

Program: B.Sc. (Hons.) Agriculture

Semester: Third

Course: Crop Production Technology – I (Kharif Crops)

Course Code: 13A.208

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Course Objective:

- To know the Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of various *kharif* crops
- To prepare nursery and transplant various *kharif* crops
- To Identify weeds of *kharif* crops
- To understand the yield attributing characters and estimate yield of *kharif* crops

Unit I:

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops: Cereals – rice, maize, sorghum, pearl millet and finger millet

Unit II:

Pulses-pigeonpea, mungbean and urdbean

Unit III:

Oilseeds- groundnut, and soybean; fibre crops- cotton & jute

Unit IV:

Forage crops-sorghum, cowpea, cluster bean and napier.

Practical:

1. Rice nursery preparation
2. Transplanting of rice
3. Sowing of soybean, pigeonpea and mungbean.
4. Sowing of maize, groundnut and cotton
5. Effect of seed size on germination and seedling vigour of *kharif* season crops
6. Effect of sowing depth on germination of *kharif* crops
7. Identification of weeds in *kharif* season crops
8. Top dressing and foliar feeding of nutrients
9. Study of yield contributing characters and yield calculation of *kharif* season crops
10. Study of crop varieties and important agronomic experiments at experimental farm.
11. Study of forage experiments, morphological description of *kharif* season crops
12. Visit to research centres of related crops.

Suggested Reading:

1. Singh, Chhidda; Singh P. and Singh, R. 2003. *Modern Techniques of Raising Field Crops*, Oxford & IBH Publishing Co., New Delhi.
2. Singh, S.S. 1998, *Crop Management: Under irrigated and rainfed conditions*.
3. Singh, S.S. 1993, *Principles and Practices of Agronomy*, Kalyani Publishers, New Delhi.
4. Reddy, T.Y. and Reddi, G.H.S. 1993. *Principles of Agronomy*, Kalyani Publishers, New Delhi.
5. Maiti, S. , Hedge, M.R. and Chhattopadhyay, S.B. 1988. *Handbook of Annual Oil Seed Crops*. Oxford & IBH Publishing Co., New Delhi.

6. Jaiswami, L.H. and Baldeo, B. 1990. *Advances in Puulse Production Technology*, ICAR, New Delhi.
7. Thakur, C. 1979. *Crop Production, Vol. I & II*. Metropolitan Book Pvt. Ltd., New Delhi.
8. Ahlawat, I.P.S. , Sharma, O.P. & Saini., G.S. 1998 *Scientific Crop Production in India*. Aman Publishing House, Madhu Market, Budhana gate, Meerut.
9. Rathore, P.S. 1999-2000. *Techniques and Management of Field Crop Production*. Agrobios (India), Jodhpur.
10. Rathore, P.S. and Sharma, S.K. 2003. *Scientific Pulse Production*. Yash Publishing House, Bikaner.
11. Sharma, Kalicharan 1990 *Bharat ki promokh faslea*. G.B. Pant Agricultural & Technology University, Nanital.
12. Reddy, S.R. 2004. *Agronomy of Field Crops*. Kalyani Publishers, New Delhi.

Program: B.Sc. (Hons.) Agriculture

Semester: Third

Course: Fundamentals of Plant Breeding

Course Code: 13A.209

| L | T | P | C |
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Course Objective:

- To apply the basic principles of genetics and plant breeding for improvement of plants
- To describe how total phenotypic variations are partitioned into different component and how the genetic portion is manipulated.
- To describe various selection techniques and methods that can be used in genetic improvement of self and cross pollinated crops.
- Study about the fundamentals of mutation, polyploidy and wide hybridization and their role in crop improvement.
- Apply statistical tools in plant breeding

Unit I:

Historical development, concept, nature and role of plant breeding, major achievements and future prospects; Genetics in relation to plant breeding. Modes of reproduction and apomixes, self-incompatibility and male sterility- genetic consequences, cultivar options.

Unit II:

Domestication, Acclimatization and Introduction; Centres of origin/diversity, components of Genetic variation; Heritability and genetic advance; Genetic basis and breeding methods in self- pollinated crops - mass and pure line selection, hybridization techniques and handling of segregating population; Multiline concept.

