Course Code	EM 514
Course Title	**Partial Differential Equations**
No. of Credits	**2**
Pre-requisites	**EM211,EM212**
Compulsory/Optional	**Optional**

Aim(s): To provide students with the basic understanding of the theory and methods of solutions for partial differential equations.

Intended Learning Outcomes:

On successful completion of the course, the students should be able to;

- Solve first order partial differential equations using the method of characteristics.
- Classify linear second order linear partial differential equations and solve them using method of separation of variables and Eigen-function expansion method.

Time Allocation (Hours): Lectures 24Tutorials 4Assignments4

Course content/Course description:

- **Introduction:**Partial differential equations as a mathematical model and their solutions, initial and boundary value problems.
- **First order Partial Differential Equations**: Linear and quasi-linear partial differential equations, method of characteristics.
- **Fourier series:** Introduction.
- **SecondOrderLinear Partial Differential Equations**: Classification, separation of variables andEigen-function expansion method, examples from the heat, wave, Laplace and Poisson equations; d'Alembert's solution to the wave equation.
- **Partial differential equations in other coordinates:**Polar, cylindrical and sphericalcoordinates.
- **Numerical solutions of partial differential equations:** Finite difference methods.

Recommended Texts :

- Walter A. Strauss,Partial Differential Equations, 2nd edition, 2008,John Wiley and Sons.
- Y.Pinchoverand J. Rubinstein, AnIntroduction to Partial Differential Equations 2005,Cambridge University Press.
- P.J. Olver,Introduction to Partial Differential Equations, 3rd edition, 2014,Springer.

Assessment	Percentage Mark
In-course Tutorials Assignments	20 30
End-semester	50