

LOGANATHA NARAYANASAMY GOVERNMENT COLLEGE

(AUTONOMOUS)

Ponneri – 601 204, Thiruvallur District

PG AND RESEARCH DEPARTMENT OF CHEMISTRY



M.Phil. CHEMISTRY SYLLABUS

Effective from the Academic Year 2020-2021

Regulation – 2.0

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VISION

To render ourselves more accountable to our people, our learners, the State Government, UGC and MHRD. To design our own curriculum, which is locale-specific and need-based. To be constantly on our toes to tirelessly alter syllabi and produce competent graduates for job placement and the nation. To create an effective evaluation mechanism with focus on year-long assessments.

MISSION

To upgrade the Department of Chemistry as one with greater knowledge and competence. To give a boost to the quality of graduates we send out through continuous assessment and evaluation and thus augment our human resources. To upgrade the first generation learner into a first-rate graduate.

M.Phil. CHEMISTRY CURRICULUM - 2020-2021 Onwards

Regulation 4.0

S. No.	Semester	Sub. Code	Subject Title	Credits
1.	I	Core Paper	Scientific Research and Methodology	5
2.		Core Paper	Instrumental Methods in Research Analysis	5
3.		Core Paper	Internal Paper	5
4.	II	Core Paper	Project work	16
Total				31

MEMBERS OF BOARD OF STUDIES

Convener	Dr. D. SEGHAR , Principal, L. N. Government College (Autonomous), Ponneri – 601 204.
Chairman	Dr. R. P. MEENA, Assistant Professor & Head, PG Department of Chemistry, L. N. Government College (Autonomous), Ponneri – 601 204.
University Nominee	Mrs. A.C. ABIRAMI, University Nominee, Department of Chemistry, R. V. Government Arts College, Chengalpet-603 001.
External Members (Subject Expert)	Dr. K. ARIVAZHAGAN, Assistant professor , Department of Chemistry, Government Arts College for Men Nandanam, Chennai -600 035. Dr. G. RAMACHANDRAN, Assistant Professor, Department of Chemistry, Dr.Ambedkar Arts College , Vyasarpadi, Chennai-600 039.

Industrialist	<p>S. KANNAN Technical Director M N Dastur & company(p) Ltd Nandanam, Chennai-600035</p>
Alumini	<p>S.VINOTH B. Sc-2013-2016 (Batch) M.Sc-2016-2018 (Batch)</p>
Internal Members	<p>Dr. S. Senthilkumar, Assistant Professor of Chemistry Mr. N. Afsar, Assistant Professor of Chemistry Dr. S. George, Assistant Professor of Chemistry Mrs. K. Jayanthi, Assistant Professor of Chemistry Dr. A. Ramesh, Assistant Professor of Chemistry Dr. S. Manjunathan, Assistant Professor of Chemistry Dr. K. N. Marimuthu, Assistant Professor of Chemistry Dr. S. Maria Rayappan, Assistant Professor of Chemistry Dr. S. Esakku, Assistant Professor of Chemistry Dr. Vidyavathy Balraj, Assistant Professor of Chemistry</p>

SCHEME OF EVALUATION

ALL THEORY COURSES	
Internal	20
External	80
Total	100
MODE OF INTERNAL ASSESSMENT	
Seminars	15
Assignment(s)	05
Total	20
PROJECT WORK	
Viva-voce	20
Evaluation of Dissertation	80
Total	100

DEGREE	SEMESTER	SUBJECT TITLE	SUBJECT CODE	TOTAL HOURS	CREDITS
M.Phil.	I	Scientific Research and Methodology	Core Paper	90	5

OBJECTIVES

- To understand the methodology for executing research projects
- To gain knowledge for writing research articles
- To practice on software tools for chemistry applications

UNIT –I - LITERATURE SURVEY

Print: Sources of information – Primary, Secondary and Tertiary sources – Journals – Journal abbreviations – Abstracts – Current titles – Reviews – Monographs – Dictionaries – Textbooks – Current contents – Introduction to Chemical Abstracts and Beilstein – Subject Index, Substance Index, Author Index, Formula Index and other Indices with examples.

Digital: Web resources – E-Journal – Journal access – TOC alerts – Hot articles – Citation index – Impact factor – H-Index – I-Index – E-Consortium – UGC info net – E-Books – Internet discussion groups and communities – Blogs – Preprint server – Search engines, Scirus, Google Scholar, Chem Industry, Wiki – Databases, Chem Spider, Science Direct, Sci Finder, Scopus and web of science.

