

**Syllabus**  
**B. Sc. (Ag) Hons. Part-II, Semester-II**  
**Agriculture University, Jodhpur**

**Courses & Credits**

<b>Course No.</b>	<b>Course Title</b>	<b>Credits</b>
AGRON-4221	Field crops-II (Rabi )	3(2+1)
AGRON-4222	Water management	2(1+1)
SCHEM-4221	Soil survey, land use planning and remote sensing	2(1+1)
ENTO-4221	Insect Ecology & Integrated pest management	3(2+1)
HORT-4221	Production Technology of Vegetables & Flowers	4(3+1)
AECON-4221	Agricultural Finance and Co-operation	2(1+1)
PPHYS-4221	Crop Physiology	3(2+1)
EXTED-4221	Entrepreneurship Development and Communication Skills	2(1+1)
NSNC-4221	NSS / NCC*	1(0+1)
	<b>Total</b>	<b>22(13+9)</b>

\*Shall be offered from first to fourth semester and evaluation reported at the end of fourth semester.



# Syllabus

## **B. Sc. (Ag) Hons. Part-II, Semester-II**

### **Agriculture University, Jodhpur**

**AGRON-4221**

**Field Crops- II (*Rabi*)**

**3(2+1)**

**Theory:**

Origin, geographical distribution, importance, production in Rajasthan and India, soil and climatic requirements, varieties, cultural practices *viz.* seed and sowing, intercultural operations, fertilizer, water and weed management, plant protection measures; harvesting and yield of wheat, barley; chickpea; rapeseed and mustard, potato, sugarcane and lucerne; Package of practices of tobacco, sunflower, safflower, linseed, sugarbeet, isabgol, lentil, berseem, oats, opium poppy, frenchbean, taramira and peas.

**Practical:**

Identification of seeds of *rabi* crops, Seed bed preparation and sowing of wheat and sugarcane; Calculations on seed rate; Top dressing of nitrogen in wheat and study of fertilizer experiments on *rabi* crops; Identification of weeds in wheat and other *rabi* crops; Application of herbicides and study of weed control experiments; Morphological characteristics of wheat, barley, oats, rapeseed and mustard; Yield contributing characters of crops, Judging sugarcane maturity and quality tests.

**Suggested Readings:**

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 Pulse 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.

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## **B. Sc. (Ag) Hons. Part-II, Semester-II**

### **Agriculture University, Jodhpur**

**AGRON- 4222**

**Water Management**

**2(1+1)**

**Theory:**

Irrigation: definition and objectives; Water resources and irrigation development in India and Rajasthan; Soil moisture constants and theories of soil water availability; Methods of soil moisture estimation; Evapotranspiration and crop water requirement; Scheduling of irrigation; Methods of irrigation: surface, sprinkler and drip irrigation; Irrigation efficiency and water use efficiency, Irrigation water quality and its management including conjunctive use of water; Water management of different crops (rice, wheat, maize, groundnut, sugarcane, pearl millet, chickpea, mustard); Agricultural drainage

**Practical:**

Determination of bulk density by field method; Determination of soil moisture content by gravimetric, tensiometer, electrical resistance blocks and neutron moisture meter methods; Determination of field capacity by field method; Determination of permanent wilting point; Measurement of irrigation water using different devices; Calculations on irrigation water requirement and irrigation efficiencies (problems); Determination of infiltration rate; Demonstration of border method of irrigation; Demonstration of furrow method of irrigation; Demonstration of check basin and basin method of irrigation; Acquaintance and upkeep of sprinkler and drip irrigation systems; Determination of EC, pH, carbonates bicarbonates and  $Ca^{+} Mg$  in irrigation water (quality parameters).

