SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.25)
Syllabus with effect from the Academic Year 2022-2023

PROGRAMME STRUCTURE
Master of Science in Chemistry
MSc (Organic Chemistry) Semester: IV

Programme Outcome (PO) - For MSc Chemistry Programme	Master of Science program provides extended theoretical and practical knowledge of different science subjects. Master of Science programme at Sardar Patel University is designed keeping the overall back ground preparation in mind for the student to either seek a job or to become an entrepreneur. The students, after completion of Bachelor of Science can select the master's programme in the subject they have had at the final year or in a related discipline (depending upon eligibility criteria prescribed by university). **Programme outcomes: At the end of the program, the students will be able to** 1. Have a deep understanding of both the theoretical and practical concepts in the respective subject. 2. Understand laboratory processes and use scientific equipments and work independently. 3. Develop research temperament as a consequence of their theory and practical learning. 4. Communicate scientific information in oral and written form. 5. Understand the issues related to nature and environmental contexts and think rationally for sustainable development. 6. The students are able to handle unexpected situations by critically analyzing the problem.
Programme Specific Outcome (PSO) - For MSc Chemistry Semester - IV	Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Analytical Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Chemistry and Industrial polymer Chemistry. After completing M.Sc. chemistry program, students will be able to: ■ Demonstrate and apply the fundamental knowledge of the basic principles in various fields of Chemistry. ■ Apply knowledge to build up small scale industry for developing endogenous product. ■ Collaborate effectively on team-oriented projects in the field of chemistry or other related fields. ■ Communicate scientific information in a clear and concise manner both orally and in writing.

	■ Inculcate logical thinking to address a problem and become result oriented with a positive attitude. ■ Enhance the scientific temperament among the students so as to develop a research culture and implementation of the policies to tackle the burning issues at global and local level. ■ Apply the knowledge to develop the sustainable and eco-friendly technology. ■ Take up global level research opportunities to pursue Ph.D programme targeted approach and specific competitive exams conducted by service commission ■ Accept enormous job opportunities at all level of chemical industries, pharmaceutical industries and placements in R & D.

To Pass	At least 40% Marks in the University Examination in each paper and 40% Marks in the aggregate of University and Internal examination in each course of Theory, Practical & 40% Marks in Viva-voce.

Course Type	Course Code	Name of Course	Type of Course	T /P	Credit	Hours per Week	Exam Duration in hrs	Component of Marks		
								Internal	External	Total
								Total/ Passing	Total/ Passing	Total/ Passing
Core Course	PS04CORC51	Natural Products	EM	T	4	4	3	30/10	70/28	100/40
	PS04CORC52	Medicinal Chemistry	EM& EN	T	4	4	3	30/10	70/28	100/40
	PS04CORC53	Stereochemistry of Organic Compounds	EM	T	4	4	3	30/10	70/28	100/40
Core Course (Any One)	PS04CORC54	Practical in Organic Chemistry **OR**	EM&SD	P	4	8	6	30/10	70/28	100/40
	PS04CORC55	Project Work	EM&SD	P	4	8		30/10	70/28	100/40
Core Course (Any One)	PS04CORC56	Practical in Organic Chemistry **OR**	EM&SD	P	4	8	6	30/10	70/28	100/40
	PS04CORC57	Project Work	EM&SD	P	4	8		30/10	70/28	100/40
Core Course	PS04CORC58	Comprehensive Viva		-	1	1			50/20	50/20
Elective Course (Any one)	PS04ECHE51	Environmental Chemistry and analysis	EM& EN	T	4	4	3	30/10	70/28	100/40
	PS04ECHE52	Analysis of Pharmaceuticals drugs	EM& EN	T	4	4	3	30/10	70/28	100/40

