COURSE STRUCTURE AND SYLLABI

Diploma in Agriculture Science

(1st & 2nd year) - 2014-15
### SEMESTER – I

<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>CREDIT HOURS</th>
<th>COURSE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agronomic Principles, Practices and Meteorology</td>
<td>3+1</td>
<td>DGAG1101</td>
</tr>
<tr>
<td>Soils and Soil Fertility Management</td>
<td>2+1</td>
<td>DGAC1101</td>
</tr>
<tr>
<td>Principles of Entomology and Economic Entomology</td>
<td>2+1</td>
<td>DGEN1101</td>
</tr>
<tr>
<td>Farm power, Machinery and Post Harvest Technology</td>
<td>2+2</td>
<td>DGAE1101</td>
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<tr>
<td>Vegetable culture and Nursery Management</td>
<td>2+1</td>
<td>DGHO1101</td>
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<tr>
<td>Communication skill in English</td>
<td>0+1</td>
<td>DGAS1101</td>
</tr>
<tr>
<td>Computer Application</td>
<td>0+1</td>
<td>DGAS1102</td>
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<tr>
<td>Total</td>
<td>11+8=19</td>
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### SEMESTER – II

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<thead>
<tr>
<th>COURSE TITLE</th>
<th>CREDIT HOURS</th>
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<tbody>
<tr>
<td>Water Harvest, Irrigation Technology &amp; Weed Management</td>
<td>3+1</td>
<td>DGAG1202</td>
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<tr>
<td>Breeding of Field crops, seed production, Testing and Certification</td>
<td>3+1</td>
<td>DGP1G201</td>
</tr>
<tr>
<td>Manures and fertilizers</td>
<td>2+1</td>
<td>DGAC1202</td>
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<tr>
<td>Crop pests and their Management</td>
<td>2+1</td>
<td>DGEN1202</td>
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<tr>
<td>Plant pathology, crop diseases and their Management</td>
<td>2+1</td>
<td>DGPP1201</td>
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<tr>
<td>Commercial floriculture and Ornamental Gardening</td>
<td>2+1</td>
<td>DGHO1202</td>
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## SEMESTER III

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<thead>
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<th>COURSE TITLE</th>
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<tbody>
<tr>
<td>Agronomy of Field Crops-I</td>
<td>2+1</td>
<td>DGAG2103</td>
</tr>
<tr>
<td>Land Surveying, Watershed Management and Green House Technology</td>
<td>2+1</td>
<td>DGAE2102</td>
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<tr>
<td>Fruit culture and Propagation</td>
<td>2+1</td>
<td>DGHO2103</td>
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<tr>
<td>Participatory Agricultural Management Programme</td>
<td>0+9</td>
<td>DGRW2101</td>
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<td><strong>Total</strong></td>
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## SEMESTER IV

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<tr>
<td>Agronomy of Field Crops-II</td>
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<td>DGAG2204</td>
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<tr>
<td>Organic Farming and Integrated farming system</td>
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<td>DGAG2205</td>
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<tr>
<td>Agricultural Extension, Communication and Rural Sociology</td>
<td>2+1</td>
<td>DGEE2201</td>
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<tr>
<td>Agroforestry, Medicinal and Aromatic Plants</td>
<td>2+1</td>
<td>DGHO2204</td>
</tr>
<tr>
<td>Agricultural Economics, Finance &amp; Marketing</td>
<td>3+0</td>
<td>DGEC2201</td>
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<tr>
<td>Fundamentals of Livestock, Poultry and Fish Production</td>
<td>2+1</td>
<td>DGAP2201</td>
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SEMESTER – I

1. Agronomic Principles, Practices and Meteorology [DGAG1101] (3+1)


Practical: Identification of field crops and under utilized crops and their growth stages; Study of tillage implements; Practice of ploughing; Practice of puddling; Study of seeding equipments; Different methods of sowing; Study of inter-cultivation implements and practice; Site selection for Agromet observatory; Measurement of temperature; Measurement of rainfall; Measurement of evaporation (atmospheric/soil); Measurement of atmospheric pressure; Measurement of sunshine duration and solar radiation; Measurement of wind direction and speed and relative humidity.