UNIT –II METHODS OF SCIENTIFIC RESEARCH

General principles of research, inculcation of scientific temper, avoidance of prejudices and lax judgments, undue admiration of authority (i.e. excessive admiration of the work of great minds), false distinction between theoretical and applied research, impulses of a strong will to do research, persistent hard work and concentration, developing high-minded independence of judgment and taste for scientific originality, various stages of scientific research, observation, experimentation, working hypotheses, proof etc., - Fundamental knowledge of Patent and IPR.

UNIT-III PROPOSAL, PAPER AND THESIS WRITING

Assignments and test papers, Thesis and dissertations, style and conventions in writing, selection of topic. Rough drafting of the article – Title, Abstract, Introduction, Literature review problem and time limitation, Experimental methods, Results and discussions, Foot notes, Figures, Data presentations, Tables, Sign convention followed –Bibliography, Conclusions and recommendations. The general format – page and chapter format – use of quotations – footnote – tables and figures. Results and discussions – applicability of the findings to common usage – referencing – abbreviations used etc.

UNIT-IV STATISTICAL ANALYSIS OF DATA

Various types of errors – precision and accuracy – significant figures, various statistical tests on the accuracy of results, positive and negative deviation from accurate results - the Gaussian distribution – the normal distribution of random errors, mean value, variance and standard deviation, reliability interval, deviations from the Gaussian law of error distribution, t-tests-comparison of the mean with the expected value, comparison of the results of two different methods, comparison of the precision of two methods by F-test, Gross errors and elimination of outlying results, graphical methods – Linear regression, regression line, standard deviation, correlation coefficient – Multiple Linear regression (one variable with two other variables)

UNIT – V COMPUTER APPLICATIONS

File Management - Understanding the importance of file management - backing up of files - MS Excel – opening, entering text & data and formatting. Presentations – Power point – exploring, creating and editing slides, inserting tables and charts – Special effects – Clip Art, creating and drawing shapes. Networks – Internet Explorer- www – working Google and yahoo services, browsing, searching, saving –Printing a web page - email- creating, receiving, reading and sending messages.

Applications of some computer packages like Chem draw, Sciplot, ISIS draw, Chem sketch.

Reference Books

1. J.Anderson, B.H.Durstun and M.Poole, “Thesis and Assignment Writing”, John Wiley, Sydney 1970.

- R. Berry, "How to Write a Research Paper", Pergamon, 1969.
- Ralph Berry, "The Research Project: How to Write It", Fourth Edition Routledge (UK), 2000.
- W.G. Campbell, "Form and Style in thesis writing", Boston M.A; Houghton Mifflin Co., 1970.
- Anderson, "Thesis and Assignment Writing", Wiley, 1970.
- Jerry March, "Advanced Organic Chemistry: Reactions, Mechanisms and Structure", 5th Ed., Wiley, 1996.
- A.I. Vogel, "Quantitative Inorganic Analysis", 3rd Ed., ELBS Longman London.
- D.A. Skoog and D.M. West, Fundamentals of Analytical Chemistry, Holt Rinehart and Winston Publications, IV Edn, 1982.
- W.L. Cochran, "Statistical Methods", Oxford and IBH Publication, New Delhi, 1967.
- K. Balagurusamy, "Fortran for Beginners", Tata McGraw Hill, New Delhi, 1990.

DEGREE	SEMESTER	SUBJECT TITLE	SUBJECT CODE	TOTAL HOURS	CREDITS
M.Phil.	I	Instrumental Methods in Research Analysis	core paper	90	5

OBJECTIVES

- To gain knowledge about various research tools
- To understand about the interpretation of spectral data
- To know the mode of handling of various electro analytical tools

UNIT –I UV AND VISIBLE SPECTROSCOPY

Correlation of energy change with electronic transactions– Woodward–Fieser – Scott rules – application to dienes, trienes and polyenes – unsaturated carbonyl compounds – conjugated cyclic ketones.

Electronic spectra of dx complexes – d² to d⁹ complexes – Charge-Transfer spectra – Characteristics – Charge-Transfer spectrum of MnO₄⁻ (LMCT) – Charge-Transfer versus d-d transitions.

UNIT – II: IR AND RAMAN SPECTRA

Vibration spectra – selection rules – Harmonic and anharmonic oscillators – overtones – Fermi resonance, combination bands rotation – vibration spectra of diatomic molecules – transition for the rigid rotor – coupling of rotation and vibration – linear and perpendicular bonds – Fourier transform of IR spectroscopy.