Unit III:

Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methods of breeding cross pollinated crops, modes of selection; Population improvement Schemes-Ear to row method, Modified Ear to Row, recurrent selection schemes; Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties;

Unit IV:

Breeding methods in asexually propagated crops, clonal selection and hybridization; Maintenance of breeding records and data collection; Wide hybridization and prebreeding; Polyploidy in relation to plant breeding, mutation breeding-methods and uses; Breeding for important biotic and abiotic stresses; Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding; Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

Practical:

1. Plant Breeder's kit
2. Study of germplasm of various crops.
3. Study of floral structure of self-pollinated and cross pollinated crops.
4. Emasculation and hybridization techniques in self & cross pollinated crops.
5. Consequences of inbreeding on genetic structure of resulting populations.
6. Study of male sterility system.
7. Handling of segregation populations.

8. Methods of calculating mean, range, variance, standard deviation, heritability.
9. Designs used in plant breeding experiments, analysis of Randomized Block Design.
10. To work out the mode of pollination in a given crop and extent of natural out-crossing. Prediction of performance of double cross hybrids.

Suggested Reading:

1. Alard, R.W. 2000. *Principles of Plant Breeding*. John Willey & Sons, New York.
2. Chahel, G.S. and S.S. Ghosal. 2002. *Principles and Procedures of Plant Breeding, Biotechnological and Conventional Approaches*. Narosa Publishing House, New Delhi.
3. Singh, B.D. 2005. *Plant Breeding*. Kalyani Publishing House, New Delhi.
4. Singh, P. 2001. *Essentials of Plant Breeding-Principles and Methods*. Kalyani Publishing House, New Delhi.
5. Jain, H.K. and M.C. Kharackwal. 2004. *Plant Breeding- Mendelian to Molecular approach*. Narosa Publishing House, New Delhi.

Program: B.Sc. (Hons.) Agriculture
Semester: Third
Course: Agricultural Finance and Cooperation
Course Code: 13A.210

| L | T | P | C |
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Course Objective:

- To teach about concepts of Agricultural finance, credit, sources of Agricultural finance
- To impart knowledge on preparation and analysis of financial statements and project reports
- To make understand the Concept of Agricultural co-operation and various types of co-operatives
- To analyze progress and performance of cooperatives, commercial banks, RRBs
- To impart knowledge on preparation of viable bankable projects
- To provide knowledg on optimum allocation of limited amount of capital among different enterprise.

Unit I:

Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4 R's, and 3C's of credits.

Unit II:

Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks, Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost.

Unit III:

An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.

Unit IV:

Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED.

Practical:

1. Determination of most profitable level of capital use.
2. Optimum allocation of limited amount of capital among different enterprise.
3. Analysis of progress and performance of cooperatives using published data.
4. Analysis of progress and performance of commercial banks and RRBs using published data.
5. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management, schemes and procedures.
6. Estimation of credit requirement of farm business – A case study.
7. Preparation and analysis of balance sheet – A case study.
8. Preparation and analysis of income statement – A case study.

9. Appraisal of a loan proposal – A case study.
10. Techno-economic parameters for preparation of projects.
11. Preparation of Bankable projects for various agricultural products and its value added products.
12. Seminar on selected topics.

Suggested Reading:

1. Reddy, S. and Raghu Ram, P. *“Agricultural Finance and Management”* Oxford and IBH, New Delhi.
2. Singh, J.P. 1990. *“Agricultural Finance – Theory and Practice”* Ashish Publishing House, New Delhi
3. Pandey, U.K. *“An Introduction to Agricultural Finance”* Kalyani Publishes, New Delhi
4. Pandey, Mukesh and Tewari, Deepali *“Rural and Agriculture Marketing”*
5. Matoria, C.B. *“Agricultural Problems of India”*
6. Krishnaswami, O.R. *“Fundamental of Cooperation”*
7. Nelson, A.G. and Murray, W.G. 1988 *“Agricultural Finance”* IOWA State University Press, Amies, IOWA, USA

Program: B.Sc. (Hons.) Agriculture

Semester: Third

Course: Agri-Informatics

Course Code: 13A.211

| L | T | P | C |
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Course Objective:

- To makes the student aware with the advances in agricultural development and entrepreneurship to provide better agricultural services, enhanced technology dissemination, and information delivery through the advances in ICT and internet.
- To familiarize with different crop simulation models, use of DBMS in agriculture
- To create awareness of smart phone mobile apps in agriculture, application of Decision support system in agriculture
- To acquaint with various IT applications used for the computation of water and nutrient requirement of crops

Unit I:

Introduction to Computers, Operating Systems, definition and types, Applications of MSOffice for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, uses of DBMS in Agriculture,

Unit II:

World Wide Web (WWW): Concepts and components. Introduction to computer programming languages, concepts and standard input/output operations. e-Agriculture, concepts and applications, Use of ICT in Agriculture.

