TEACHING PLAN FOR B.A. (HONS) ECONOMICS SEMESTER- III

UGCF COURSE: ECON009

(ADVANCED MATHEMATICAL METHODS FOR ECONOMICS)

CREDITS: 4

TEACHER: Ms. GUNJAN KHANDELWAL

READINGS: Sydsaeter, K., Hammond, P. (2002). Mathematics for economic analysis. Pearson Educational.

UNIT	TOPIC	READINGS	NO. OF LECTURES
1. **Multivariate Optimization with constraints**	Constrained optimisation with equality and inequality constraints: geometric characterisation, Lagrange characterisation using calculus and applications; properties of value function: envelope theorem, applications.	Sydsaeter, K., Hammond, P. (2002). Mathematics for economic analysis. Pearson Educational. (Chapter 18.1 to 18.9 & 18.3 (The statement only))	**19 Hours**
2. **Linear programming**	Introduction, graphical solution, matrix formulation, duality, economic interpretation.	Sydsaeter, K., Hammond, P. (2002). Mathematics for economic analysis. Pearson Educational. (Chapter 19)	**06 Hours**
3. **Integration, differential equations, and difference equations**	Definite integrals, indefinite integrals and economic applications; first order and second order difference equations, equilibrium and its stability; first order differential equations, phase diagrams and stability; second order differential equations.	Sydsaeter, K., Hammond, P. (2002). Mathematics for economic analysis. Pearson Educational. (Chapter 10, 20 and 21 (except 21.9))	**20 Hours**

Assessment:

1. Internal Assessment (IA): 30 Marks – two class tests (12 marks each), and 6 marks for attendance.
2. Continuous Assessment (CA): 40 marks –problem solving, assignments (35 marks) and 5 marks for attendance.
3. The end semester exam: 90 marks will comprise numerical and other questions.

TEACHER: Ms. GUNJAN KHANDELWAL

Sections: A & B

Essential Readings: Devore, J. (2012). Probability and Statistics for Engineers, 8th ed. Cengage Learn-ing.

Supplementary Readings:

Hogg, R., Tanis, E., Zimmerman, D. (2021) Probability and Statistical inference, 10th Edition, Pearson India Education Services Pvt. Ltd.

Miller, I., Miller, M. (2017). J. Freund's Mathematical Statistics with Applications, 8th ed. Pearson.

UNIT	TOPIC	READINGS	NO. OF LECTURES
1. **Introduction and Overview**	The distinction between populations and samples and, between population parameters and sample statistics; Pictorial Methods in Descriptive Statistics; Measures of Location and Variability.	Devore: Ch 1	**5 Hours**
2. **Elementary probability theory**	Sample spaces and events; probability axioms and properties; counting techniques; conditional probability and Bayes' rule; independence	Devore: Ch 2	**09 Hours**
3. **Random variables and**	Defining random variables; discrete and continuous random	Devore: Ch 3 (3.1-3.3), Ch 4 (4.1- 4.2)	**10 Hours**

		variables, probability distributions; expected values and functions of random variables. equations, equilibrium and its stability; first order differential equations, phase diagrams and stability; second order differential equations.		
4.	**Special Probability Distributions**	Properties of commonly used discrete and continuous distributions (uniform, binomial, exponential, Poisson, hypergeometric and Normal random variables).	Devore: Ch 3 (3.4-3.6) and Ch 4 (4.3-4.4) including Bernoulli, Binomial, Geometric Hypergeometric, Poisson, Uniform, Exponential and Normal distribution.	**10 Hours**
5.	**Random sampling and jointly distributed random variables**	Density and distribution functions for jointly distributed random variables; computing expected values of jointly distributed random variables; conditional distributions and expectations, covariance and correlation.	Devore: Ch 5.1-5.2 (excluding the section on more than two random variables)	**11 Hours**

Assessment:

1. **Internal Assessment (IA): 30 Marks –** The internal assessment would comprise two class tests of 12 marks each. Lecture attendance will carry 6 marks.
2. **Continuous Assessment (CA): 40 marks –** Assignments which would involve plotting the distribution in R / Excel and Quizzes / problem solving (35 marks) and 5 marks for attendance.
3. **The end semester exam:** 90 marks will comprise numerical and other questions.