Raman Effect – elastic and inelastic scattering – selection rules – pure rotational – Raman spectra – polarization of light and Raman effect – mutual exclusion principle – Fermi resonance – laser Raman spectroscopy.

UNIT-III RESONANCE SPECTROSCOPY

Nuclear Magnetic Resonance Spectroscopy - Theory, Instrumentation of ^1H NMR and ^{13}C NMR - Chemical shift, coupling,; Applications – Nuclear resonance in solids and liquids, resolution – Double resonance methods – spin relaxation modes, etc.

Electron Spin Resonance Spectroscopy – Principles, Instrumentation, Hyperfine splittings. Interpretation of spectra's, solid, liquid and solution state spectral studies; Anisotropic system – the triplet state; Theory of G-tensor, ESR of transition metal ions and complexes; Endor and Eldor techniques.

UNIT – IV MASS AND MOSSBAUER SPECTROSCOPY

Ionization – ionization techniques (EI, CI, FAB, FD) – Molecular ion – nitrogen rule – isotopic peak – metastable ions - modes of fragmentation – factors affecting fragmentation - fragmentation patterns of organic compounds – Determination of molecular weight - Retro-Diels Alder fragmentation – McLafferty Rearrangement with typical compounds – applications of mass spectroscopy - problems.

Mossbauer transition and Doppler effect – isomer shift – quadrupole effect – magnetic effect on spectra – simple application to iron and tin compounds.

UNIT – V THERMO AND ELECTRO ANALYTICAL TECHNIQUES

Thermal analytical methods - Principle TGA – DTA - discussion of various components with block

diagram – characteristics– factors affecting– curves - thermometric titrations.

Polarography – Theory, DME and importance, Current Voltage curves, Diffusion current and its theory, factors affection it. Polarographic wave and halfwave potentials, applications. Oscillographic Polarography, Square wavepolarography, Tensimetry.. Chronopotentiometry - Cyclic Voltammetry, Amperometry, theoretical principles, applications in chemical investigations. Electrogravimetry – Principles and applications.

Reference Books

1. William Kemp, NMR in Chemistry, Mac Millan, 1986.
2. A. Carrington, A.D. Melahlam, Introduction to Magnetic Resonance, Harper and Row, New York, 1967.
3. E.A.V. Ebsworth, David, W.H.Ranklin and Stephen Cradock, Structural methods in Inorganic chemistry, Black well Scientific Publ., 1987.
4. R. Drago, Physical methods in chemistry, Reinhold, New York, 1968.
5. C.N. Banwell, Fundamentals of molecular spectroscopy, McGraw Hill, New York, 1966.
6. J.R. Dyer, Applications of absorption spectroscopy of organic compounds, Prentice Hall of India Pvt. Ltd., New Delhi, 1974.
7. G.W. Ewing, Instrumental methods of chemical analysis, McGraw HillPub, 1975.
8. Douglas. A. Skoog, Principles of instrumental analysis, Saunders College Pub. Co, III Edn., 1985
9. R.C. Kappor and B.S. Agarwal, Principles of polarography, Wiley Eastern Ltd., 1991.

DEGREE	SEMESTER	SUBJECT TITLE	SUBJECT CODE	TOTAL HOURS	CREDITS
M. Phil.	I	Internal Paper	Core Paper	90	5

OBJECTIVES

- To get deeper understanding on the focused research area.

Note: Syllabus will be given by the supervisors concerned.

DEGREE	SEMESTER	SUBJECT TITLE	SUBJECT CODE	TOTAL HOURS	CREDITS
M. Phil.,	II	PROJECT WORK	Core	180	16

OBJECTIVES

- To provide and develop skills and techniques directly applicable to their careers
- To update the applications of principles to practical work
- To experience upon executing the plan and strategy through project approach
- To acquire the knowledge about the interpretation of scientific data
- To get more practical exposure on concepts, principles and methodology
- To create a thirst towards research and doctoral programs

Candidates should carried out research work in consultation with the guide/supervisor allotted by the department and submit the dissertation to the department through the Supervisor and Head within the prescribed time period. The dissertation will be valued and screened by the external examiner appointed by the department. The eligible dissertations will be called for viva voce examination.

SCHEME OF EXAMINATION	EVALUATION OF DISSERTATION	VIVA-VOCE	TOTAL
	80	20	100