514A	X	X	X	X	X		X	X	
19CHY521A	X	X	X	X	X		X	X	
19CHY522A	X	X	X	X	X			X	
19CHY523A	X	X	X	X	X			X	
19CHY524A	X	X	X	X	X			X	
19CHY531A	X	X	X	X	X			X	
19CHY532A	X	X	X	X	X			X	
19CHY533A	X	X	X	X	X		X	X	
19CHY534A	X	X	X	X	X		X	X	X
19CHY590A	X	X	X	X	X		X	X	X
19CHY515A		X	X	X	X		X	X	
19CHY516A		X	X	X	X		X	X	
19CHY525A		X	X	X	X		X	X	
19CHY526A		X	X	X	X		X	X	
19CHY535A		X	X	X	X		X	X	
19CHY536A		X	X	X	X		X	X	
19CHY517A		X	X		X	X	X	X	X
19CHY527A		X		X	X	X	X	X	X
19CHY537A		X		X	X	X	X	X	X
19CHY598A		X	X	X	X	X	X	X	X
19CHY599A		X		X	X	X	X	X	X
19CHY600A	X	X	X	X	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 organize the activities.

**27. Sports and Athletics**

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