Reference Book:

5. Soil Conditions and Plant Growth – E.W.Russel and E.J. Russell
6. Agrometeorology and remote sensing - D.D. Sahu
7. Text book of Agricultural Meteorology - Edited by M.C. Varshney
8. Introduction to Agrometeorology - H.S.Mavi
10. Climate, Weather and Crops in India – D. Lenka

2. Soils and Soil Fertility Management [DGAC1101] (2+1)
**Theory:** Soil: Pedological and edaphological concepts, Definition of Rocks and minerals, Weathering, soil formation factors and processes, components of soils, Soil profile, soil physical properties, soil texture, Soil fertility and productivity-factors affecting, features of good soil management, problems of supply and availability of nutrients, relation between nutrient supply and crop growth, Criteria of essentiality of nutrients, Essential plant nutrients-their functions, nutrient deficiency symptoms, transformation and dynamics of major plant nutrients. Commercial fertilizers, composition, relative fertilizer value and cost; crop response to different nutrients, residual effects and fertilizer use efficiency, fertilizer mixtures and grades, agronomic, chemical and physiological methods of increasing fertilizer use efficiency nutrient interactions, organic fertilizers and its advantages, Time and methods of manures and fertilizers application, foliar application and its concept, relative performance of organic and inorganic manures, economics of fertilizer use, integrated nutrient management, use of vermin compost and residual waste in crops.


**Reference Book:**

1. Chemistry of the soils – F. Bear

3. **Principles of Entomology and Economic Entomology[DGEN1101]**

**Theory:**

1. Brief Introduction, Classification of Phylum Arthropoda upto classes, viz., Symphyla, Crustacea, Arachnida, Chilopoda, Diplopoda, and Insecta. Characters of class Insecta. Division of class Insecta into subclasses- Apterygora and Pterygota- orders under Apterygota. Division of Pterygota into exopterygota and endopterygota and orders under each with important examples.
2. Order Orthoptera – Characters, Prognathus or Hypognathus head, filiform antenna, biting and chewing mouth parts, large prothorax, pterothorax, wing characters, Alary and Femero alary type of stridulation, tympanal organs, saltatorial hind legs, 3 or 4 segmented tarsi, boat shaped male
genitalia, ovipositor with 3 pairs of valves. Un segmented anal cerci, simple or incomplete metamorphosis. Lay eggs in soil. Examples of agricultural importance.

3. Order Thysanoptera (Thrips) 6-10 segmented antenna, compound eyes, asymmetrical mouth parts, wing characters, leg characters, parthenogenetic type of reproduction. Examples of agricultural importance.

4. Order Hemiptera Sub order Heteroptera (Plant bug) 4 to 5 segmented antenna, well developed compound eyes, 2 ocelli if present and sucking type of mouth parts, large pronotum, five fold division of mesonotum, wing characters, odoriferous glands, small ovipositor, simple metamorphosis. Examples of agricultural importance.

5. Sub order Homoptera – Deflexed type of head, compound eyes well developed, 3 to10 segmented antenna. piercing and sucking type of mouth parts. Thoracic characters, wing characters, wax glands. Sexual, parthenogenetic and simple metamorphosis. Examples of agricultural importance.

6. Order Lepidoptera (Moth and Butterflies) overlapping scales on the body and appendages. Mouth parts siphoning type, head small with neck, compound eyes large, 2 ocelli, characters of wings and venation, presence of discal cell presence of androconia, differences between moths and butterflies. Examples of agricultural importance.

7. Order Coleoptera (Beetles and weevils) wings elytra, head with often 11 segmented antenna, biting type of mouth parts, thoracic characters, wing characters, tarsal segments variable with in the same insect and are represented by tarsal formula, abdominal characters, larvae oligopod or apodous and pupa exarate. Examples of agricultural importance.

8. Order Hymenoptera (Bees, wasps, ants and sawflies etc.,) prominent head with free neck, well developed compound eyes, ocelli or absent, antenna variable, biting, lapping and sucking mouth parts, wing characters, trochanter 1 or 2 segmented, abdominal characters, modification of ovipositor an larval and pupal characters. Examples of agricultural importance.

9. Order Diptera (two winged or true flies) Head prominent and small neck, eyes large, ptilinium, antenna 3 segment and aristate. Mouth parts sponging and sucking type, thoracic characters, hind pair of wings modified to halters tarsus 5 segmented with pulvilli and empodium, larval and pupal characters. Examples of agricultural importance.

10. External characters of cockroach- External characters, segmentation, body regions - head, thorax, abdomen; appendages of head, mouth parts, thorax- prothorax, mesothorax and metathorax, legs and wings, Abdomen-anal cerci and styles.
11. Types of mouth parts- Biting and chewing type, Piercing and sucking type Rasping and sucking type Sponging and sucking type, Sucking type.

12. Types of injury and symptoms of damage caused by pests.

13. Integrated Pest Management- Introduction, importance concepts and principles of IPM; Tools of IPM - host plant resistance, cultural methods, mechanical and physical methods, legislative or quarantine measures.


