ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
CUDDALORE-1

PG & RESEARCH DEPARTMENT OF PHYSICS

M.Phil (Physics)

SYLLABUS 2017-2018

P P.G. and Research Department of Physics
M.Phil Physics

Curriculum Template

Semester &Course	Course number/ Code	Credits earned	Marks secured (Max:100)
First Semester			
Core	MPH101	5	70
Core	MPH102	5	60
Elective		5	75
Grade point total Weight average total		15	68.33
Second Semester			
Dissertation & Viva voce	JPH201	21	64
Grade point total Weight average total		21	64
Cumulative grade point average 36 Overall weighted percentage marks			65.81

Question paper pattern (Semester)

Internal – 25 Marks
External – 75 Marks

Section A (5×15=75 marks)
(Answer Any 5 out of 8)

YEAR- I	RESEARCH METHODOLOGY For the students admitted in the year 2014	MPH101
SEMESTER – I		Hrs / Week: 7
Core: I		Credit: 5

PART-1 CORE COURSE-1

UNIT-I: RESEARCH METHODOLOGY

Meaning of research - Objectives of research - Motivation of research - Types, Approaches and Significance - Method Versus Methodology - Research in Scientific methods - Research Process - Criteria for Good Research - Problem Encountered by Research in India. Research Problem - Selecting the problem - 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 Design - Funding Agencies.

UNIT-II: THESIS WRITING

Meaning of Research Report-Logical Format for Writing Thesis and Paper-Essential of Scientific Report: Abstracts, Introduction, Review of Literature, Material and Method and Discussion-Write Up steps in drafting report- effective illustrations: Tables and figures- Reference styles: Harvard and Vancouver systems-synopsis writing-overhead projector presentation-power point presentation.

UNIT- III: ERRORS AND APPROXIMATIONS

Statistical analysis of data-Mean meridian,mode and Standard Deviation - Correlation - Comparison of sets of data- Chi Squared analysis for data - Characteristics of probability Distribution - Binomial, Poisson and Normal Distribution- Principle of Least Square Fitting - Curve fitting - theory of Errors - Types and Sources of Errors - Errors and residue.

UNIT-IV: NUMERICAL METHODS

Newton's forward and backward difference interpolation formula-Numerical integration by Trapezoidal &Simpson' one third rule-Taylor series .Differential equation method.

UNIT-V: COMPUTER BASED DATA ANALYSIS

Origin 8-Data analysis and Graphing workspace-Workbook-Worksheet& Worksheets column-Importing and Exporting data-Graphing: Customizing and Formatting the graph-Fitting analysis-Introduction to MATLAB. Introduction to Gaussion method-Quantum analysis-Ab initio approximation method.

Reference books:

1. Research Methodology, Methods And Techniques- C. R. Korthari-WishwaPrakasam Publications, II Edition.
2. A Handbook of Methodology of Research – Rajammal P.A. Devadass-Vidyalaya Press.
3. Thesis and assignment writing- Anderson- Wiley Eastern Ltd.
4. Statistical Methods- S. P. Gupta
5. Numerical methods-P.K andasamy,K.Thilagavathi&K.Gunavathi
6. Numerical methods –B.D.Guptha
7. Numerical methods-Rajaram.
8. Alan Hinchliffe,Molecular Modelling for Beginners,SecondEdition,the university of mancheste,2008,johnwiley&sons Ltd.
9. Andrew R.leach Molecular Modelling ,principle&Applications. Pearson Education Limited 1996,2001.

YEAR- I	ADVANCED PHYSICS-I	MPH102
SEMESTER –I	For the students admitted in the year 2014.	Hrs / Week: 7
Core: II		Credit: 5

PART I CORE COURSE II

UNIT-I QUANTUM MECHANICS

Second Quantization of Schrodinger and Klein –Gordon fields- creation and anhilation operators- Communication relations- second Quantization of Dirac field- covariant and anti-communication relation for Dirac field.

UNIT – II NUCLEAR AND PARTICLE PHYSICS

Compound nucleus and statistical theory- experimental evidence- statistical assumption – average cross section- angular distribution- transmission coefficients- level density- decay of the statically compound nucleus- emission of charged particles.Symmetrices and conservation laws – Gell Mann Nishijima formula – CPT invariance – Quark model.

UNIT - III: SOLID STATE PHYSICS

Types of bonds in crystals-Ionic, Valence, Metallic, Vanderwaals and hydrogen bonding-Band structure theory – Band structure for some semiconductors – Semiconductor transport theory – Basis of continuity equation – Kronig penny model -Theory of generation and recombination – theory of PN junction – solar cells – Ionic conductivity – Normal and super ionic conductors – Application of super ionic solids - Fuel cells, Electrochromic display.

UNIT – IV: DIELECTRIC STUDIES

Basic concepts of dielectrics: static fields –Time dependent fields – Static dielectric constant: Dipolar interaction – dipolar molecules in gases and dilute solutions – Onsager equation – Debye equations – Dielectric relaxation and loss – Distribution of relaxation time – Complex plane diagrams – Cole- Cole, Cole- Davidson plots.

UNIT – V: NON-LINEAR AND MOLECULAR MECHANICS

Basis of nonlinearity – Linear and nonlinear oscillators – Autonomous and non-autonomous system – Dynamical systems.The energy calculations – Energy minimization – Force field paramertization – Conformation analysis – Solvation – Montecarlo methods – Molecular dynamics – Free energy calculation.

REFERENCE BOOKS:

1. Advanced Quantum Mechanics – Sathyaprakash
2. Physics of the Nucleus – M.A. Preston – Addison – Wesley
3. Elementary Particles – D. Griffiths.
4. Nonlinear dynamics – M. Lakshmanan and S. Rajesekar – Springer International
5. Super ionic solids – S. Chandra – North Holland Publishing Company Ltd.
6. Theory of Dielectrics – H. Frohlich – Oxford University Press
7. Solid state physics by Sexena& Gupta Sexena
8. Lasers &Non linear optics, B.B.Laud-New age International pvt. Ltd, 2nd ed.