



Course description:

In this course is to learn the basics of Mathematica program, and use Mathematica to deal with vectors and matrices. In addition, the students will be learned how to derive, integrate, and plot functions and data. Moreover, a physical problems will be solved using Mathematica.

Aims of the course:

The aim of this course is to

1. Familiarize the students with basic knowledge of Mathematica and its benefits in solving difficult *and* abstract mathematical problems.
2. Develop the problem solving and critical thinking skills through solving physical problems using Mathematica.
3. Understand and simulate physical problems by graphics.

Intended Learning Outcomes: (ILOs)

A. Knowledge and Understanding

A1. Concepts and Theories:

Describe the basic principles of Mathematica.

Recall some Mathematica functions and methods.

State physical problems in symbolic form.

A2. Contemporary Trends, Problems and Research:

Review the current computer programs used in physical researches such as nuclear and solid state physics.

Unfortunately, the real physical problems cannot be solved exactly, and computers must be used to solve these problems.

A3. Professional Responsibility:

Check the truth of the calculation and to give the real results.

B. Subject-specific skills

B1. Problem solving skills:

Solve physical problems using Mathematica.

B2. Modeling and Design:

To model some physical issues using Monte Carlo method and simulate some physical quantities as field lines.

B3. Application of Methods and Tools:

Mathematica program.

C. Critical-Thinking Skills

C1. Analytic skills:

Interpret the solutions of the physical problems and to relate them to real live .

C2. Strategic Thinking:

Formulate plans designed to solve the physical problems to be suitable for Mathematica to achieve maximum useful of Mathematica.

C3. Creative thinking and innovation:

Design new methods of solving physical problems.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Communication

Begin to develop intellectual independence and foster a commitment to lifelong learning

Appreciate the need to communicate information and arguments effectively using written and oral skills.

D2. Teamwork and Leadership:

Understand and demonstrate how to work as part of a team by working with a group in the lab to perform programming, analyzing the data and submit solution.

Course structures:

Week	Credit Hours	ILOs	Topics	Teaching Procedure	Assessment methods
1	3	A1,A2,B3 ,D1,D2	Introduction to Mathematica, Simple algebra, using palletes	1. Lecturing. 2. Teaching Tools: Overhead projector and data show. 3. E-learning.	Class participation Work Sheet.
2,3,4	3	A1, A2, B3, D1, D2	Mathematica functions, Modules, Vectors, Matrices,	1. Lecturing. 2. Teaching Tools: Overhead projector and data show. 3. E-learning. 4. Literatures	Homework, Class participation
5,6,7,8	3	A3, B3, C1, C2, C3, D1, D2	Graphics, Ploting Data and functions, Derivatives, Integrals	1. Lecturing. 2. Teaching Tools: Overhead projector and data show. 3. E-learning.	Oral, Homework