15. Chemical control - Importance of pesticides - classification of insecticides.

16. Different formulations of insecticides.

17. Study of important group of insecticides with examples – botanicals (neem), cyclodienes, organo phosphates, carbamates, synthetic pyrethroids, novel insecticides, nematicides, rodenticides, acaricides, antifeedants, attractants, sex pheromones.


Practicals:

1. Methods of collection and preservation of insects including immature stages.
2. External features of a grass hopper.
3. Types of insect antenna.
4. Types of insect legs.
5. Types of insect mouth parts and study of biting and chewing (orthopteran) and sucking (Hemipteran) mouth parts. Study of mouth parts of Diptera. Hymenoptera and Lepidoptera.
6. Wing venation, types of wings and wing symptoms.
7. Types of insect larvae and pupae.
9. Dissection of male female reproductive system.
10. Study of characters of orders Orthoptera and Dictyoptera and their families.
11. Study of characters of orders Isoptera and Thysanoptera and their families.
13. Study of characters of order Lepidoptera and its families.
15. Study of characters of order Hymenoptera and its families.
4. Farm power, Machinery and Post Harvest Technology[DGAE1101] (2+2)

Primary (Mould board plough, Disc plough) and secondary tillage (Cultivator and harrows) implements, Field operation of line sowing equipment (Seed drill, transplanter), SRI method of planting with marker, Repair and maintenance of tractor, power tiller and matching implements, Operation, use and maintenance of sprayers and dusters, Operation and maintenance of harvesting tools (improved sickle, power reaper), Operation and maintenance of pedal operated thresher, power thresher-cum-winnower, and Axial flow thresher.

Practical:
Adjustment and Operation of primary tillage implements (MB plough, Disc plough etc.), Adjustment and Operation of secondary tillage implements (Cultivator and Harrow), Field operation of seed drill, field operation of paddy transplanter), Paddy transplanting in SRI method using marker, Operation of manual and power weeder (Cono, Mandua and low land power weeder), Adjustment and operation of tractor, power tiller with matching implements, Precautionary measures in operation of sprayers and dusters, Operation of axial flow thresher, Operation of pedal operated, power operated and axial flow thresher.

Moisture content determination of food grains. Study of cleaners and graders. Study of different types of dryers. Study of different storage structures. Visit to Rice mill, Dall mill and oil mill.

Reference Books
2. Post harvest technology of cereal, pulses and oil seeds, A Chakraverty

5. Vegetable culture and Nursery Management [DGHO1101] (2+1)
**Theory:** Importance and scope of the vegetable cultivation, classification of vegetables, Study of climate and environment effect on plant growth, study of climatic and soil requirement, varieties, sowing/planting times and methods, seed rate, seed treatment, nutritional and irrigation requirement, intercultural operations, physiological disorders, harvesting, cool season vegetables (Potato, Cole crops-Cabbage, Cauliflower, Knol-Khol, Root crops-Carrot, radish, Beetroots, Bulb crops- Onion, Garlic, Peas, Leafy vegetables). Warm season vegetables (Tomato, Brinjal, Chilli, Capsicum, Okra, Cluster bean, Cucurbits(Pumpkin, Cucumber, Pointed gourd, Bitter gourd, Bottle gourd), Cassava, Sweet potato, Leafy vegetables- Basella, Fenugreek), Perennial vegetables (Drumstick, Curry leaf)

**Practical:** Raising of nursery of vegetable crops, raising of some warm season and cool season vegetables, identification of seeds and plants, extraction of seeds from important crops, intercultural operations of vegetable, stages of maturity of vegetables and harvestings, visit to mandi, nearby farms & farmers cold storage.

**Reference Book:**
1. Vegetable Science and Technology in India–Vishnu Swarup
2. Vegetable for the tropical region- PremNath, S.Velayadhan and D.P.Singh

**6. Communication skill in English [DGAS1101]** (0+1)

English enhances the employability of students. It enriches a high-degree of proficiency in English Language. It is the language of opportunities. It enables the students to expedite the process of improving learning skills, with more emphasis on LSRW (Learning, Speaking, and Reading & Writing).

**Objective:**
1. To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
2. To help the students cultivate the habit of reading passages thus providing them with the required facility to face competitive exams.
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
4. To train them to use language effectively to face interviews, group discussions, public speaking.
5. To initiate them into greater use of the computer in resume preparation, report writing etc.
6. To maintain good linguistic competence—through accuracy in grammar, pronunciation and vocabulary.