	PS04ECHE53	Selected Topics in Advanced Inorganic Chemistry-II	EM& EN	T	4	4	3	30/10	70/28	100/40
	PS04ECHE54	Inorganic Polymers and Inorganic Materials	EM& EN	T	4	4	3	30/10	70/28	100/40
	PS04ECHE55	Selected Topics in Polymers-III	EM& EN	T	4	4	3	30/10	70/28	100/40
	PS04ECHE56	Selected Topics in Polymers- II	EM& EN	T	4	4	3	30/10	70/28	100/40
	PS04ECHE57	Surface Chemistry and Catalysis	EM& EN	T	4	4	3	30/10	70/28	100/40
	PS04ECHE58	Introduction to Different Materials	EM& EN	T	4	4	3	30/10	70/28	100/40
	PS04ECHE59	Topics in Organic Chemistry	EM& EN	T	4	4	3	30/10	70/28	100/40
	PS04ECHE60	Applied Organic Chemistry	EM& EN	T	4	4	3	30/10	70/28	100/40
					25					650
Add-on Course		MOOCs course from Swayam Portal								

EMPLOYABILITY = EM, ENTREPRENEURSHIP = EN and SKILL DEVELOPMENT = SD

*** Project work** (as optional) in place of practicals; to be offered to some of the students, based on their merit, interest, and placement with the teachers (Marks:200). The project shall have to be carried out under the allotted teacher(s) and a dissertation shall be submitted and will be assessed for internal (60 marks) and external (140 marks), in the usual manner.

Master of Science, Organic Chemistry
M.Sc. Organic Chemistry, Semester IV

Course Code	PS04CORC51	Title of the Course	Natural Products
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	The course based on Natural Products will clear the following points and make the understanding clear to the students offering Organic Chemistry as their specialization. It includes the knowledge based on different class of natural products Including their resources likewise: Terpenoids, Alkaloids, steroids and Vitamins. This course helps the students to understand the kinds of organic molecules present in the plane kingdom and how to identify the structural identifications by utilizing different chemistry concept.

Course Content		
Unit	Description	Weightage* (%)
1.	**Introduction of Natural Products** Classification, source and methods of isolation of natural products, General methods for the structure determination of natural products. **Vitamins:** Structure and synthesis of Vitamin A_1, Vitamin B_1 (Thiamine), Vitamin B_2 (Riboflavin), Vitamin B_6 (Pyridoxine) and Folic acid, α - Tocopherol, Biotin (Vitamin H). Synthesis of Vitamin C,	25 %
2.	**Alkaloids** Introduction of Opium alkaloids, Structure and synthesis of Morphine, Rearrangement in opium alkaloids, synthesis of Reserpine and Tylophorine. Biogenesis of Alkaloids, Structure and synthesis of Cinchonine, (-)-Cocaine, Structure and synthesis of Tropine, Synthesis of 2- ethylpyridine, tropinic acid, tropinone and tropilidine from tropine, Synthesis of pimelic acid from tropinic acid.	25 %
3.	**Terpenoids and Carotenoids** Structure and synthesis of bicyclic sesquiterpenoids Eudesmol and Cadinene, structure and synthesis of ß-Carotene, synthesis of Caryophyllene and (-) Khusimone, Cedrene and Cedrol, molecular rearrangement of Caryophyllene and Logifolene. Biogenesis of Terpenoids and Carotenoids.	25 %
4.	**Steroids**	25 %

	Introductions, structural identification and synthesis of Cholesterol, Ergosterol; **Steroid Hormones:** Introduction, classification **Androgens:** structural identification and Androsterone, synthesis of Testosterone, **Oestrogens:** Introductions and total synthesis of Oestrone; **Gestrogens:** synthesis of Progesterone from cholesterol and Stigmasterol. synthesis of Cortisone, and Chemistry of bile acids. Biogenesis of Steroids.	

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology will be blend of lectures / PPT presentation / seminar / tutorials / assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Acquire information about introduction to natural products their classification
2.	Identify natural sources and methods of isolation of natural products.
3.	Employ different methods for the structural determination of vitamins, alkaloids, terpenoids, carotenoids and steroids.
4.	Accomplish structure elucidation of natural products.
5.	Apprehend some of the total synthesis.

