Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Agriculture
Ph.D. (Ag.) Agricultural Economics, III semester

PHDAEC 608:Natural Resource Management(2+1)

Course code	Course Name	TEACHING & EVALUATION SCHEME							
		THEORY			PRACTICAL		T	P	CREDITS
		END SEM University Exam	Mid Term Exam	Teachers Assessment*	END SEM University Exam	Teacher's Assessment*			
PHDAEC 608	Natural Resource Management	60	00	40	30	20	2	1	3

Legends: T- Theory; **P** – Practical;

*Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class.

Objectives:

Concept building on natural resources. Gaining expertise in economic aspect of natural resources and maintain a balance between economic gains and environment conservation.

Theory:

Unit I:Concepts

Natural resources - definition - characteristics and classification. Stock dynamics of renewable and non-renewable resources. Equation of motion for renewable and non-renewable resources. Fundamental equation of renewable resources.

Unit II: Models for economic view of natural resources

Growth curves of fishery and forest resources. The role of time preference in natural resource use. Simple two-period model of optimal use of renewable and non-renewable resources. Advanced models of optimal resource use – Static Vs. dynamic efficiency in natural resource use Applications of dynamic programming and optimal control.

Unit III: Management of water resources

Economics of groundwater use - optimal extraction of groundwater. Analytical and numerical solutions for optimal inter-temporal allocation of natural resources. Optimal harvesting of single rotation and multiple rotation forests. Optimal management of fishery

Unit IV: Property Rights

Property rights in natural resources and their implication for conservation and management of natural resources. Management of common property natural resources – Institutional

arrangements for conservation and management of common pool fishery, groundwater and forestry resource.

Unit V: Dynamics of resource economics:

Resource scarcity – Natural resource degradation – Poverty and resource degradation

Practical

- Natural resource accounting - Pricing and valuation of natural resources
- Natural resources policy.
- Practical Derivation of the fundamental equation of renewable resources
- Estimation of growth curves and stock dynamics for fishery and forestry resources.
- Simple two period problem of optimal resource use – Numerical solution for simple two-period model of dynamic efficiency in natural resource extraction.
- Multi-period dynamic efficiency – Using Excel Solver in solving dynamic natural resource harvesting problems.
- Using analytical solution procedures for solving natural resource management problems – Optimal control.

Suggested Reading:

- Hackett SC. 2001. *Environmental and Natural Resource Economics: Theory, Policy and the Sustainable Society*. M.E. Sharpe, Armonk, NY.
- Hartwick JM and Olewiler ND. 1998. *The Economics of Natural Resource Use*. 2nd Ed. Addison-Wesley Educational Publ.
- Kerr JM, Marothia DK, Katar Singh, Ramasamy C and Bentley WR. 1997. *Natural Resource*
- *Economics: Theory and Applications in India*. Oxford & IBH.
- Pearce DW and Turner K. 1990. *Economics of Natural Resources and the Environment*. John Hopkins Univ. Press.

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PHDSTAT 615: Advanced Time Series Analysis **(2+0)**

Course code	Course Name	TEACHING & EVALUATION SCHEME							
		THEORY			PRACTICAL		T	P	CREDITS
		END SEM University Exam	Mid Term Exam	Teachers Assessment*	END SEM University Exam	Teacher's Assessment*			
PHDSTAT 615	Advanced Time Series Analysis	60	00	40	00	0	2	0	2

Legends: T - Theory; **P** – Practical;

*Teacher Assessment shall be based on following components: Quiz / Assignment / Project / Participation in Class etc.

Objective

This is an advanced course in Time Series Analysis that aims at describing some advanced level topics in this area of research with a very strong potential of applications. This course also prepares students for undertaking research in this area. This also helps prepare students for applications of this important subject to agricultural sciences

Theory:

Unit I Multivariate time series:

Modelling the mean, stationary VAR models: properties, estimation, analysis and forecasting, VAR models with elements of nonlinearity,

Unit II Non-stationary Multivariate Time Series:

Non-stationary multivariate time series: spurious regression, co-integration, Vector Error Correction Model (VECM)

Unit III Volatility:

The class of ARCH and GARCH models; Extensions of GARCH models: TGARCH, IGARCH, GARCH, EGARCH, GJR-GARCH, ARCH and GARCH model with-t distributed error; ARCD (Auto-Regressive Conditional Density), Multivariate GARCH model: estimation, analysis and forecasting, stochastic volatility.

Unit IV Structural time-series modelling:

State space models, Kalman filter, Local level model, Local linear trend model, Seasonal models, Cyclical models. Threshold and Functional coefficient autoregressive models, Structural Break in time series.

Unit V

Fuzzy time series models, Artificial Neural Network (ANN) methodology, Support vector machines, Wavelets for time series analysis, combinations of time series models.

Suggested Reading:

- Box G.E.P., Jenkins G.M. and Reinsel G.C. 2015. Time Series Analysis: Forecasting and Control. 5th Ed. John Wiley.
- Brockwell P.J. and Davis R.A. 1991. Time Series: Theory and Methods. 2nd Ed. Springer. • Chatfield C. 2004. The Analysis of Time Series: An Introduction. 6th Ed. Chapman& Hall/ CRC.
- Johnston J. 1984. Econometric Methods. McGraw Hill.
- Singh, P. 2016. Applications of Soft Computing in Time Series Forecasting: Simulation and Modeling Techniques. Springer International Publishing AG
- Tong H. 1995. Nonlinear Time Series: A Dynamical System Approach.Oxford Univ. Press.
- Vapnik, V. N. (2000). The Nature of Statistical Learning Theory. Springer- Verlag, New York.
- Percival, D.B. and Walden, A.T. 2000. Wavelet Methods for Time-Series Analysis. Cambridge University Press, U.K.

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