7. To enrich the discourse competence, to prepare the learner to be able to produce contextualize written text and speech.

The labs train the students in Language Skills, Soft Skills, Interpersonal Skills, Business Communication, Pre-Placement Training etc.

**Lab-1 : Warm Up**

ICE-BREAKING ACTIVITIES: Basic Conversational skills

- In your college how do you introduce yourself to a friend, faculty etc.?
- How do you introduce yourself to a new colleague in the college?
- How do you greet them when you meet them—
  (At the Doctor, at the Restaurant, at the Market Yard)

Formal and Informal Introduction: Introduction can be both formal and informal. We use different styles of language and mannerisms in each case. Hence students will be divided into groups/pairs and they will introduce each other in formal and informal way.

**Lab-2: Reading Comprehension**

Students will be given practice in reading and comprehension 6-8 passages of 100-300 words each, on topics of General as well as professional interest. The texts will be supported by suitable exercises designed to foster comprehension skills and vocabulary enrichment. Students are encouraged to read newspapers, articles, books and novels.

- Using Dictionary, reading dialogues, rapid reading, intensive reading, improving reading skills
- Passages for locating main idea and supporting details
- Passages for skimming and scanning, Note Making, Summary etc.

**Lab-3 : Writing Skill**

Students are assigned in such activities/exercises like Mechanics of good letter, Effective business correspondence, Personal Correspondence. Preparation of Curriculum vitae (CV) and Job application. The Style, Importance of professional writing—Choice of words and Phrases, precision, conciseness clichés, redundancy, jargon, foreign words. Precis writing and synopsis writing.

**Lab-4 : Phonetics (Sounds Of English)**
In this lab students will be introduced to phonetics and its structure like vowels, consonants, long & short vowels, syllables (stressed & unstressed), intonation.

Lab-5 : Building Vocabulary Skills
- Students will be given tasks on Synonyms, Antonyms, Homonyms, One word substitutions etc. in the form of activities or games.
- Discussion on new words and exercises
- Exercises on Figurative Language & Idiomatic Language (E.g.: dust and ashes, doorstep of doom, boundaries of knowledge, Apple of one’s eye, in a fix etc.).

Lab-6: Communicative Grammar
The grammar section is primarily for creating awareness in editing written tasks.
In this section students will be engaged in some exercises on Verbs, Subject-Verb agreement, tense patterns and common errors.

Lab-7 : Oral Presentation Of Reports:
Seminars and conferences, features of oral presentation, regulating speech, physical appearance, body language, voice, audience, preparation of visual aids.

Lab-8 : Theme Based Presentations (Power Point & Lcd Projector)
A presentation will be conducted among the students on the given topic related to agriculture like WTO, Developing new technologies in Agriculture, Bio fertilizers etc.

Lab-9: Telephonic Conversation
Students will be given tasks on Telephonic conversation and they will be tested on the rate of speech, clarity of voice, speaking and listening politeness, telephone etiquette.

Lab-10: Mock Meetings
In this lab, students are divided into groups and asked to hold a meeting among them and evaluation will be done on the basis of purpose, procedure participation, chairmanship, physical arrangements, recording minutes of meeting.

Lab-11: Mock Interviews
Testing initiative, team spirit, and leadership, intellectual ability- potential for development, memory, motivation, objectives, aptitude etc.

Lab-12: Group Discussions And Debates On Current Topics Review Or Feedback

7. Computer Application [DGAS1102] (0+1)
   i) Introduction to Computers; Study of Computer Components; Booting of Computer and its Shut Down.
ii) Practice of some fundamental DOS Commands, TIME, DATE, DIR, COPY, FORMAT, VOL, LABEL, and PATH.

iii) Operating System, Units of memory, Use of Mouse, Title Bar, Minimum, Maximum and Close Buttons, Scroll Bars, Menus and Tool Bars; WINDOWS Explorer, Creating Folders, COPY and PASTE functions.

iv) MSWORD: Creating a Document, Saving and editing; MSWORD, Use of options from Tool Bars, Format, Insert and Tools (Spelling & Grammar) Alignment of text.

v) MSWORD: Creating a Table, Merging of Cells, Column and Row width, advanced options (like Water marking, mailings).

vi) MSEXCEL: Overview of Excel, Formatting cells, Cut, Copy, Paste, Insert, Printing, Page Setup, Use of options from Tool Bars.

vii) MSEXCEL: Entering Expressions through the formula tool bar and use of inbuilt functions, SUM, AVERAGE, and STDEV.

viii) MSEXCEL: Data Analysis using different charts. Creating Graphs and saving with & without data.

ix) MS Power Point: Preparation of slides on Power Point.

x) MSACCESS: Creating Database, Structuring with different types of fields.

xi) Internet Browsing: Browsing a Web Page and Creating of E-Mail ID.