6.	Deploy the acquired knowledge in industry and academic research.

Suggested References:	
Sr. No.	References
1.	The Chemistry of Natural Products, K. W. Bentley, Vol. I – V (Interscience).
2.	Organic Chemistry, Vol. 2, I. L. Finar, 5th Edition (1994) ELBS Publication.
3.	Natural Products Chemistry, Vol. I & II K. Nakanishi et al., Academic press publication (1974).
4.	The Molecules of Nature, J. B. Hendrickson, W. A. Benjamin Inc. (1965).
5.	Selected Organic Synthesis, Ian Fleming John Wiley (1977).
6.	Chemistry of Natural Products, N. R. Krishnaswamy, University Press (India) Ltd. (1999).
7.	Classical Methods in Structure Elucidation of Natural Products, Reinhard W. Hoffmann by Wiley-VHCA.

On-line resources to be used if available as reference material
On-line Resources

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Master of Science, Organic Chemistry
M.Sc. Organic Chemistry, Semester IV

Course Code	PS04CORC52	Title of the Course	Medicinal Chemistry
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	1. To learn about many facets of drug design, drug discovery, pharmacodynamics and pharmacokinetics with the elucidation of mechanisms of action of biologically active compounds. 2. To familiarize with different class of drugs. 3. To understand the SAR of different class of drugs and based on that, students may be able to design the future target molecules.

Course Content		
Unit	Description	Weightage* (%)
1.	**Introduction to Medicinal Chemistry** **Pharmacokinetics:** Drug administration, drug absorption, drug distribution, drug metabolism (general pathway of drug metabolism: oxidative, reductive and hydrolytic reactions), drug excretion, time course of drug action; first order and zero order, time course of drug concentration change in plasma, Plateau effect. **Pharmacodynamics:** Receptors, chemical messengers, binding sites, Receptor types and subtypes (protein receptors, DNA receptors with examples of Agonists and Antagonists).	25
2.	**Psychoactive Drugs** **Sedative and Hypnotics**: Classifications, SAR of Barbituric acid, synthesis of Glutethimide, Oxazepam and Methaquilone. **Antianxiety agents:** introduction, classification, SAR of Benzodiazepine, mode of action; synthesis and uses: Diazepam, Nitroazepam, Maprobamate, Hydroxyzine. **Antidepressants:** Introduction, classification, synthesis and uses: Isocarboxazide, Imipramine, Sertraline, Venlafaxine. **Antipsychotics**: introduction, classification, synthesis and uses: Chlorpromazine, Thioridazine, Trifluoperazine, Haloperidol, Trifluperidol, Loxapine and Clozapine. **Cardiovascular Drugs** **Antianginal and Vasodilators**: Introduction and classifications, synthesis of Nitroglycerine, Nicorandil, Nifedipine, Bepridil, Minoxidil and Hydralazine and SAR of Dihydropyridines. **Antihypertensive drugs:** introduction and classifications, synthesis of Captopril, Ramipril.	25

