HU 308: Mathematical Economics

Contact Hours- 04 (per week)
Examination Duration- 03
Credits- 04 (4-0-0)

Objective: The objective of this course is to transmit the body of basic mathematics that enables the study ofeconomic theory at the undergraduate level, specifically the courses on microeconomic theory,macroeconomic theory, statistics and econometrics set out in this syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

Course Outline
Unit I: Functions of one real variable
Graphs; elementary types of functions: quadratic, polynomial, power, exponential, logarithmic; sequences and series: convergence, algebraic properties and applications; continuous functions: characterizations, properties with respect to various operations and applications; differentiable functions: characterizations, properties with respect to various operations and applications; second and higher order derivatives: properties and applications.
Unit II: Single-variable optimization
Geometric properties of functions: convex functions, their characterizations and applications; local and global optima: geometric characterizations, characterizations using calculus and applications.

Unit III: Functions of several real variables
Geometric representations: graphs and level curves; differentiable functions: characterizations, properties with respect to various operations and applications; second order derivatives: properties and applications; the implicit function theorem, and application to comparative statics problems; homogeneous and homothetic functions: characterizations and applications.

Unit IV: Multi-variable optimization
Convex sets; geometric properties of functions: convex functions, their characterizations, properties and applications; further geometric properties of functions: quasiconvex functions, their characterizations, properties and applications; unconstrained optimization: geometric characterizations, characterizations using calculus and applications; constrained optimization with equality constraints: geometric characterizations, Lagrange characterization using calculus and applications; properties of value function: envelope theorem and applications.
Readings:
1. K. Sydsaeter and P. Hammond, *Mathematics for Economic Analysis*, Pearson Educational Asia: Delhi, 2002.
2. Chiang and Wainwright.