Reference Book:


SEMESTER –II

1. Water Harvest, Irrigation Technology & Weed Management[DGAG1202] (3+1)
Theory: Definition and objectives, water resources; soil plant water relationships; soil water movement, evapotranspiration and crop water requirement; effective rainfall, scheduling of irrigation; Methods of irrigation: surface and subsurface, Micro irrigation, sprinkler and drip irrigation; Irrigation efficiency and water use efficiency, conjunctive use of water, irrigation water quality and its management. Weeds: Introduction, harmful and beneficial effects, classification, crop weed competition and allelopathy. Methods of weed control: physical, cultural, chemical and biological methods. Integrated weed management; Herbicides: advantages and limitation of herbicide usage in India, formulations, methods of application; Introduction to adjuvants and their use in herbicides; compatibility of herbicides with other agro chemicals.

Practical: Determination of field capacity by field method; Calculation of irrigation water requirement (Problems); Demonstration of furrow method of irrigation; Demonstration of check basin and basin method of irrigation; Erection and operation of sprinkler irrigation system; Identification of weeds; Survey of weeds in crop fields and other habitats; Computation of herbicide doses; Study of herbicide application equipment and calibration; Demonstration of methods of herbicide application; Tours and visits to experimental field and problem areas.

Reference Book:

1. Irrigation Principles and Practices - O.W. Israelsen and V.E. Hansen
2. Irrigation and Drainage - D. Lenka
5. Modern weed management - O.P.Gupta
6. Principles of Weed science - V.S. Rao
7. Weed management - V.N. Saraswat, V. M. Bhan and N.T. Yaduraju (ICAR)
8. All about weed control - S. Subramaniam, A.Mohamed Ali and R. Jaykumar

2. Breeding of Field crops, Seed production, Testing and Certification[DGP1201] (3+1)


Practical: Emasculatiaon and crossing techniques in rice, emasucation and crossing techniques in cotton, vegetative propagation in Napier grass, seed sampling methods, seed moisture test and seed germination test, unfilled grains and pods identification and separation in Rice and Groundnut, seed viability test, methods to overcome seed dormancy, seed physical purity determination test, seed genetic purity determination test, visit to seed technology testing laboratory, visit to seed processing centre, visit to seed production units, emasculatiaon and crossing techniques in Okra/Brinjal/Chilli, seed treatment methods in Rice and Groundnut, Visit to National seed corporation or Andhra Pradesh State Seed Development Corporation (APSSDC) & other seed corporations.

Reference Book:
1. Principles of Plant Breeding - R.W. Allard
2. Plant Breeding Principles and Methods - B. D. Singh
3. Plant Breeding - (Ed.) V. L. Chopra
4. Plant Breeding. Analysis and Exploitation of Variation - D. Roy

3. Manures and fertilizers [DGAC1202] (2+1)

Theory: Introduction-Raw materials-Manures-Bulky and concentrated-FYM, Composts-Different methods, Mechanical compost plants, Vermicomposting, Green manures, oil cakes,
sewage and sludge-Biogas plant slurry, plant and animal refuges, Fertilizers-classification, Manufacturing processes and properties of major nitrogenous(ammonium sulphate, urea, calcium ammonium nitrate, ammonium nitrate, ammonium sulphate nitrate) Phosphatic(single super phosphate, enriched super phosphate, diammonium phosphate, ammonium poly phosphate), Potassic and complex fertilizers, their fate and reactions in the soil, Secondary and micronutrients fertilizers, cz Amendments, Fertilizer control order, fertilizer storage, Biofertilizers and their advantage.

**Practical:** Total nitrogen and phosphorus in manures/composts-Ammonical and nitrate nitrogen-water soluble P$_2$O$_5$, potassium, calcium, sulphur and zinc contents of fertilizers. COD in organic wastes-Adulteration in fertilizer, Compatibility of fertilizers with pesticides.

**Reference Book:**
5. Toxicology of insecticides-F. Matsumura
7. Chemistry of insecticides & fungicides-V.S.Sreeramulu

4. **Crop pests and their Management[DGEN1202]**

**Theory:** Biology nature of damage and management of insect pests of major field crops like rice, wheat, maize, sorghum, ragi, sugar cane, cotton, jute, pulses, groundnut, mustard, sunflower, sesamum, castor, commonly grown vegetable crops of Odisha belonging to cucurbits, colecrops and solonaceous crops, sweet potato etc. Pest of coconut, cashewnut, coffee and their management.