Unit III:

Computer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input Management, Smartphone Apps in Agriculture for farm advises, market price, postharvest management etc; Geospatial technology for generating valuable agri-information.

Unit IV:

Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning using IT tools.

Practical:

1. Study of Computer Components, accessories, practice of important DOS Commands.
2. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management.
3. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document.
4. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data.

5. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system.
6. Introduction to World Wide Web (WWW).
7. Introduction of programming languages.
8. Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/ Wofost;
9. Computation of water and nutrient requirements of crop using CSM and IT tools.
10. Introduction of Geospatial Technology for generating valuable information for Agriculture.
11. Hands on Decision Support System.
12. Preparation of contingent crop planning.

Suggested Reading:

1. *John Walkenbach, Herb Tyson, Michael R. Groh, Faithe Wempen, Microsoft Office 2010 Bible*
2. *Bangia, Learning Ms Office 2010*
3. *Prof. Satish Jain and M. Geetha, MS-Office 2010 Training Guide*
4. *Johnson, Microsoft Office 2010.....on Demand*
5. *Kate Shoup, Microsoft Office 2010*
6. *Melanie Gass, It's All about You! Office 2010*
7. *Nancy Conner and Matthew MacDonald, Office 2010: The Missing Manual*

Program: B.Sc. (Hons.) Agriculture

Semester: Third

Course: Farm Machinery and Power

Course Code: 13A.212

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Course Objective:

- To create awareness on different power sources on a farm
- To educate about the principles of operation of farm equipments
- To impart skill on safely operation of wheel and track type tractors and attached implements and self-propelled equipment.

Unit I:

Status of Farm Power in India, Sources of Farm Power , I.C. engines, working principles of I C engines, comparison of two stroke and four stroke cycle engines , Study of different components of I.C. engine, I.C. engine terminology and solved problems, Familiarization with different systems of I.C. engines:

Unit II:

Air cleaning, cooling, lubrication, fuel supply and hydraulic control system of a tractor, Familiarization with Power transmission system: clutch, gear box, Differential and final drive of a tractor, Tractor types, Cost analysis of tractor power and attached implement

Unit III:

Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations, Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples,

Unit IV:

Familiarization with Plant Protection equipment, Familiarization with harvesting and threshing Equipment.

Practical:

1. Study of different components of I.C. engine.
2. To study air cleaning and cooling system of engine.
3. Familiarization with clutch, transmission, differential and final drive of a tractor.
4. Familiarization with lubrication and fuel supply system of engine.
5. Familiarization with brake, steering, hydraulic control system of engine.
6. Learning of tractor driving,
7. Familiarization with operation of power tiller.
8. Implements for hill agriculture.
9. Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow.
10. Familiarization with seedcum-fertilizer drills their seed metering mechanism and calibration, planters and transplanter
11. Familiarization with different types of sprayers and dusters
12. Familiarization with different intercultural equipment,
13. Familiarization with harvesting and threshing machinery.

Suggested Reading:

1. Jagadishwar Sahay - *Elements of Agricultural Engineering*.
2. Surendra Singh. *Farm Machinery - Principles and Applications*. ICAR Publication.
3. S.C.Jain and C.R.Rai. *Farm Tractor – Maintenance and Repair*. Standard Publishers, 1705-B, Nai Sarak, Delhi – 110006
4. Ojha, T. P. and Michael, A.M. *Principles of Agricultural Engineering. Vol. I*, Jain Brothers, 16/893, East Park Road, Karol Bagh, New Delhi – 110005

Program: B.Sc. (Hons.) Agriculture

Semester: Third

Course: Production Technology for Vegetable and Spices

Course Code: 13A.213

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Course Objective:

- To educate about package and practices of Vegetables and Spices cultivation.
- To impart practical knowledge of seed bed preparation, sowing, irrigation, fertilization, harvesting and storage of vegetable and spices.