**Suggested Readings:**

1. Michael, A.M. 1987. Irrigation - Theory and Practice, Vikas Publishing House Pvt. Ltd., New-Delhi.
2. Parihar, S.S. and Sandhu, B.S. 1978. Irrigation of Field Crops- Principles and Practices, ICAR, New-Delhi.
3. Lenka, D. 1999. Irrigation and Drainage. Kalyani Publishers, New-Delhi.
4. Sankara Reddy, G.H. and Yellamanda Reddi, T. 1995. Efficient use of Irrigation Water. Kalyani Publishers, New-Delhi.
5. Reddy, S.R. 2000. Principles of Crop Production, Kalyani Publishers, New-Delhi.
6. Majumdar, D.K. 2004. Irrigation Water Management- Principles and Practice. Prentice Hall of India, New-Delhi.
7. Mishra, R.D. and Ahmed, M. 1987. Manual on Irrigation Agronomy, Oxford & IBH Publishing Co. Pvt. Ltd., New-Delhi.

# Syllabus

## **B. Sc. (Ag) Hons. Part-II, Semester-II**

### **Agriculture University, Jodhpur**

**SCHEM- 4221      Soil Survey, Land Use Planning and Remote Sensing**

**2(1+1)**

#### **Theory:**

Soil profile development, soil survey: Significance and purpose of soil survey, methods of soil survey and mapping. Types of soil surveys: Detailed, Reconnaissance, and Detailed—reconnaissance soil survey. Land use planning: Land capability classification, Soil mapping units. Soil survey interpretations and soil survey report. Major soil groups of India with special reference to Rajasthan. Soil taxonomy – a comprehensive US system of soil classification. Remote sensing: concept of remote sensing. Aerial photography, Aerial and satellite sensor imagery, image processing and interpretations.

#### **Practical:**

Examinations and description of typical soil profile. Interpretation of topographic map and delineation of physiographic boundaries based on important characters, typifying pedon excavation, examination and classification, interpretation of the identified soil characteristics and their evaluation for land use planning. Preparation of the soil survey report, interpretation of remote sensing information.

#### **Suggested Readings:**

1. Brady, N.C. (1996) The nature and properties of soil Mac Millan, Publishing company New York.
2. Buol, S.W., Hole, H.D. and Mc Crackoh, R.J. ( 1980 ) Soil genesis and classification, Oxford and IBH publishing Co. New Delhi.
3. Cursau Paul, J. (1985) Principal of remote sensing, Loymen, New York.
4. lilles, T.m. and Kiefer, R.W. (1979 ) Remote sensing and image interpretation John willey and sons, New York.
5. Patel, A.N. and Singh Surendra (1999) Principal of remote sensing, Scientific publishers (India) Jodhpur.
6. Sehgal, J. (2000) Pedology: Concepts and applications, Kalyani publisher, Ludhiana
7. ISSS (2002) Fundamental of Soil Science Div. of Soil Science, IARI, New Delhi

# Syllabus

## **B. Sc. (Ag) Hons. Part-II, Semester-II**

### **Agriculture University, Jodhpur**

**ENTO-- 4221 Insect Ecology and Integrated Pest Management Including Beneficial Insects**

**3 (2+1)**

**Theory:**

**Insect Ecology:** Definition, scope and concept. Environment and its components. Agroecosystem. Effect of abiotic factors- temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – positive and negative interactions. Causes of pest outbreak. Pest surveillance and forecasting. Categories of pests.

**IPM:** Introduction, importance, scope, concepts and limitations. Tools of IPM- Host plant resistance, cultural, mechanical and physical, legislative and biological control (parasites, predators and pathogens such as bacteria, fungi and viruses). Chemical control- Classification, toxicity and formulations of insecticides. Study of important insecticides- Botanicals, chlorinated hydrocarbons, organophosphates, carbamates, synthetic pyrethroids and novel insecticides, chitin synthesis inhibitors, rodenticides, acaricides and fumigants. Hormones and pheromones, repellents, antifeedants, attractants, gamma radiation and genetic control. Insecticides Act 1968- Important provisions. Application techniques of insecticides. Symptoms of insecticide poisoning, first aid and antidotes.

**Beneficial insects:** Honeybee- Important species, rearing techniques, diseases and natural enemies. Silkworm- Important species, rearing techniques, diseases and natural enemies. Lac insect- rearing techniques, diseases and natural enemies.

