Course Announcement:
MAT 454
Partial Differential Equations II
Spring 2023

Schedule: MWF 10-10:50 AM
Instructor: Neel Patel

Description:

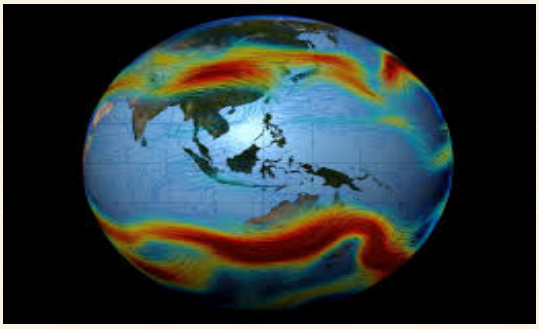
Partial differential equations (PDE) describe various physical and societal phenomena using the language of multivariable calculus. PDE models appear in physics, engineering, finance, music, chemistry and other fields. The four fundamental PDE (heat, wave, transport, Laplace) form the linear PDE basis for studying nonlinear or inhomogeneous models.

In this course, we will be using the theory of the fundamental solutions to these four linear PDE to study their inhomogeneous and nonlinear analogues. Particular importance will be given to deriving PDE models related to the interests of the students enrolled in the course and to learning methods of approximation and analysis of these PDE.

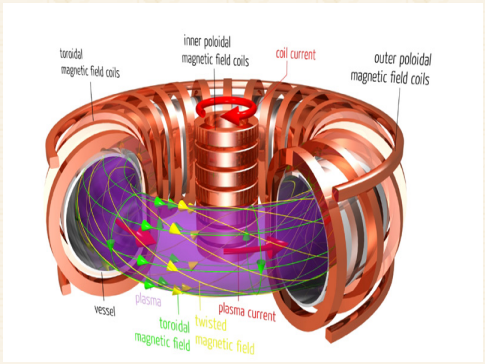
Prerequisites: MAT 453 (or equivalent by **departmental permission**)

PDE Models:

Traffic flow: A transport problem with shocks created by red lights



Jet Streams and Cold/Warm Fronts:
A "free boundary" PDE model



Tokamaks: Plasma particles move according electromagnetic forces give by Maxwell's inhomogeneous wave equations

Epitaxial Growth of Crystalline Layers:
A heat equation like model for describing crystal growth used in semiconductor production