

SYLLABUS

(As per NEP 2020)

**Doctor of Philosophy
in Rural Development and Agricultural Production**

**Department of
RURAL DEVELOPMENT AND
AGRICULTURAL PRODUCTION
School of Human and Environmental Sciences,
North-Eastern Hill University, Tura Campus,
Chasingre, West Garo Hills,
Meghalaya.
2023**

MEMBERS OF SYLLABUS COMMITTEE (2023)

Ph.D. Programme

**DEPARTMENT OF RURAL DEVELOPMENT AND AGRICULTURAL PRODUCTION,
North-Eastern Hill University, Tura Campus**


Dr. Binu Mathew - Chairman

Dr. B.K. Mishra - Member

Prof. D.C. Kalita - Member

Dr. Lolly S. Pereira - Member




Head
Head
Dept. of RDAP
NEHU, Tura Campus.

Department of
RURAL DEVELOPMENT AND AGRICULTURAL PRODUCTION
North-Eastern Hill University, Tura Campus, Tura, Meghalaya.

GENESIS:

The Department of Rural Development and Agricultural Production (RDAP) located at Tura Campus of North-Eastern Hill University was established in the year 2002 for rendering M.Sc. programme. Subsequently, Ph.D. and M.Phil. programmes were started in the year 2008 and 2014 respectively. Since its inception, it has been a sincere endeavour of the department to keep abreast with the latest developments in the field of Agriculture, Horticulture, Animal Science, Food processing, Rural Development and allied sectors. The department has evolved over the years and apart from routine teaching and research activities, extension and outreach activities were also been initiated in the vicinity of the campus.

VISION:

To contribute towards rural development by rendering knowledge, creating awareness and developing entrepreneurial skills through teaching, research, extension and training.

MISSION:

- To improve the scientific knowledge, skills and capabilities of the rural youth through teaching, research, extension, workshops and skill development programmes.
- To develop entrepreneurial skills among the rural people in agriculture and allied sectors.
- To collaborate with government/non-government organizations for the implementation of various agricultural and rural developmental activities.
- To offer consultancy services in relevant fields of agriculture, horticulture, rural development, animal husbandry and allied sectors.

OBJECTIVES:

- To deliver courses on different economic activities for the development of rural sector *viz.* agronomy, horticulture, organic farming, animal sciences, agro-processing, marketing etc.
- To carry out research on various aspects of rural development, agriculture and allied sectors.
- To study traditional agricultural practices, their strengths and weaknesses; validation and popularisation.
- To promote innovative agricultural planning and sustainable methods of ensuring fertility and productivity of land.
- To study human and social factors related to rural development and agricultural production with special emphasis on entrepreneurship.
- To carry out skill development programmes for the rural youth in agriculture and allied sectors like agronomy, horticulture, nursery management, processing of fruits and vegetables, animal rearing, processing of dairy products and other traditional food products.

Duration of coursework: One Semester (Six Months)

**Syllabus of Ph.D. in Rural Development and Agricultural Production
(as per NEP 2020)**

| Course Number | Course Title | Credits |
|----------------------|---|----------------|
| RDA-CC-700 | Research and Publication Ethics | 2 (Two) |
| RDA-CC-701 | Research Methodology | 4 (Four) |
| RDA-CC-702 | General Aspects of Agricultural and Rural Development | 4 (Four) |
| RDA-AG-703* | Rural Development and Sustainable Change | 4 (Four) |
| RDA-HO-704* | Agronomy: Principles and Practices | 4 (Four) |
| RDA-AS-705* | Horticultural Production and Management | 4 (Four) |
| RDA-AS-706* | Animal Production and Management | 4 (Four) |

Note: * These courses are optional. Students can choose any one paper depending upon the area of interest.

RDA-CC-700: Research and Publication Ethics (Credits: 2)

Unit I:

Research Ethics

Ethics: definition, ethics in research, ethics and morality, intellectual honesty and research integrity, scientific misconducts: falsification, fabrication and plagiarist: selective reporting and misrepresentation of data

Practical: Use of software tools to identify predatory publications

Unit II:

Publications Ethics

Definition, introduction and importance; publication misconduct definition, concept, problems that lead to unethical behaviour, types of misconducts: violation of publication ethics, authorship and contributor-ship: identification of publication misconduct, complaints and appeals; and predatory publishers and journals

Practical: Use of plagiarism software.

Suggested Reading List:

Beall, J. (2012). Predatory publishers are corrupting open access. *Nature*, 489(7415), 179.

Chaddah, P. (2018). *Ethics in competitive research*. Pothi.com.

National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. (2009). *On being a scientist: A guide to responsible conduct in research*. National Academics Press.