**Practical:** Identification of crop pests with symptoms of damage in major crops belonging to cereals, pulses, oil seeds, fiber crops, sugar cane, important vegetables and plantation crops.

**Reference Book:**
1. Insect pest of India and S.E Asia – A.S.Atwal
2. Elements of Economic Entomology – B.V.David
3. Insect and mites of crops in India – MRGK Nair
4. Agricultural insect pests and their control V.B.Awasthi

5. Plant pathology, Crop diseases and their Management[DGPP1201] (2+1)

**Theory:** Introduction, important plant pathogenic organisms, different groups, fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, viruses, viroids, algae, protozoa and phanerogamic parasites with examples of disease caused by them. Economic importance, symptoms, cause, epidemiology, disease cycle and integrated management of disease of rice, sorghum, bajra, maize, wheat, sugarcane, turmeric, ginzer, tobacco, groundnut, sesamum, sunflower, cotton, redgram, blackgram, greengram, tea, soyabeans.

**Practical:** Plant disease symptom identification and preservation of disease samples. Study of symptoms, etiology, host-parasite relationship and specific control measures of the following crop diseases. Presentation of disease samples survey and collection of diseases of rice, sorghum; diseases of wheat, bajra and maize; diseases of sugarcane, turmeric and tobacco; diseases of groundnut, castor and sunflower; diseases of sesame and cotton; diseases of redgram, greengram, blackgram, bengalgram and beans; Field visits at appropriate time during the semester.

**Note:** Students should submit 50 pressed, well mounted diseased specimens in three installments during the semester.

**Reference Book:**

2. An Introduction to Fungi- H. C. Dubey
3. Principles of Plant Pathology - R. S. Singh
4. Plant Pathology - R. S. Mehrotra

6. Commercial floriculture and Ornamental Gardening[DGHO1202] (2+1)

**Theory:** Scope and importance of ornamental horticulture, Garden types and its parts. planning of ornamental garden, house plants and seasonal flowers in garden cultivation, Propagation of flowering and ornamental plants, Production technology of important commercial flowers like rose, tuberose marigold, gladiolus and chrysanthemum and some house plants.
Practical: Identification of seeds and plants (Flowers, trees, climbers, house plants, seasonal plants etc.) Layout of lawn and its maintenance. Care and maintenance of house plants. Training and pruning of Rose. Pinching, disbudding and dishooting of chrysanthemum, prolonging the shelf life of flowers, Raising nursery of commercial flowers.

Reference Book:
1. Floriculture in India - G.S. Randhawa and A. Mukopadhyay
2. Complete gardening in India - K.S.G. Gopalswami

SEMESTER – III

1. Agronomy of Field Crops-I [DGAG2103] (2+1)

Theory: Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of kharif crops, Cereals – rice, maize, sorghum, pearl millet and minor millets; Pulses : pigeonpea, mungbean, urdbean and horsegram; Oilseeds: groundnut, sesame, niger and soybean; Fibrecrops: cotton, jute, mesta and sun hemp; and Forage crops: sorghum, maize, bajra, guinea grass, deenanath grass, hybridnapier, para grass, cowpea, rice bean and stylosanthes.

Practical: Rice nursery preparation and transplanting/seed bed preparation and sowing of Kharif crops; Calculations on seed rate; Sowing of soybean, pigeonpea, mungbean, maize, groundnut, and cotton; Effect of seed size on germination and seedling vigour of soybean/groundnut; Effect of sowing depth on germination of groundnut; Identification of weeds in rice, maize and soybean fields and study of weed control experiments in these crops; Top dressing of nitrogen in maize and rice and study of fertilizer experiments on rice, maize, sorghum and millets; Study of yield contributing characters, yield calculations, harvesting and yield estimation of above crops; Study of forage experiments. Judging the maturity stage of kharif crops viz: rice maize pulses and oilseed crops.