Unit I:

Importance of vegetables & spices in human nutrition and national economy, kitchen gardening, brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices:

Tomato, Brinjal, Chilli, Capsicum, Cucumber, Melons, Gourds, Pumpkin, French bean, Peas;

Unit II:

Cole crops such as Cabbage, Cauliflower, Knol-khol; Bulb crops such as Onion, Garlic;

Unit III:

Root crops such as Carrot, Raddish, Beetroot; Tuber crops such as Potato;

Unit IV:

Leafy vegetables such as Amaranth, Palak. Perennial vegetables).

Practical

1. Identification of vegetables & spice crops and their seeds.
2. Nursery raising.
3. Direct seed sowing and transplanting.
4. Study of morphological characters of different vegetables & spices.
5. Fertilizers applications.
6. Harvesting & preparation for market.
7. Economics of vegetables and spices cultivation.

Suggested Reading:

1. S. P Singh & Others. *Principles of Vegetable Production*.
2. Nepal Singh, D.K. Singh. *Vegetable Seed Production Technology*
3. T.K. Bose, J. Kabir & Others. *Vegetable Crops- Volume-I*
4. T.K. Bose, J. Kabir & Others. *Vegetable Crops- Volume-II*
5. T.K. Bose, J. Kabir & Others. *Vegetable Crops- Volume-III*
6. Vishnu Swarup. *Vegetable Science and Technology in India*

7. Prem Singh Arya. *Spice Crops of India*
8. M.K.Rana. *Scientific Cultivation of Vegetables*

Program: B.Sc. (Hons.) Agriculture

Semester: Third

Course: Environmental Studies and Disaster Management

Course Code: 13A.214

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Course Objective:

- To create awareness to save the environment from agricultural hazards.
- To understand the effects of deforestation, afforestation and proper use of organic fertilizers and pesticides
- To know about disaster and rescue from the disasters.

Unit I:

Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources, Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of an individual in conservation of natural resources. • Equitable use of resources for sustainable lifestyles. Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains, food webs and Ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit II:

Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystem diversity and biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Environmental Pollution: definition, cause, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. dies.

Unit III:

Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Human Population and the Environment: population growth, variation among nations,

population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

Unit IV:

Disaster Management

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents. Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

Practical

1. Pollution case studies.
2. Case Studies- Field work
3. Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain
4. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
5. Study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc.

Suggested Reading:

1. *M.P. Singh & Others. Conservation of Biodiversity and Natural Resources*
2. *Bharucha, E. 2005. Text book of Environmental Studies for undergraduate courses. University Grants Commission, New Delhi.*
3. *Anjaneyalu, Y. 2004. Introduction to Environmental Science. BS Publications, Hyderabad, A.P. India.*

Program: B.Sc. (Hons.) Agriculture

Semester: Third

Course: Statistical Methods

Course Code: 13A.215

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Course Objective:

- To apply statistical designs in various agricultural experiments
- To analyze the variance of various data
- To apply testing of hypothesis in agricultural experiments

Unit I:

Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data, Measures of Central Tendency & Dispersion. Definition of Probability, Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability. Binomial & Poisson Distributions

Unit II:

Definition of Correlation, Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations.

Unit III:

Introduction to Test of Significance, One sample & two sample test t for Means, Chi-Square Test of Independence of Attributes in 2 x2 Contingency Table.

Unit IV:

Introduction to Analysis of Variance, Analysis of One Way Classification. Introduction to Sampling Methods, Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement, Use of Random Number Tables for selection of Simple Random Sample.

Practical:

1. Graphical Representation of Data.
2. Measures of Central Tendency (Ungrouped data) with Calculation of Quartiles, Deciles & Percentiles.
3. Measures of Central Tendency (Grouped data) with Calculation of Quartiles, Deciles & Percentiles.
4. Measures of Dispersion (Ungrouped Data).
5. Measures of Dispersion (Grouped Data).
6. Moments, Measures of Skewness & Kurtosis (Ungrouped Data).
7. Moments, Measures of Skewness & Kurtosis (Grouped Data).
8. Correlation & Regression Analysis.
9. Application of One Sample t-test.
10. Application of Two Sample Fisher's t-test.
11. Chi-Square test of Goodness of Fit.
12. Chi-Square test of Independence of Attributes for 2 x2 contingency table.
13. Analysis of Variance One Way Classification.
14. Analysis of Variance Two Way Classification.
15. Selection of random sample using Simple Random Sampling.