Otrell-Cass, K., Andrée, M., & Ryu, M. (2020). *Ethics in contemporary science education research* (pp. 1-11). Springer International Publishing. doi: 10.1007/78-3-50921-7_1

Resnik, D. B. (2008). What is ethics in research and why is it important? University of Arizona Program on Research Integrity Education Monthly Newsletter, 8(8), August-1.

RDA-CC-701: Research Methodology **(Credits: 4)**

Unit-I:

Research: meaning, definition and classification; scientific method; methods of research: qualitative, quantitative, statistical, analogical and logical; case study method, historical method, fieldwork method.

Unit-II:

Hypothesis: research design; participatory rural appraisal (PRA) techniques; various sampling methods: cumulative root frequency rule; methods of data collection: analysis and interpretation of data; Thesis writing.

Unit-III:

Correlation and regression; test of significance; analysis of variance and co-variance; Design of Experiment: analysis of time series data; economic analysis of the project; financial analysis: Benefit Cost Ratio(BCR); Internal Rate of Return (IRR); Net Present Value (NPV); Pay Back Period (PBP); measurement of marketing efficiency: marketing margin, marketing cost, price spread.

Unit-IV:

Standard of living of people: methods of its measurement; human development index (HDI), gender development index (GDI); Poverty and its measurement; measuring social development; sustainability and its measurement: construction of diversification index.

Suggested Reading List:

Bhattacharya, B. K. *Statistics in Applied Sciences*.

Goode, W. J., & Hatt, P. K. (1981). *Methods in Social Research*. New Delhi: McGraw-Hill International Co.

Gupta, S. C. (2022). *Fundamentals of Applied Statistics*. Sultan Chand & Sons.

Wilkinson, T. S., & Bhandarkar, P. L. (2002). *Methodology and Techniques in Social Research*. Bombay: Himalaya Publishing House.

Myrdal, G. (1967). *Objectivity in Social Research*. New York: Pantheon Books.

Moser, C., & Kalton, G. (1974). *Survey Methods in Social Investigation*. London: ELBS and Heinemann.

Field, A. (2006). *Discovering Statistics Using SPSS*. London: Sage Publications.

Sharma, N. K. (1998). *Statistical Techniques*. Mangal Deep

RDA-CC-702: General Aspects of Agriculture and Rural Development (Credits: 4)

Unit-I:

Sustainable agriculture: concept, need and scope; organic farming: importance, scope and limitations; concept of crop diversification for improved food and nutritional security; conservation tillage and watershed management; contract farming: concept and scope; shifting cultivation; agro-forestry.

Unit-II:

Horticulture: concept and definition; branches of horticulture; status of horticulture in India and Northeastern states; importance, scope and limitations of horticultural industry in India with special reference to Northeast region.

Unit-III

Animal husbandry and dairy: definition, scope, importance, branches, history and development; resources and infrastructure of livestock in India; handling of livestock: cattle, swine, goat and poultry for recording of growth; production treatment and vaccination; general management practices for profitable dairy farming; recent trend in production and availability of milk and milk products. Importance of integrated farming system; farm wastes and manures, it's economic.

Unit-IV:

Concept of development and underdevelopment: meaning, magnitude and main characteristics; rural development and its multidimensional character; approaches to rural development- the Indian experience; types of rural development programmes; problems of rural development: land tenure and land reforms; rural industrialization and rural finance; cooperatives and rural development; rural demographic transition, inclusive growth and governance, economic planning and government intervention.

Suggested Reading List:

- ICAR Publications. (2000). *Dairy Year Book*. New Delhi: ICAR Publications.
- Dutt, R., & Sundaram, K. P. M. (2015). *Indian Economy*. S. Chand Publishing.
- Chadda, K. L. (2001). *Handbook of Horticulture*. New Delhi: ICAR Publications.
- Singh, Katar. (2002). *Rural Development: Principles and Perspectives*. New Delhi: Sage.
- Balasubramaniam, P., & Palaniappan, S. P. (2002). *Principles and Practices of Agronomy*. Jodhpur: Agrobios.
- Prasad, J. (1996). *Principles of Dairy Farm Management*. New Delhi: Kalyani Publishers.
- Reddy, Y. T., & Reddy, G. H. S. (2005). *Principles of Agronomy*. New Delhi: Kalyani Publishers.
- Sastry, N. S. R., Thomas, C. K., & Singh, R. A. (1986). *Farm Animal Management and Poultry Production*. Vikas Publishing House PVT Ltd..
- Trivedi, P. P. (1993). *Home Gardening*. New Delhi: ICAR.

RDA-RD-703: Rural Development and Sustainable Change (Credits: 4)

Unit-I:

Sustainable development: concept and dimensions; contemporary issues and challenges; Dualism of less developed economies: economic obstacles and socio-cultural hindrances; structure of rural economy: unemployment and underemployment; capital and social investment in rural India.