3.	**Antineoplastics Agents**: introduction, classification, synthesis and drug profile. **Alkylating agents:** Melphalan, Cyclophosphamide and dacarbazine. **Topoisomerase inhibitors:** Doxorubicin, Etoposide and Dactinomycin. **Antimetabolites:** Mercaptopurine, Methotrexate and Gemcitabine. **Tubulin binders:** Docetaxel, Paclitaxel and Vincristine**.** **Antiviral Agents:** Introduction, classification of drugs according to its mechanism of action and according to the treatment protocol. **Drug profile based on Nucleotide analogues:** Acyclovir, Idoxuridine, Rimantadine, **None Nucleoside RT inhibitors:** Nevirapine, Emivirine. **Nucleoside RT inhibitors:** Zalcitabine, Zidovudine. **HIV protease inhibitors:** Indinavir, Ritonavir.	25
4.	**Antibiotics:** General Introduction, classification based on mechanism of action and chemical structure. **ß-lactam antibiotics:** Penicillin -V, Pivampicillin, SAR of Penicillin. **Cephalosporins:** Introduction, classification, synthesis of Cephalexin, cephadroxil, Cefuroxime and Cefoperazone; **Aminoglycoside antibiotics:** Introductions, SAR of aminoglycosides, synthesis of Chloramphenicol, SAR of Chloramphenicol. **Tetracyclic:** Introduction, classifications. **Quinolone antibacterials:** Introductions, synthesis of Nalidixic acid, Flouroquinolone, Ciprofloxacin and Ofloxacin, SAR of Quinolones. **Drug Design:** Concepts of drug design, approaches to lead discovery, SAR, combinatorial chemistry, Pro-drugs.	25

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology will be blend of lectures / PPT presentation / seminar / tutorials / assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand pharmacokinetic and pharmacodynamics of drugs.
2.	Understand the concepts of drug design.
3.	Realize structural activity relationship in the organic scaffolds based on variety of drug molecules
4.	Differentiate between different classes of drugs including psychoactive drugs, antineoplastics agents, antiviral agents and antibiotics.
5.	Appreciate the role of chemistry in pharmaceutical industries for the synthesis of pharmaceutically active agents.

Suggested References:	
Sr. No.	References
1.	Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical, Chemistry, 11th Edition by John H. Block & John M. Beale, Published by Lippincott Williams & Wilkins (2004).
2.	Principles of Medicinal Chemistry, 4th Edition by William O-Foye, Thomas L. Lemke and David A.Williams, Published in India by B. I. Waverly Pvt. Ltd. New Delhi (1995).
3.	Essential of Medicinal Chemistry, 2nd Edition by Andrejus korolkovas, Published by Wiley-India Edition (1988).
4.	Instant Notes: Medicinal Chemistry, Edited by Graham L. Patric, Published by Viva Books Private Ltd. (2002)
5.	Textbook of Medicinal Chemistry Vol. I & II by V. Alagarsamy Published by Elsevier (2010).
6.	Medicinal Chemistry 3rd Edition by Ashutosh Kar Published by New age international (P) Limited,Publishers (2005).
7.	Medicinal Chemistry Edited by Alfred Burger Published by Interscience Publishers, John Wiley & Sons,New York (1951)
8.	Burger's Medicinal Chemistry and Drug Discovery Vol. 3: Therapeutic agents Edited by Manfred E. Wolff Published by Interscience Publishers, John Wiley & Sons, New

	York (1996)
9.	Burger's Medicinal Chemistry 4th Edition: Part III Edited by Manfred E. Wolff Published by Interscience Publishers, John Wiley & Sons, New York (1981)
10	Organic Chemistry, Vol. 2, I. L. Finar, 5th Edition (1994) ELBS Publication.
11	Natural Products Chemistry, Vol. I & II K. Nakanishi et al., Academic press publication (1974).
12	The Molecules of Nature, J. B. Hendrickson, W. A. Benjamin Inc. (1965).
13	Selected Organic Synthesis, Ian Fleming John Wiley (1977).
14	Chemistry of Natural Products, N. R. Krishnaswamy, University Press (India) Ltd. (1999).

On-line resources to be used if available as reference material
On-line Resources

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Master of Science, Organic Chemistry
M.Sc. Organic Chemistry, Semester IV

Course Code	PS04CORC53	Title of the Course	Stereochemistry of Organic Compounds
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	1. To impart knowledge of the basics of asymmetric synthesis, resolution techniques, conformational analysis, and supramolecular chemistry. 2. To understand the basics of chiral catalysis. 3. To familiarize to draw various conformations of carbocyclic, heterocyclic, fused, and bridged rings 4. To impart the knowledge of the effect of various factors on conformations of substituted cyclohexanes, heterocycles, and decalines. 5. To familiarize students with the use of various spectroscopic techniques in conformational analysis of cyclic systems. 6. To familiarize students with the importance of intermolecular forces in molecular recognition. 7. To familiarize students with various supramolecular assemblies and their role in molecular recognition. 8. To comprehend the importance of supramolecular chemistry in various fields.

