

P. G. DEPARTMENT OF APPLIED PHYSICS AND BALLISTICS
VALUE ADDED COURSE (VAC) FOR POST GRADUATE STUDENTS

COURSE TITLE: ADVANCE TOOLS FOR SCIENTIFIC REPORT WRITING AND COMPUTATION	
COURSE CO-ORDINATOR:	Dr. Bibekananda Nayak, Asst. Prof. of Physics
CODE:	APAB-VAC-01
CREDIT: 02,	TOTAL MARKS: 100
INTERNAL MARKS: 20,	EXTERNAL MARKS: 80
CREDIT HOURS: 30 HRS	

Objective: This value added course offers tips on how to use various scientific mathematical tools from LaTeX to Mathematica and Maple to MATLAB. It includes exercises and challenges to stimulate creativity and improve problem solving abilities of post graduate students. It focuses on the use of both commercial software programs and free and open source software for mathematical typesetting, generating data, and much more. It describes how to create a LaTeX file, give a presentation, create diagrams, use mathematical algebra systems and extraction of experimental data from research papers.

Pre-Requisites: Basic knowledge about computer, computer programming and mathematical algebra systems.

Teaching Scheme: (Blended mode) Theoretical parts will be covered in online lectures but applications and exercises will be conducted in offline mode.

Highlights of the Course:

- Offers thorough introduction to the LaTeX typesetting system.
- Explores the functions of Computer Algebra Systems, including Mathematica, Maple and Maxima
- Presents the computational and graphical capabilities of MATLAB
- Covers free resources, including Octave, R, and Linux

Module-I: LaTeX-I (9 hours)

- Why LaTeX?
- Basic Document
 - Writing LaTeX Code
 - Document Class
 - Declarations and Environments
 - Arguments
 - Special characters
 - Packages
 - Basic Formatting
 - Font Types
 - Alignments
 - Spacing
 - List

- LaTeX and You
 - Files
 - File Structure
 - The Title Page
 - Abstract and Summary
 - Bibliography
 - The Paper
 - Referencing
 - Math Mode
 - Typesetting Math
 - Commands
 - Math Symbols Resources
 - Math Exercises
 - Figures and Tables
 - Commands
 - Includegraphics
 - Formatting Tables
 - Captions and Labels

Module-II: LaTeX-II (6 hours)

- Beamer
 - Introduction
 - Adding a slide
 - Special Slides
 - Beamer at RSI
 - Formatting
 - Animation
 - Themes
 - Design
 - Colour
- LaTeX Extended
 - The structure of Error
 - Missing closing Braces
 - Missing Environment End
 - Spaces in File Names
 - Forgetting to Escape
 - Forgetting to Use Math Code
 - Defining Theorems and More
- Macros
 - What are Macros
 - Resetting Commands
- Help

Module-III: Computer Algebra System (CAS) (9 Hours)

- Introduction to Mathematica, Maple and Maxima
 - Computer Algebra System
 - Computation of Functions
 - Plotting of Graphs
 - Simple Programming
 - More resources

- Introduction to MATLAB and Octave
 - What are MATLAB and Octave
 - Explore Linear Algebra
 - 2D Plot
 - 3D Plot
 - Manipulation of Appearance of plots
 - More Resources

Module-IV: Graphical Software and Open Source Software (6 Hours)

- Introduction to PostScript
 - What is PostScript?
 - Uses of Stack
 - Making of Simple Pictures
 - Adding of Text to Pictures
 - Adding of Colour to Pictures
 - More Resources
- Open Source Software
 - What is Open Source Software?
 - What is Linux?
 - How to install Linux?
 - Linux Applications
 - More Resources

Evaluation Process:

Internal Assessment: 20 Marks (Based on Multiple Choice Questions)

Two Internal assessments will be conducted during course period. Best of two will be considered as final assessment mark.

Final Assessment: Preparation of CV in LaTeX, Writing of an existing research paper as per Physical Review format in LaTeX (by using various Tools).

Course Outcome: At the end of the course learner is expected

- To develop his academic report/Research Project/Thesis/Dissertation/CV in LaTeX
- To develop the problem solving skill by using CAS
- To develop any presentation by using Beamer.
- To develop programming skill by using various open source software.