Reference Book:
1. Modern Techniques of raising field crops - Chida Singh
2. Crop management under rainfed and irrigated condition - S.S. Singh
3. Agronomy of field crops - S.R. Reddy
4. Text book of field crop production - Edited by R. Prasad (ICAR)
2. **Land Surveying, Watershed Management and Green House Technology**  
   [DGAE2102]  

**Theory:** Surveying: survey equipment, chain survey, cross staff survey, plotting procedure, calculations of area of regular and irregular fields. Levelling - levelling equipment, terminology, methods of calculation of reduced levels, types of levelling, contouring. Water source, Water lifting devices - pumps (shallow and deep well), capacity, power calculations. Water conveyance systems, open channel and underground pipeline. Irrigation methods - drip and sprinkle irrigation systems. Soil and water conservation - soil erosion, types and engineering control measures. Green house technology, Introduction, Types of Green Houses; Plant response to Green house environment, Planning and design of greenhouses, Design criteria of greenhouse for cooling and heating purposes. Green house equipment, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses

**Practical:** Acquaintance with chain survey equipment; Levelling equipment - dumpy level, levelling staff, temporary adjustments and staff reading; Differential leveling; Study of centrifugal pumping system and irrigation water measuring devices; Study of different components of sprinkler irrigation systems; Study of different components of drip and sprinkler irrigation systems; Uniformity of water application in drip and sprinkler systems; Study of soil and water conservation measures. Study of different types of green houses based on shape, construction and cladding materials.

**Reference Book:**

1. A Text Book of Surveying and Levelling – P.C. Purnima
2. Land & Water Management Engineering – V.V.N. Murty

3. **Fruit culture and Propagation**[DGHO2103]  

**Theory:** Importance and scope of fruit crops in India, important varieties, propagation methods, soil and climatic requirements for important commercial fruits, Layout and planting, manuring, irrigation, interculture, training and pruning, intercropping and physiological disorders, harvesting of important fruits like mango, banana, citrus, guava, pineapple, papaya and custard apple.
Practical: Identification of major and minor fruits, nursery management and maintenance of grafts, lifting and packing of plants, Orchard layout and planting management. Intercultural operations, special care, use of growth regulators, post harvest handling of fruits, visit to commercial orchards, tissue culture labs.

Reference Book:
1. Fruits - Ranjit Singh

4. Participatory Agricultural Management Programme[DGRW2101] (0+9)
A special programme called “PAMP” (Participatory Agricultural Management Programme) is introduced 3rd semester to learn the production and protection technologies by involving themselves in cultivation of rainfed and irrigated crops.

Under this programme the students are being formed into several groups for raising ID crops rainfed and irrigated crop.

SEMESTER–IV

1. Agronomy of Field Crops-II [DGAG2204] (2+1)
Theory: Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops; Cereals: wheat, barley; Pulses: chickpea, lentil, peas, french bean; Oilseeds: rapeseed and mustard, sunflower, safflower and linseed; Sugar crops: sugarcane and sugar beet, Commercial crops: potato and tobacco, Forage crops: berseem, Lucerne, Japanese mustard and oat.

Practical: Seed bed preparation and sowing of wheat, sugarcane and sunflower; Calculations on seed rate; Top dressing of nitrogen in wheat and study of fertilizer experiments on wheat and mustard; Identification of weeds in wheat and grain legumes, application of herbicide and study of weed control experiments; Morphological characteristics of wheat, sugarcane, chickpea and mustard; Yield contributing characters of wheat; Yield and quality analysis of sugarcane; Judging the maturity stage of rabi crops. Important agronomic experiments of rabi crops and visit to research stations related to rabi crops.

Reference Book:
1. Modern Techniques of raising field crops - Chida Singh
2. Crop management under rainfed and irrigated condition - S.S.Singh
3. Agronomy of field crops - S.R.Reddy
4. Text book of field crop production - Edited by R. Prasad (ICAR)

2. **Organic Farming and Integrated farming system**[DGAG2205] (2+0)


Integrated farming system- definition, goal, components, factors affecting ecological balance, land degradation, soil health management, models of IFS for rainfed and irrigated conditions and different categories of farmers.

**Reference Book:**
1. Farming system : Theory and Practice - S.A.Solaimalai
2. Organic Farming : Theory and Practice- S.P.Palaniappan and K.A. Annadurai

3. **Agricultural Extension, Communication and Rural Sociology**[DGEE2201] (2+1)


**Practical:** Preparation of Interview Schedule to collect information from villager, Identification of village tour to identify the innovation and adaption pattern, Identifications of various social and
cultural patterns of rural society through field visit, Visit to various rural institutions to study their structure and function.