Course Content		
Unit	Description	Weightage* (%)
1.	**Asymmetric synthesis:** Chemo-, Regio- and Stereoselectivities • Introduction and classification of asymmetric synthesis • Cram's chelated and Prelog's rules, and Felkin-Anh model• Diastereoselectivity in the aldol reaction• Use of BINOLs, BINAPs, CBS, $IPCBH_2$, IPC_2BH and 9-BBN in asymmetric reactions• MPV reduction and Sharpless epoxidation	**25**
2.	**Methods of resolution and conformational analysis of acyclic compounds:** Classification of resolution techniques • Industrial methods for resolution of (±) 2-octanol, (±) phenylethylamine and (±) alanine •	**25**

	Conformational analysis of ethane, *n*-butane, halogenated alkanes, and vicinal dihydroxy, halogen and hydroxy amino compounds	
3.	**Conformational analysis of cyclic compounds:** Conformational analysis of mono-, di- and polysubstituted cyclohexane • small, common, and medium-sized carbocyclic rings • six-membered heterocyclic compounds • conformational analysis of fused and bridged cyclic ring systems	**25**
4.	**Molecular recognition chemical and stereochemical aspects:** Introduction • the structure of DNA, replication and formation of its double helix • natural receptors proteins and enzymes • synthetic molecular receptors: cyclophanes, calixarene, and cyclodextrins • ORD, CD and octane rule.	**25**

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology will be a blend of lectures / PPT presentation/seminar/tutorials/assignments, etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Learn basics of asymmetric synthesis, resolution techniques for separation of enantiomers, conformational analysis, and molecular resolution.
2.	Understand the stereochemistry of carbon compounds one of the major parts of organic chemistry dealing with three-dimensional structural structures.
3.	Learn the dynamic aspects of organic molecules and their relationship with their physical and chemical properties.
4.	Understand the basics of chiral catalysis.

5.	Understand the basics of conformational analysis of acyclic and cyclic compounds.
6.	Draw various conformations of carbocyclic, heterocyclic, fused, and bridged rings
7.	Explain the effect of various factors on conformations of substituted cyclohexanes, heterocycles, and decalines.
8.	Appreciate the use of various spectroscopic techniques in conformational analysis of cyclic systems.
9.	Solve problems based on conformational analysis.
10.	Understand the basics of supramolecular chemistry.
11.	Recognize the importance of intermolecular forces in molecular recognition.
12.	Identify various supramolecular assemblies and their role in molecular recognition.
13.	Comprehend the importance of supramolecular chemistry in various fields.

Suggested References:

Sr. No.	**References**
1.	Stereochemistry: Conformation and Mechanism, By P.S. Kalsi, 6th edition, New Age International (P) Ltd., Publishers(2005).
2.	Stereochemistry and Mechanism through solved problems, By P.S. Kalsi, Wiley Eastern Ltd. (1994).
3.	Stereochemistry of organic compounds, By D. Nasipuri, 2nd Edition, New Age International (P) ltd., Publishers (1994).
4.	Stereochemistry of Carbon Compounds, By E.L. Eliel, Tata McGraw-Hill Pub. Co. Ltd. (1962).
5.	Organic Chemistry, By J. Clayden, N. Greeves, S. Warren, and P. Wothers, Oxford Uni. Press, N.Y. (2001).

On-line resources to be used if available as reference materials
Online Resources: https://swayam.gov.in/

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Master in Science, Organic Chemistry
M. Sc. Organic Chemistry, Semester – IV

Course Code	PS04CORC54	Title of the Course	Practical in Organic Chemistry
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	1. To make able to plan multistep synthesis. 2. To impart knowledge and skills to synthesize various heterocyles with diverse structures. 3. To familiarize with separation and purification of the product. 4. To make able use TLC for monitoring the progress of the reaction.

