

SAKTHI COLLEGE OF ARTS AND SCIENCE FOR WOMEN,

ODDANCHATRAM

(Recognized Under Section 2(f) and 12(B) of UGC Act 1956)

(Affiliated to Mother Teresa Women's University, Kodaikanal)

PG AND RESEARCH DEPARTMENT OF PHYSICS

CURRICULUM FRAMEWORK AND SYLLABUS FOR

OUTCOME BASED EDUCATION IN

SYLLABUS FOR

M.Phil., PHYSICS

FRAMED BY

MOTHER TERESA WOMEN'S UNIVERSITY, KODAIKANAL

UNDER

CHOICE BASED CREDIT SYSTEM

2015 - 2018

M.Phil., PHYSICS - SYLLABUS

Subject Code	Subject	Formative	Summative	Total
Semester I				
PHY11	Research Methodology	40	60	100
PHY 12	Advanced experimental techniques	40	60	100
PHY 13	General Skills	40	60	100
Semester II				
PHY 14	Special paper related to project	100	-	100
PHY15	Project	40	60	100

The M.Phil Degree Programme consists of four theory papers. PHY13 is common for all the courses. Special paper (PHY14) is pertaining to the area of specialization chosen by the candidate under a guide. It is purely internal (framing syllabus, question setting and evaluation).

Each candidate will submit a dissertation on a topic in Physics after carrying out the project work under the supervision of a guide. The project may be theoretical or experimental. The duration of the project will be for six months or more as per the discretion of the department.

The dissertation will be evaluated by an external examiner and viva voce will be conducted by a committee consisting of the guide and the department faculty.

The examination will be for 100 marks in each of the theory papers. The question paper will cover the entire syllabus. The duration of the examination is 3 hours.

PHY11 / RESEARCH METHODOLOGY

UNIT I WORKING ON A RESEARCH PROBLEM

Scientific research –An introductory approach-Research methods and techniques—
Selection and formulation of research problem and Hypothesis - Research design -
methods of collection of literature-access using internet web tools - e-journals-
preparation of PPT and poster presentations - Style and format of thesis writing: Format
for Table, Figure and footnotes - Use of Appendix and Bibliography. (15 hrs.)

UNIT II STATISTICAL METHODS

Measures of central tendency: meaning, characteristics, measures of central tendency,
arithmetic mean, Median, mode, geometric mean ,harmonic mean, skewness -
Distributions : Student's t –test ,F-test, Chi-square test-Correlation and Regression
analysis-Graphical representation and curve fitting of data :Method of least squares:
linear and non-linear curve fitting. (15 hrs)

UNIT III SOLUTIONS OF EQUATIONS

Determination of zeros of polynomials – Roots of nonlinear algebraic equations and
transcendental equations – Bisection and Newton-Raphson methods – Convergence of
solutions. (9 hrs.)

UNIT IV LINEAR SYSTEMS

Solution of simultaneous linear equations – Gaussian elimination – Matrix inversion _
Eigenvalues and eigenvectors of matrices – Power and Jacobi Methods. (9 hrs.)

UNIT V INTERPOLATION AND CURVE FITTING

Interpolation with equally spaced and unevenly spaced points (Newton forward and
backward interpolations, Lagrange interpolation) – Curve fitting – Polynomial least-
squares fitting – Cubic spline fitting. (8 hrs.)

BOOKS FOR STUDY:

1. Santosh Gupta, Research Methodology and statistical techniques, Deep and deep publications, 2005.
2. J.Anderson, B.H Durston, M.Poole, Thesis and assignment Writing, Wiley Eastern university 1998.
3. Santosh Gupta, Research Methodology & Statistical techniques, Deep and Deep Publication 2005.

4. B.C.Nakra, K K.Chaudhry, Instrumentation , Measurement and Analysis,2nd edition, Tata McGraw-Hill publishing Company Ltd, 2004.
5. John R.Tayore, An Introduction to Error Analysis, University Science Books, 1982.
6. Sastry, Introductory Methods of Numerical Analysis.
7. V. Rajaraman, Computer oriented Numerical Methods, 3rd Ed. Prentice-Hall, New Delhi.
8. M.K. Jain, S.R. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 3rd Ed. New Age International, New Delhi.
9. F. Scheild, Numerical Analysis, 2nd Edition, Schaum's Series McGraw-Hill, NY.

PHY12 ADVANCED EXPERIMENTAL TECHNIQUES

UNIT I THERMAL ANALYSIS

Differential Scanning Calorimetry and Differential Analysis- Thermogravimetry- Evolved gas detection and analysis- methodology of thermogravimetry, differential scanning calorimetry and differential thermal analysis- Thermochemical analysis- dynamic mechanical analysis. (15 hrs.)

UNIT II X-RAY METHOD

Production of X-rays and X-ray spectra- Instrumentation- Direct X-ray method- X-ray absorption method- x-ray fluorescence method- X-ray diffraction – Auger Emission Spectroscopy (AES)- Electron spectroscopy for Chemical Analysis (ESCA) (10 hrs.)

UNIT III ULTRAVIOLET AND VISIBLE SPECTROMETRY

Instrumentation- Radiation sources- Wavelength selection- cells and sampling devices- detectors- readout modules- Instruments for absorption photometry. (9 hrs.)

UNIT IV INFRARED AND RAMAN SPECTROSCOPY

Infra red spectrometry

Correlation of Infrared spectra with molecular structure- Instrumentation- Sample Handling- Quantitative Analysis.

Raman Spectroscopy

Theory- Instrumentation- Sample Handling and illumination- Structural analysis- polarization measurements- quantitative analysis- comparison of Raman with Infrared spectroscopy. (12 hrs)

UNIT V ELECTRON MICROSCOPY

Principles of SEM, TEM, EDAX, AFM- instrumentation-sample preparation and analysis of material. (10 hrs.)

BOOKS FOR STUDY:

1. Willard, Merritt, Dean, Settle, Instrumental Methods of Analysis, CBS publishers, New Delhi.
2. Skoog, Holler, Niemann, Principles of Instrumental Analysis, Thomson, 2005.