Unit-II:

Poverty and rural development: Anti-poverty programmes and rural development; social exclusion, inclusion and people's participation; employment programme for rural areas; community participation and rural development; rural development and economic upliftment of poor.

Unit-III:

Rural development: administrative structure and policy dissemination, governance and local governance: Panchayati Raj system and village councils; NGOs, voluntary organizations and rural mobilization new economic policy and rural development; WTO, globalisation and rural economy.

Unit-IV:

Rural society and change: rural-urban continuum, rural transition, rural social characteristics and development with special reference to Northeast region; role of culture and indigenous knowledge in agricultural and rural development; impact of science and technology on rural society; social legislation and rural development; rural social problems and sustainable development; human rights, social justice and empowerment; democratization and rural leadership.

Suggested Reading List:

- Bhose, S. G. R. (2003). *NGOs and Rural Development*. Guwahati: Eastern Book House.
- Dandekar, V. M. (1996). *Poverty and Rural Unemployment*. New Delhi: Sage Publications.
- Dandekar, V. M. (1996). *Poverty and Unemployment*. New Delhi: Sage Publications.
- Dantwala, M. L. (1997). *Dilemma of Growth*. New Delhi: Sage Publications.
- Cohia, D. (1993). *Cooperatives in Agriculture*. Delhi: Prentice-Hall.
- Desai, A. R. (Ed.). (1984). *Rural Sociology*. Bombay: Popular Prakashan.
- Mandal, G. C. (1992). *Rural Development: Retrospect Concept*. New Delhi. NIRD Publication. (2001). *Indian Panchayati Raj Report: Vol. I and II*. Hyderabad: NIRD Publication.
- Jain, G. L. (2000). *Rural Economy and Society: Towards Development*. Guwahati: Eastern Book House.
- Jain, L. C. (1990). *Grass without Roots*. New Delhi: Sage Publications.
- Maheswari, S. R. (1995). *Rural Development in India: A Public Policy Approach*. New Delhi: Sage Publications.
- Meier, G. M. (2006). *Leading Issues in Economic Development*. New Delhi: OUP.
- Metha, S. R. (1984). *Rural Development Policies and Programme*. New Delhi: Sage Publications.

RDA-RD-704: Agronomy: Principles and Practices **(Credits: 4)**

Unit-I:

Crop production techniques for cereals (rice and maize), legumes (black gram, green gram and soybean), oilseeds (rapeseed and mustard), fodder crops (napier, guinea and setaria); innovative methods, modern varieties, fertilizer requirements, intercultural operations; integrated weed management; economics and post-harvest technology.

Unit-II:

Soil fertility and productivity; principles and methods of fertilizer application; integrated nutrient management and bio-fertilisers; concepts of irrigation scheduling; methods of irrigation: sprinkler and drip irrigation-their merits and demerits; water quality; conjunctive use of water; farming systems: definition, scope and importance and limitations; integrated farming systems: concepts and components.

Unit-III:

Dry-land farming: dry-land farming and rain-fed farming; constraints of dry-land farming in India; contingency crop planning and mid-season corrections for aberrant weather conditions; techniques of moisture conservation in situ; green manure (GM); soil acidity and its reclamation; problem soils in Northeast region; shifting cultivation: concept, limitation and improved management practices; agro-forestry: system and components.

Unit-IV:

Principles and practices of field experimentation; recording of data; statistical analysis of data from agronomic experiments; pooling of data over years/seasons/sites; interpretation of data from weed control, fertilizer, irrigation and intercropping trials; economic analysis of experimental data, determination of economic optimum dose, gross and net returns.

Suggested Reading List:

Balasubramaniam, P., & Palaniappan, S. P. (2002). *Principles and Practices of Agronomy*. Jodhpur: Agrobios.

Rao, V. S. (2003). *Principles of Weed Science*. New Delhi: Oxford and IBH Publishing Co.

Reddy, S. R. (2002). *Principles of Agronomy*. New Delhi: Kalyani Publishers.

Singh, S. S. (2004). *Crop Management under Irrigated and Rain-fed Conditions*. New Delhi: Kalyani Publishers.

Varshneya, M. C., & Pillai, M. B. (2006). *Textbook of Agricultural Meteorology*. New Delhi: ICAR.

Yadav, D. S. (2002). *Pulse Crops Production Technology*. New Delhi: Kalyani Publishers.

Reddy, Y. T., & Reddy, G. H. S. (2005). *Principles of Agronomy*. New Delhi: Kalyani Publishers.

