St. Aloysius' College (Auto.), Jabalpur

Department of Physics

Certificate Course on

"Physics Through Mathematica"

Credit: 2   **Time Duration: 30 Hrs**.

Course Outcome

The students are expected to acquire the knowledge of the following:

- Mathematica programming.
- Basic commands and functions of Mathematica.
- Solution of Equations and their plotting through Mathematica.
- Import and Export of data from one format to another format using Mathematica.
- Dealing with Physical Problems using Mathematica .

	Paper	Maximum Marks	Minimum Marks	Total Marks
I	Theory	50	20	100
II	Practical	50	20	

Unit I

Introduction to Mathematica, Rules for writing the Commands and program in Mathematica, Application and uses of Mathematica.

Unit II

Some basic commands: Factorial, Square root, Transpose, Tuples, Partition, Riffle, Select, Sort, Length, Extract, Grid, Differentiation, Integration.

Unit III

Solution of Equation, Solution of Differential equation, Plotting of Data, Plotting of function, Plotting of Differential equation, User defined function.

Unit IV

Import and Export, Importing data into a notebook from a file with 'xls', 'txt',' 'dat' extension. Import of images in 'jpeg' format. Exporting data from a notebook into a file with 'xis', , 'txt',' 'dat'extension, Exporting of images in 'jpeg' format.

Unit V

1. Study of projectile motion, 2. Study of potential and kinetic energies in Simple Harmonic Motion, 3. Charging and Discharging in a R-C circuit, 4. Charging and Discharging in circuits with inductors, capacitors and resisters, 5. Resonance plots of a LCR circuit.

Note : Students who have passed XII with Science are eligible to join the course

Unit will consist of 6hours of tutorials and hand on exercises.

Reference:
1. Programming in Mathematica: Roman Maeder, Addison Wesley.

2. Mathematica in the Laboratory: Samuel, Dick, Alfred Riddle, Douglas Stein, Cambridge University Press.

3. www.wolfram.com

4. http://demonstrations.wolfram.com/