



Programme Specifications

M.Sc. Programme

Programme:
Industrial 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

Programme Specifications: M.Sc. Chemistry with Specialization in Industrial Chemistry

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

1. Title of the Award

M.Sc. (Industrial Chemistry)

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

Industrial Chemistry is the branch of chemistry, which applies physical and chemical processes towards the transformation of natural materials and their derivatives to products which have utilitarian value. Over 90% of all the manufactured goods are touched by the business of chemistry. Chemical industries are an essential part of any nation's economy. Chemical industry contributes around 3% of the Indian GDP and nearly 16% India's manufacturing sector. The industry presently produces around 80,000 commercial products, which range from toiletries and cosmetics, to plastics and pesticides. The industry is integral to the development of agricultural and industrial development in India and has key linkages with other industries dealing with fertilizers, automobiles, consumer goods, pharmaceuticals and food products. Globalization poses many challenges to the industry, which had predominantly developed in a protected environment. With World Trade Organization assuming an increasing role in global economics, there is an inevitable move towards an inter-linked international economy. In India, pharmaceuticals and biotechnology have performed exceedingly well even at the world level. Growing at an average rate of 12.5%, the Indian chemical industry offers a wide spectrum of job opportunities for chemists. There is a great demand for chemists who are capable of translating chemical knowledge and skills into industrial development.

The Faculty of Mathematical and Physical Sciences of MSRUAS offers the M.Sc.(Industrial 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 industrial 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 Industrial Chemistry are to:

- Impart higher level knowledge and understanding of industrial 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 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 commercially important materials for chemical industries
- KU2: Describe chemical properties, methods of preparation/ purification of these materials
- KU3: Outline various assaying methods for chemical compounds
- KU4: Select appropriate physical and chemical techniques for processing of materials and identify the effects of these techniques on environment

17.2 Cognitive Skills

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

- CS1: Model and Explore alternative materials/chemical processes in an industry
- 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 materials of industrial importance
- PS2: Devise 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
Total			16		10	550	21

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
Total			16		10	550	21

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	19CHY541A	Chemistry of Agrochemicals, Textiles and Polymers	3			100	3
2	19CHY542A	Chemistry of Industrial Minerals	3			100	3
3	19CHY543A	Petroleum Chemistry	3			100	3
4	19CHY544A	Chemistry of Oils, Fats, Surfactants and Coatings	3			100	3
5	19CHY590A	Research Methodology	2			50	2
6	19CHY545A	Industrial Chemistry Laboratory 1			4	50	2
7	19CHY546A	Industrial Chemistry Laboratory 2			4	50	2
8	19CHY537A	Seminar 3			2	50	1
Total			14		10	600	19

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
Total					38	400	19

* 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

Student 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

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
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				
19CHY541A	X	X	X		X							
19CHY542A	X	X		X	X							
19CHY543A	X	X			X	X	X	X				
19CHY544A	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
19CHY545A	X	X		X	X	X	X		X	X	X	X
19CHY546A	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

Course 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	X	
19CHY512A	X	X	X	X	X		X	X	
19CHY513A	X	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	X	
19CHY523A	X	X	X	X	X		X	X	
19CHY524A	X	X	X	X	X		X	X	
19CHY541A	X	X	X	X	X		X	X	
19CHY542A	X	X	X	X	X		X	X	
19CHY543A	X	X	X	X	X		X	X	
19CHY544A	X	X	X	X	X		X	X	
19CHY590A	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	
19CHY545A		X	X		X	X	X	X	X
19CHY546A		X	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.

