ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

CUDDALORE-1

PG & RESEARCH DEPARTMENT OF CHEMISTRY

M.Phil - SYLLABUS 2020-2021

M.Phil. CHEMISTRY

CURRICULUM DESIGN TEMPLATE FROM 2020

Semester	Code	Part	Course Title	Hours	Credit
I	MPCH101	III	Research Methodology	7	5
	MPCH102	III	Advanced Chemistry	7	5
		III	Elective Paper (Guide Paper)	7	5
		III	Science-6 (Library)+6(Lab)	12	-
			Total	**33**	**15**
II	JCH201	III	Dissertation and Viva Voice		21
			Total		**21**
			Grand Total	**33**	**36**

Syllabus

M.Phil (CH)	RESEARCH METHODOLOGY	MPCH101
SEMESTER - I		HRS/WK – 7
CORE – I		CREDIT- 5

Objective:

To impart knowledge on research methodology. To gain an in depth knowledge in statistical analysis.

COURSE OUTCOMES (COs)

CO1: Scholars learn the meaning, objective and problems in Research.
CO2: Scholars acquire the basic principles of experimental designs.
CO3: Scholars get to know about Data collection methods for documentation and presentation.
CO4: Scholars learn data analysis, types and sources of errors and determination of control errors.
CO5: Scholars learn essentials of a scientific report.

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER I	COURSE CODE: MPCH101					TITLE OF THE COURSE: RESEARCH METHODOLOGY								HOURS: 7	CREDITS: 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)								MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	3	4	3	4	3	4	4	4	4	4	4	4	3	3.69	
CO2	3	3	3	3	3	3	3	3	4	3	3	4	4	3.23	
CO3	3	3	4	3	3	3	3	4	4	4	4	4	4	3.53	
CO4	3	3	3	3	3	3	3	4	4	3	4	4	4	3.38	
CO5	3	3	3	4	3	3	3	3	3	4	4	4	4	3.38	
Mean Overall Score														3.44	

Result: The Score of this Course is 3.44 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **High** association with Programme Outcome and Programme Specific Outcome.

UNIT-1 RESEARCH METHODOLOGY [12 Hrs]

Meaning of research – the objective of research – motivation of research – approaches, and significance – methods versus methodology – research in scientific methods – research process – criteria for good research – problem encounters by research in India – funding agencies.

UNIT – II: RESEARCH DESIGN [12 Hrs]

Research problem: selecting the problem – the necessity of defining the problem – techniques involved in defining the problem – research design – needs and features of good design – different research design – basic principles of experimental designs.

UNIT – III: DATA COLLECTION AND DOCUMENTATION [12 Hrs]

Data collection methods – data types – processing and presentation of data- techniques of ordering data – the meaning of primary and secondary data – the uses of computers in research – the library and internet – uses of search engines – virtual libraries – common software for documentation and presentation.

UNIT – IV: DATA AND ERROR ANALYSIS [12 Hrs]

Statistical analysis of data – standard deviation – the correlation – comparison of sets of data – chi-squared analysis for data – characteristics of probability distribution – binomial, Poisson and normal distribution – the principle of least square fittings – curve fitting – a measurement of errors – types and sources of errors – determination of control errors.

UNIT – V: RESEARCH COMMUNICATION [12 Hrs]

Meaning of research report – logical format for writing and paper – essential of a scientific report: abstract- introduction, review of the literature – materials and methods and discussion – write up steps in drafting report – effective illustrations: tables and figures – reference styles: Harvard and Vancouver systems.

Text Books:

1. Research Methodology, methods, and techniques-C.R.Kothari-Wishwa Prakasam publications, II Edition.
2. Research: An Introduction-Robert Ross-Harper and Row Publications.
3. Research methodology-P.Saravanavel-Kitlab Mahal, Sixth edition.
4. A Hand-Book of Methodology of Research-Rajammal P.A.Devadass-Vidyalaya press.
5. N.Subramanian, Introduction to Computer.

Reference Books:

1. G.W.Secdecor and W.Cocharan, Statistical methods oxford and IBH, New Delhi.
2. Santosh Gupta, Research methodology methods, and statistical techniques.
3. S.P.Gupta, Statistical Methods-
4. Scientific social surveys and research-P.Young-Asia publishers, Bombay.
5. How to write and publish a scientific paper –R.A. Day Cambridge University Press.
6. Thesis and assignment writing-Anderson-Wiley Eastern Ltd.

M.Phil (CH)	ADVANCED CHEMISTRY	MPCH102
SEMESTER – I		HRS/WK – 7
CORE – II		CREDIT- 5

Objective:

To study the applications of spectroscopy and to apply it in practice. To provide hands on experience in instrumental methods.