**Practical:**

Visit to meteorological observatory and IPM laboratory. Pest surveillance through light traps, pheromone traps and field incidence. Study of sampling techniques for the estimation of insect population. Practicable IPM practices-Mechanical, physical and cultural methods Identification and application of parasites and predators. Botanical insecticides- Neem based products Chemical control- Insecticides and their formulations. Handling of plant protection equipments. Calibration of spray equipments. Calculation of doses/concentrations of insecticides. Calculation of doses/concentrations of insecticides. IPM case studies of one important field crop. Poison bait preparation for rodent control and its application. Safe handling of pesticides. Rearing technique for honeybees. Rearing technique for silkworm. Rearing technique for lac insect.

**Suggested Readings:**

- 1 Metcalf, R.L and Luckman W.H. 1982. Introduction to Insect Pest Management. Wiley Inter Science publishing, New York.
- 2 G.S.Dhaliwal and Ramesh Arora 2001. Integrated Pest Management. Concepts and Approaches. Kalyani publishers, New Delhi.
- 3 Larry P.Pedigo. 1991. Entomology and Pest Management. Mc Millan publishing company, New York.
- 4 Yazdani G.S. and Agarwal M.L. 1979. Elements of Insect Ecology. Naroji publishing house, New Delhi.
- 5 David, B.V. 2003. Elements of Economic Entomology, Popular Book Depot, Chennai.

# Syllabus

## **B. Sc. (Ag) Hons. Part-II, Semester-II**

### **Agriculture University, Jodhpur**

**HORT-4221 Production Technology of Vegetables and Flowers**

**4(3+1)**

#### **Theory:**

Importance and scope of Olericulture. Types of vegetable gardening. Classification of vegetables. Package of practices with reference to botanical name, family, origin, distribution, climate, soil, varieties, sowing, manure and fertilizers, irrigation, intercultural operations, harvesting, yield and plant protection measures including physiological disorders for fruit vegetables – tomato, brinjal, chilies, and okra; Cucurbitaceous vegetables-cucumber, ridge gourd, bottle gourd, bitter gourd, melons – water melon, musk melon and round melon, Cole crops – cabbage, cauliflower and knol-khol. Bulb crops – onion and garlic. Beans and peas – French bean, cluster bean, dolichos bean, peas and cowpea. Tuber crops – potato, sweet potato, colocasia, ; Root crops – carrot, radish, turnip and beet root; Leafy vegetables – amaranths and palak. Introduction to protected cultivation of important vegetables viz .cucumber, capsicum and tomato. Importance and scope of floriculture. Principles of landscape gardening. Types and styles of ornamental gardening. Planting, care and management of lawn, ornamental trees, shrubs, climbers, palms, indoor- plants and seasonal flowers in the gardens. Package of practices for rose, jasmine, chrysanthemum, marigold and gladiolus. Introduction to protected cultivation of important flower crops viz. rose and gerbera.

#### **Practical:**

Planning and layout of kitchen garden; Identification of important vegetable and ornamental plants; trees (shrubs, climbers, house plants, palms etc..) Raising of vegetable nurseries. Transplanting of vegetable seedlings in main field; Layout of lawns and maintenance; Potting, repotting and maintenance of house plants; Visit to commercial vegetable farms ;Training and pruning of rose (standards, hybrid 'T' roses scented roses) and chrysanthemum (pinching and disbudding); Planning and layout of gardens and garden designs for public and private areas; Harvesting indices of different vegetable crops; Grading and packing of vegetables; Prolonging the shelf life of cut flowers. Visit to different styles and types of gardens.

#### **Suggested Readings:**

1. Thompson, H. C. and Kelly, W. C. Vegetables Crops. Tata McGraw Hill
2. Chauhan, D.V.S. Vegetable Production in India. Ram Prasad & sons, Agra
3. Bosse, T.K. Vegetables. Naya Prokash, Calcutta
4. Singh, S. P. Production Technology of Vegetables Crops. Agril. Res. Communication centre, Karnal
5. Choudhary, B. Vegetables. NBT, New Delhi
6. Gopalaswamiengar, K. S. The Complete Gardening in India. The Hosali Press, Bangalore
7. Arora, J.S. Introductory Ornamental Horticulture. Kalyani Publisher, Ludhiana