**Reference Book:**

1. Introductory Rural Sociology- J.B. Chitamber
2. An Introduction to Sociology- Vidya Bhusan & D. R. Sachdev
3. Extension Education- A. Adivi Reddy
5. Extension Communication & Management – G.L.Ray

4. Agroforestry, Medicinal and Aromatic Plants[DGO2204] (2+1)

**Theory:** Agro forestry- definition, objectives and scope. Advantages and disadvantages of agro forestry. Classification of agro forestry system. Tree –crop interaction in agro forestry. Trees suitable for agro forestry and their characteristics. Tree architecture and canopy management. Economics of agro forestry system. Agro forestry for wasteland and watershed management. Agro forestry and maintenance of biodervasity. Agroforestry for climate change adaptation and mitigation. Scope and importance of Medicinal and aromatic plants, study of general principles of climate and soil for cultivation of Medicinal and aromatic plants, production technology of some important plants like mentha, lemon grass, citronella, palma rosa, pacheoli, aswagandha, periwinkle, isabgol and Aloe vera.

**Practical:** Study of agro forestry layout. Visit to farmer’s field where agro forestry is practiced and study of agro forestry system. Study of different traditional agro forestry system in field and designing the improved models. Visit to rural areas to study the land use pattern and preparing suitable designs for the farmers of the area. Identification of medicinal and aromatic plants. Visit to medicinal and aromatic plant garden. Extraction procedures and use.

**Reference book:**

1. Text book of agro forestry- B.S. Chundawat & SK. Gautam
2. An Introduction to agro forestry- P.K.R. Nair
3. Hand book of agro forestry- S.P. Singh
4. Agro forestry principle and practices- A.P. Dwivedi
5. Medicinal and Aromatic Plants-Narain Singh Chauhan
5. **Agricultural Economics, Finance & Marketing**[DGEC2201] (3+0)

**Theory:** Definition of Economics, Scope and importance of economics, Difference between Micro and Macro Economics, Basic terms and concepts used in economics, Consumer behaviour and demand, law of diminishing marginal utility, law of equi-marginal utility, Indifference Curve, Elasticity of demand, Methods of measuring price elasticity of demand, Income elasticity of demand and cross elasticity of demand, consumer’s surplus and application, Production and supply: Nature and factors of production, Short-run and long –run production function, Theory of cost, Short-run and Long-run cost curves. Characteristics of perfect and various imperfect market and their equilibrium conditions.

Macro-Economic Concepts, importance and measurement of national income, Theory of Employment, Theory of Consumption function, Aggregate demand and Aggregate supply, Money, Demand and supply of money, Inflation, monetary and fiscal policy, Importance and function of public finance, public revenue and expenditure, canons of taxation.

Definition, Importance, Need of Agricultural Finance, Problems of agricultural credit in India, Requisites of good credit system, classification of credit and loan, Institutional agencies in agricultural credit, test of farm credit proposal, tools of farm financial analysis, agricultural projects.

Definitions, Meaning and Role of agricultural marketing, scope of agricultural marketing, characteristics of agricultural commodities, classification of markets, producer’s surplus, process of agricultural marketing, marketing risk management strategy, speculation, hedging, problems in agricultural marketing, marketing channels, agricultural prices, role of government in agricultural marketing, Marketing efficiency-meaning, definition, marketing margin, price spread cooperative marketing, food corporation of India, quality control of agricultural products, AGMARK, contract farming.

**Reference Book:**

1. Elementary economic theory - K.K. Dewett and J.D. Verma
2. International Economics - B. Mishra
3. Fundamentals of Agricultural Economics - A.N. Sadhu and A. Singh
6. Fundamentals of Livestock, Poultry and Fish Production[DGAP2201] (2+1)

**Theory:** Place of livestock in the national economy, different livestock development programmes of Govt. of India. Important exotic and Indian breeds of cattle, buffalo, sheep, goat and swine. Measures and factors affecting fertility in livestock, reproductive behaviour like oestrus, parturition, farrowing etc. Milk secretion, milking of animals and factors affecting milk yield and composition. Selection and breeding of livestock for higher milk and meat production. Feeding and management of calves, growing heifers and milch animals and other classes and types of animals, housing principles, space requirements for different species of livestock. Disease control measures, sanitation and care, breeding, feeding and production records. Breed characteristics of poultry, their methods of rearing, breeding, feeding and management, incubation, hatching and brooding, vaccination and prevention of diseases, preservation and marketing of eggs, its economics and keeping quality. Cost of production of milk, economical units of cattle, buffalo, sheep, goat and swine, fresh water fish production technology.

**Practical:** Identification, handling and restraining of animals; Judging and culling; Feeding and ration formulation; Hatching, housing and management of poultry; Visit to livestock farms and Economics of livestock production.

**Reference Book:**

2. Livestock Production and Management – N.S.R. Sastri, C.K. Thomas, R.A. Singh
5. A Textbook of Livestock Production Management in Tropics – D.N. Verma