Course Content		
Unit	Description	Weightage* (%)
1.	Multistep Synthesis of Heterocyclic Compounds (Minimum Sixteen (16) exercises) • To monitor reaction by Thin Layer Chromatography(TLC) 1. Acridone 2. Antipyrin 3. Phenacetin 4. 2-Methylbenzimidazole 5. 2-Benzylbenzimidazole 6. 2-ChloroPhenylbenzimidazole 7. Preparation of heterocyclic azodye 8. 5-Chloro-3-methyl-1-phenyl-1H-pyrazolone-4-carboxaldehyde 9. 2-Phenylindole 10. 5-Nitroanthranilicacid 11. 2-Methyl-3-benzyl-4-ketoquinazoline 12. 2,3-Dimethyl4-ketoquinazoline 13. 2-Styryl-3(H)-4-ketoquinazoline 14. Flavone 15. 2-Chloro-3-formyl-quinolones 16. 5-Hydroxy-1,3-benzoxathiazolone-2 17. *p*-Aminobenzene sulfonamide (Sulfadrug), 18. 2-Chloromethylbenzimidazole 19. 3-(4-Carbonyl-1-phenylpyrazol-3-yl) chromen-2-one 20. Miscellaneous	100

Teaching-Learning Methodology	To meet the effectiveteaching and the learning requirements, teaching-learning methodology will be blend of practicals/ demonstrations/lectures / PPT presentation / seminar / tutorials / assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Practical Examination (As per CBCS R.6.8.3)	**30**%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learnerwill be able to	
1.	Able to plan multistep synthesis.
2.	Able synthesize various heterocyles with diverse structures.
3.	Learn separation and purification of the product.
4	Learn use of TLC for monitoring the progress of the reaction.
5	Learn good laboratory practices.

Suggested References:	
Sr. No.	References
1.	Vogel's Textbook of practical organic chemistry, 5th edition, B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatchell (PearsonEducation)
2.	Comprehensive practical organic chemistry: Preparation and Quantitative analysis, V. K. Ahluwalia, Renu Aggarrwal (Universities Press)

On-line resources to be used if available as reference material:
On-line Resources: https://swayam.gov.in/

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Master in Science, Organic Chemistry
M. Sc. Organic Chemistry, Semester – IV

Course Code	PS04CORC55	Title of the Course	Project Work
Total Credits of the Course	04	Hours per Week	08

Course Objectives:	To provide exposure to research problem and carry out research in the novel and fascinating topics of research in chemistry.

Course Content	
Description	Weightage* (%)
Research work in laboratory on a topic given by the supervisor	100%

Teaching-Learning Methodology	Laboratory exercise and thesis writing

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Presentation and Viva-voce Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to proceed for literature survey, synthesis and characterization of compounds/ materials using modern analytical and spectroscopic techniques and their study for various applications. They will be trained in research for pursuing higher studies. They will get training for working in research in academic and industries.

Suggested References: Published research articles on given research topic.

On-line resources to be used if available as reference material
Published papers by reputed publishers like American Chemical Society, Royal Society of Chemistry, Wiley, Elsevier, etc.

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Master of Science, Organic Chemistry
M.Sc. Organic Chemistry, Semester IV

Course Code	PS04CORC56	Title of the Course	Practical in Organic Chemistry
Total Credits of the Course	4	Hours per Week	8

Course Objectives:	1. To make able to plan synthesis. 2. To familiarize with the synthesis of various esters and drug intermediates. 3. To familiarize with separation and purification of the product. 4. To make able to use TLC for monitoring the progress of the reaction. 5. To familiarize with use of column chromatography in purification of impure products. 5. To make able to identify the structure of unknown organic compound using combined spectral data.