# Syllabus

## **B. Sc. (Ag) Hons. Part-II, Semester-II**

### **Agriculture University, Jodhpur**

**AGECO -4221**

**Agricultural Finance and Co-Operation**

**2(1+1)**

**Theory:**

Agricultural finance: nature and scope. Time value of money, Compounding and Discounting. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4R's 5C's and 7 P's of credit, repayment plans. History of financing agriculture in India. Commercial banks, nationalization of commercial banks. Lead bank scheme, regional rural banks, scale of finance. Higher financing agencies, RBI, NABARD, AFC, Asian Development Bank, World Bank, Insurance and Credit Guarantee Corporation of India. Assessment of crop losses, determination of compensation. Crop insurance, advantages and limitations in application, estimation of crop yields. Agricultural cooperation: philosophy and principles. History of Indian cooperative Movement, pre-independence and post independence periods, cooperation in different plan periods, cooperative credit structure: PACS, FSCS. Reorganisation of cooperative credit structure in Andhra Pradesh and single window system. Successful cooperative systems in Gujarat, Maharashtra. Punjab etc.

**Practical:**

Factors governing use of Capital and identification of credit needs; Time value of money, Compounding and discounting; Tools of financial management, Balance sheet, Income statement and cash flow analysis; Estimations of credit needs and determining unit costs; Preparations and analysis of loan proposals; Types of repayment loans; Study of financial institutions: PACS, DCCB, Apex Banks, RRBs, CBs, NABARD.

**Suggested Readings:**

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. Mamoria, 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

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# Syllabus

## **B. Sc. (Ag) Hons. Part-II, Semester-II**

### **Agriculture University, Jodhpur**

**PPHY- 4221**

**Crop Physiology**

**3(2+1)**

**Theory:**

Introduction, Definition of Crop Physiology, Importance in Agriculture and Horticulture. Crop Water Relations, Physiological importance of water to plants, Water potential and its components, measurement of water status in plants. Crop water relations (contd.) Transpiration, Definition, significance, Transpiration in relation to Crop productivity, Water Use Efficiency, WUE in C<sub>3</sub>, C<sub>4</sub> and CAM plants, Factors affecting WUE. Photosynthesis, Energy synthesis, Significance of C<sub>3</sub>, C<sub>4</sub> and CAM pathway, Relationship of Photosynthesis and crop productivity, Translocation of assimilates, Phloem loading, apoplastic and symplastic transport of assimilates, Source and sink concept, Factors affecting Photosynthesis for productivity, Methods of measuring photosynthesis, Photosynthetic efficiency, Dry matter partitioning, Harvesting index of crops. Photorespiration and crop productivity. Respiration and its significance, Importance of glycolysis, TCA cycle. Pentose Phosphate Pathway, Growth respiration and maintenance respiration, Alternate respiration, Salt respiration, wound respiration, measurement of respiration. Nutriophysiology, Definition, Mengel's classification of plant nutrients, Physiology of nutrient uptake, Functions of Plant nutrients, Deficiency and toxicity symptoms of plant nutrients, Foliar nutrition, Hydroponics, solution and sand culture. Physiology of flowering, Photoperiodism and Vernalisation in relation to crop productivity, Classification of plants, Commercial application of photoperiodism. Growth and Development, Definition, Types of growth, Determinate and Indeterminate growth, Monocarpic and Polycarpic species with examples, Measurement of growth, Growth analysis Growth characteristics, Definitions and mathematical formulae. Plant Growth Regulators, Occurrence, Biosynthesis, Mode of action of Auxins, Gibberellins, Cytokinins, ABA, Ethylene. Novel plant growth regulators, Commercial application of plant growth regulator in agriculture and horticulture. Senescence and abscission, Definition, Classification, Theories of mechanism and control of senescence, Physiological and biochemical changes and their significance. Abscission and its relationship with senescence. Seed Physiology, Seed dormancy, Definition, types of seed dormancy, Advantages and disadvantages of seed dormancy, Causes and remedial measures for breaking seed dormancy with examples, Optimum conditions of seed storage, Factors influencing seed storage (ISTA standards). Post Harvest Physiology, Fruit ripening, Metamorphic changes, Climacteric and non-climacteric fruits, Hormonal regulation of fruit ripening (with ethrel, CCC, Polaris, paclobuterozole), Use of hormones in increasing vase life of flowers.