Suggested Reading:

1. Nageswara Rao, G 2007. *Statistics for Agricultural Sciences*. B S Publications, Hyderabad
2. Rangaswamy, R 1995. *A Text Book of Agricultural Statistics*. New Age International (P) Limited, Hyderabad.
3. Chandel SRS, *Hand Book of Agricultural Statistics*. Achal Prakashan Mandir publications, New Delhi.
4. Agrawal, B .L. *Programmed Statistics*. 2nd Edition, New Age International Publishers, Hyderabad.

Program: B.Sc. (Hons.) Agriculture
Semester: Third
Course: Livestock and Poultry Management
Course Code: 13A.216

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Course Objective:

- To acquaint students on basic aspects of dairying in India compared with developed countries, problems and prospectus of dairying, detailed aspects of care and management of different classes of dairy cattle, buffaloes and poultry.

Unit I:

Role of livestock in the national economy. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry.

Unit II:

Management of calves, growing heifers and milch animals. Management of sheep, goat and swine. Incubation, hatching and brooding. Management of growers and layers. Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry. Improvement of farm animals and poultry. Digestion in livestock and poultry.

Unit III:

Classification of feedstuffs. Proximate principles of feed. Nutrients and their functions. Feed ingredients for ration for livestock and poultry. Feed supplements and feed additives. Feeding of livestock and poultry.

Unit IV:

Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Practical:

- External body parts of cattle, buffalo, sheep, goat, swine and poultry.
- Handling and restraining of livestock.
- Identification methods of farm animals and poultry.
- Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records.
- Judging of cattle, buffalo and poultry.
- Culling of livestock and poultry.
- Planning and layout of housing for different types of livestock.
- Computation of rations for livestock.
- Formulation of concentrate mixtures.
- Clean milk production, milking methods.
- Hatchery operations, incubation and hatching equipments.
- Management of chicks, growers and layers.
- Debeaking, dusting and vaccination.
- Economics of cattle, buffalo, sheep, goat, swine and poultry production.

Suggested Reading:

1. Jagdish Prasad. *Poultry Production and Management*
2. R.A. Singh. *Poultry Production*
3. Banerjee, G. C. 2011. *A Text Book of Animal Husbandry VIII ed. Oxford and IBH Publications. New Delhi.*
4. ICAR. 2011. *Hand Book of Animal Husbandry published by DIPA, ICAR, New Delhi.*
5. Ranjan, SK. 1994 *Animal Nutrition and Feeding Practices. Vikash Publications. New Delhi.*
6. Sukumar, De. 2000. *Outlines of dairy technology. Oxford University Press, New Delhi.*
7. Thomas C.K., Sastry NSR and Singh, RA. 1982. *Farm Animal Management and Poultry Production. Vikash Publications. New Delhi.*

Program: B.Sc.(Hons.) Agriculture

Semester: Third

Course: NSS

Course Code: 13AP.117

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NSS

Unit I:

Vocational skill development

To enhance the employment potential and to set up small business enterprises skills of volunteers, a list of 12 to 15 vocational skills will be drawn up based on the local conditions and opportunities. Each volunteer will have the option to select two skill-areas out of this list

Unit II:

Issues related environment

Environmental conservation, enrichment and sustainability, climatic change, natural resource management (rain water harvesting, energy conservation, forestation, waste land development and soil conservations) and waste management

Unit III:

Disaster management

Introduction and classification of disaster, rehabilitation and management after disaster; role of NSS volunteers in disaster management.

Entrepreneurship development

Definition, meaning and quality of entrepreneur; steps in opening of an enterprise and role of financial and support service institution.

Unit IV:

Formulation of production oriented project

Planning, implementation, management and impact assessment of project

Documentation and data reporting

Collection and analysis of data, documentation and dissemination of project reports