Course Content

Unit	Description	Weightage* (%)
1.	Synthesis of Some Drugs and Intermediates, Synthesis of Various Esters,Demonstration of column chromatography, Spectral Analysis A. Synthesis of Some Drugs and Intermediates (08exercises) 1. Yarayara (2-methoxynaphthalene) 2. 5,5'-Diphenylhydantoin 3. Benzimidazole 4. Benzotriazole 5. 2-Hydroxy-4-methylquinoline 6. 2,3-Diphenylquinoxaline 7. 6-Methyl-4-oxo-1,3, -dihydro-2-thiopyrimidine 8. Ethyl-6-methyl-2-oxo-4-phenyl-1,3,4-trihydro-5-pyrimidinecarboxylate B. Synthesis of Various Esters (07exercises) 1. Benzocain (Ethyl-p-aminobenzoate) 2. Dibutylmaleate 3. EthylCinnamate 4. Butesin (Butyl-4-aminobenzoate)	100

	5. Isobutylphenylacetate 6. Salol (PhenylSalicylate) 7. Ethylphenylacetate C. Demonstration of ColumnChromatography D. SpectralAnalysis Structure interpretation of organic compounds from spectra. Minimum eight (08) exercises should be given.	

Teaching-Learning Methodology	To meet the effective teaching and the learning requirements, teaching-learning methodology will be blend of practicals/ demonstrations/lectures / PPT presentation / seminar / tutorials / assignments etc.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Practical Examination (As per CBCS R.6.8.3)	**30**%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learnerwill be able to	
1.	Able to plan synthesis.
2.	Able synthesize various esters and drug intermediates.
3.	Learn separation and purification of the product.
4	Learn use of TLC for monitoring the progress of the reaction.
5	Learn use of column chromatography in purification of impure products.
6	Learn good laboratory practices.
7	Able to generate spectral data from various spectra
8	Able to identify the structure of unknown organic compound using these combined spectral data.

Suggested References:

Sr. No.	References
1.	Vogel's Textbook of practical organic chemistry, 5th edition, B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatchell (PearsonEducation)
2.	Comprehensive practical organic chemistry: Qualitative analysis, V. K. Ahluwalia, Sunita Dhingra (Universities Press)
3.	Organic structures from spectra, 5th edition, L. D. Field, S. Sternhell, J. R. Kalman (Wiley: A John Wiley & Sons Ltdpublication)
4.	Elementary Organic Spectroscopy: Principles and Chemical applications (revised edition), Y. R. Sharma (S. ChandPublishing)

On-line resources to be used if available as reference material:
On-line Resources: https://swayam.gov.in/

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Master in Science, Organic Chemistry
M. Sc. Organic Chemistry, Semester – IV

Course Code	PS04CORC57	Title of the Course	Project Work
Total Credits of the Course	04	Hours per Week	08

Course Objectives:	To provide exposure to research problem and carry out research in the novel and fascinating topics of research in chemistry.

Course Content	
Description	Weightage* (%)
Research work in laboratory on a topic given by the supervisor	100%

Teaching-Learning Methodology	Laboratory exercise and thesis writing

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Presentation and Viva-voce Examination (As per CBCS R.6.8.3)	30%
2.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to proceed for literature survey, synthesis and characterization of compounds/ materials using modern analytical and spectroscopic techniques and their study for various applications. They will be trained in research for pursuing higher studies. They will get training for working in research in academic and industries.

Suggested References: Published research articles on given research topic.

On-line resources to be used if available as reference material
Published papers by reputed publishers like American Chemical Society, Royal Society of Chemistry, Wiley, Elsevier, etc.

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Master in Science, Organic Chemistry
M. Sc. Organic Chemistry, Semester – IV

Course Code	PS04CORC58	Title of the Course	Comprehensive Viva
Total Credits of the Course	01	Hours per Week	01

Course Objectives:	To assess the overall knowledge of the student in the relevant subjects covered in core as well as elective courses.

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