**Practical:**

Preparation of solutions. Growth analysis: Calculation of growth parameters. Methods of measuring water status in roots, stems and leaves. Estimation of water potential by Chardakov's method. Measurement of absorption spectrum of chloroplastic pigments and fluorescence. Measurement of leaf area by various methods. Stomatal frequency and index. Leaf anatomy of C<sub>3</sub> and C<sub>4</sub> plants (Demonstration by already prepared slides). Respirometer – measurement of respiration. Measurement of transpiration by different methods. Measurement of respiratory quotient (RQ). Optimum conditions for seed germination. Breaking seed dormancy (a.) Chemical method (b.) Mechanical method. Yield analysis. Seed viability and vigour tests. Effect of ethylene on regulation of stomata.

**Suggested Readings:**

1. N.K. Gupta & Sunita Gupta, 2004. Plant Physiology. Oxford & IBH Publication, New Delhi
2. R.L. Agarwal, 1995. Seed Technology, Oxford & IBH Publication, New Delhi
3. G.R. Noggle and G.J. Fritz, 1986. Plant Physiology, Prentic Hall of India Pvt. Ltd.
4. J.B. Salisbury and C.W. Ross (1992). Plant Physiology, Wadswar Publishing Company, Belmont, California
5. S.N. Pandey & B.K. Sinha (1995). Vikas Publishing House Pvt. Ltd., New Delhi



# Syllabus

## **B. Sc. (Ag) Hons. Part-II, Semester-II**

### **Agriculture University, Jodhpur**

**EXTED-4221 Entrepreneurship Development and Communication Skills 2(1+1)**

#### **Theory:**

Communication Skills: Meaning and Process of communication, verbal and non-verbal communication; listening and note taking, writing skills, oral presentation skills. Public speaking. Entrepreneurship Development: Concept & Meaning. Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs. Globalization and the emerging business / entrepreneurial environment. Entrepreneurial and managerial characteristics; managing an enterprise; motivational drives; entrepreneurial ethics; Entrepreneurship development Programmes- SWOT analysis, generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government Policy on Small and Medium Enterprises (SMEs)/ SSIs. Export and Import Policies. Contract farming and joint ventures, public- private partnerships.

#### **Practical:**

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Summarizing, abstracting; individual and group presentation. Practice on SWOT Analysis, visit to SMEs / SSIs

#### **Suggested Readings:**

1. Akhouri, M.M.P., Mishra, S.P. and Sen Gupta, R. 1989. Trainers Manual on Developing Entrepreneurial Motivation, NIESBUD, New Delhi.
  2. Bidgoli, H. 1989. Decision Support Systems: Principles and Practices, St. Paul, West Publishing Co., USA.
  3. Goyal, D.P. 1994. Management Information System: Concept and Application, Deep & Deep Publisher, New Delhi.
  4. Mancuso, J. 1974. The Entrepreneurs Handbook (Vol. 192), Artech House, Inc., USA.
  5. Patel, V.G. 1987. Entrepreneurship Development Programme in India and Its Relevance to Developing Countries, Entrepreneurship Development Institute of India, Ahmedabad.
  6. Rao, T.V. 1974. Development of an Entrepreneur, Indian Institute of Management, Ahmedabad.
  7. Dipak De & M.S. Rao. Entrepreneurial behaviour of farmers : An axiomatic theory. ISBN 81-85694-36-2, Ganga Kaveri Publishing House, D.35/77, Jangamawadimath, Varanasi-221001 (India), Ph.- 0542-2451936.
  8. Dipak De & Basavaprabhu Jirli. Entrepreneurship : Theory and practice in agriculture. ISBN 81-85694-57-5, Ganga Kaveri Publishing House, D.35/77, Jangamawadimath, Varanasi-221001 (India), Ph.- 0542-2451936
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