COURSE OUTCOMES (COs)

CO1: Scholars learn the instrumental methods of GC- HPLC, CV, Polarography and Amperometry.
CO2: Scholars understand the Principles and applications in structural elucidation.
CO3: Scholars learn the Applications of UV-Visible, IR, NMR in Organic molecules.
CO4: Scholars learn the Applications of UV-Visible, IR, NMR, Mossbauer and ESR spectrometry in the determination of structures of inorganic molecules.
CO5: Scholars learn the concept of point groups and retro synthesis.

Relationship Matrix Course Outcomes, Programme Outcomes and Programme Specific Outcomes

SEMESTER I	COURSE CODE: MPCH102					TITLE OF THE COURSE: ADVANCED CHEMISTRY								HOURS: 7	CREDITS: 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)								MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8		
CO1	4	4	3	4	3	4	4	4	4	4	4	4	3	3.76	
CO2	4	3	3	3	3	3	3	3	4	3	3	4	4	3.30	
CO3	3	3	4	3	3	3	3	4	4	4	4	4	4	3.53	
CO4	4	3	3	3	3	3	3	4	4	3	4	4	4	3.46	
CO5	3	3	3	4	3	3	3	3	3	4	4	4	4	3.38	
Mean Overall Score														3.48	

Result: The Score of this Course is 3.48 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **High** association with Programme Outcome and Programme Specific Outcome.

UNIT – I: INSTRUMENTAL METHODS OF ANALYSIS [12 Hrs]

Atomic absorption and emission spectroscopy, chromatography: GC - HPLC, electroanalytical methods: coulometry cyclic voltammetry, polarography, amperometry, and ion-selective electrodes.

UNIT – II: SPECTROSCOPY [12 Hrs]

Principles and applications in structural elucidation

Rotational – diatomic molecules – isotopic substitution and rotational constants. Vibrational – diatomic molecules – linear triatomic molecules – specific frequencies of functional groups in polyatomic molecules. Electronic – singlet and triplet states – np* and pp*transitions – application to conjugated double bonds and conjugated carbonyls – Woodward-Fieser rules – charge transfer spectra.nuclear magnetic resonance – basic principle – chemical shift – spin-spin interaction and coupling constant. Mass spectroscopy – parent peak, base peak – metastable peak – MCLafferty rearrangement.

UNIT – III [12 Hrs]

Applications of UV-Visible, IR, NMR – COSY, NOESY, HMBC, HSQC and mass spectrometry in the determination of structures of organic molecules.

UNIT – IV [12 Hrs]

Applications of UV-Visible, IR, NMR, Mossbauer and ESR spectrometry in the determination of structures of inorganic molecules – a variation of optical activity with wavelength – optical rotatory dispersion and circular dichroism curves and their application in determining the configuration and conformation of different inorganic compounds and conformational analysis.

UNIT – V [12 Hrs]

Symmetry elements – point groups – optical activity – its origin – atomic and conformation asymmetry – a variation of optical activity with wavelength. Retrosynthesis – synthons – synthetic equivalents – GI – target molecules – retrosynthesis of molecules (cubane, ciprofloxacin)

Text Books:

1. H.H.Willand, L.L. Merrit and J.A.Dean, Instrumental Methods of Analysis-D.Ven. Nostrand& Co.
2. H.A. Strobel, Chemical Instrumentation, Addition-Wesley publishing & Co.
3. R.S.Drago, Physical Methods in Inorganic Chemistry
4. R.S.Drago, Physical Methods in Chemistry.

Reference Books:

1. C.N.Banwell, Fundamentals of Molecular Spectroscopy, 1996, McGraw Hill.
2. William Kemp, Organic Spectroscopy, Macmillan Ltd, 1994.
3. R.M.Silverstein, G.C.Basler, and T.C.Morril Spectrometric Identification of Organic Compounds, - John Wiley-1997.
4. Stuart Warren -Designing Organic Synthesis

Question paper pattern for M.Phil

THEORY EXAMINATION

Internal Examination **(25 marks)**

Two Internal Examinations	15 marks
Assignment / Seminar	10 marks
Total	**25 marks**

External Examination **(75 marks)**

Question Pattern

M. Phil. CHEMISTRY

Time: 3 Hours **Max. Marks: 75**

Section A (5 × 6 = 30 marks)

ANSWER ALL FIVE QUESTIONS

Internal Choice (Either or Pattern)

Section B (3 × 15 = 45 marks)

ANSWER ANY THREE QUESTIONS

Out of Six Questions (Open Choice)

TOTAL (30+45=75)

NOTE: Equal weightage will be given for all units.