RDA-HO-705: Horticulture Crop Production and Management (Credits: 4)

Unit-I:

Horticulture: present status, prospects and constraints of fruits, vegetables, flowers and ornamentals, spices and plantation crops production in India with special reference to the north-eastern region.

Unit-II:

Branches of horticulture; planning and layout of orchard; system of planting; intercultural operations. Protected cultivation of horticultural crops: classifications and types of green house; greenhouse production systems.

Unit-III:

Propagation and nursery management of horticultural crops: sexual and asexual propagation methods; horticultural nursery management: selection of site, components of nursery, types of nursery, nursery operations.

Unit-IV:

Post-harvest management of horticultural crops: concept, scope and limitations; basic principles and methods of preservation; packaging, storage and marketing of horticultural produce.

Suggested Reading List:

- Bose, T. K. (1985). *Fruits of India: Tropical and Sub-Tropical*. Calcutta: Naya Prakash.
- Chadda, K. L. (1995). *Spices*. New Delhi: ICAR Publications.
- Chadda, K. L. (2001). *Handbook of Horticulture*. New Delhi: ICAR Publications.
- Chadda, K. L., & Chaudhury, B. (1992). *Ornamental Horticulture India*. New Delhi: ICAR Publications.
- Choudhury, B. (1983). *Vegetables*. New Delhi: National Book Trust.
- Gupta, R. (1980). *Medicinal and Aromatic Plants: Handbook of Agriculture*. New Delhi: ICAR Publications.
- Panda, J. M. (1994). *Production Technique of Spices*. New Delhi: Oxford and IBH.
- Prasad, S. (2000). *Commercial Floriculture*. Bikaner: Agro-Botanical Publishers.
- Shanmugavelu, K. G., & Madhav Rao, V. N. (1980). *Spices and Plantation Crops*. Bombay: India Book House.
- Singh, S. B. (1996). *Production Technology of Vegetable Crops*. Karnal: Universal Publications.
- Trivedi, P. P. (1993). *Home Gardening*. New Delhi: ICAR.

RDA-AS-706: Animal Production and Management (Credits: 4)

Unit-I:

Basic terms used in livestock/animal production; Importance and scope of dairy animals in rural development; comparison of dairy farming in India with advanced countries; opportunities in dairy farming; dairying under mixed and specialized farming; starting a dairy farm; procurement of goods; housing and layout of dairy farm; breed selection and breeding; development of green fodder suiting to local conditions and environment.

Unit-II:

Indian dairying prospects and opportunities; budgeting and herd recording; personnel management; management of lactating cows, dry cows, pregnant cows, and heifers; care and management of cows at and after calving; raising young dairy calves; pricing policy and cost of milk production; storage of milk; distribution of milk; organic milk production

Unit-III:

Scope and importance of swine production in India with special reference to Northeast region; package and practices of swine production; socio-economic importance of goat rearing; nutritional and therapeutic importance of goat milk; scope and importance of sheep rearing; cultural significance of sheep farming; common management practices of goat and sheep farming.

Unit-IV:

Poultry: definition, scope and origin; present status of Indian poultry industry; nutritive value of egg and poultry meat; package and practices of poultry farming; bio-security in poultry farming; economics of poultry farming; common diseases of poultry and its prevention and control.

Suggested Reading List:

- ICAR Publications. (2000). Dairy Year Book. New Delhi.
- Etgen, W.M., & Reaves, P.M. (1998). Dairy Cattle Feeding and Management. New York: John Wiley & Sons.
- Gopal Krishnan, C. A., & Mohanlal, G. B. (1985). *Livestock and Poultry Enterprises for Rural Development*. New Delhi: Vikas Publishing House.
- Houpt, K. A., & Wolski, T. R. (1982). *Domestic Animal Behaviour*. Iowa: Iowa State University Press.
- Mudgal, V. D. (1996). *Advances in Dairy Animal Production*. Lucknow: International Book Distributors.
- Panda, B. (1990). *Feeding Poultry*. New Delhi: ICAR Publications.
- Prasad, J. (1996). *Principles of Dairy Farm Management*. New Delhi: Kalyani Publishers.
- Ranjhan, S. K. (1999). *Animal Nutrition and Feeding Practices*. New Delhi: Vikas Publishing House.
- Reddy, D. V. (2001). *Principles of Animal Nutrition and Feed Technology*. New Delhi: Oxford and IBH.
- Sastry, N. S. R., Thomas, C. K., & Singh, R. A. (1986). *Farm Animal Management and Poultry Production*. Vikas Publishing House PVT Ltd..
- Singh, R. A. (1996). *Poultry Production*. New Delhi: Kalyani Publishers.
- Winton, A. L. (1993). *Milk and Milk Products*. Bikaner: Agro-Botanical Publishers.