FACULTY OF AGRICULTURAL SCIENCES

COURSE CURRICULUM

FOR

B.Sc. (Hons.) AGRICULTURE
(Program ID - 1)
(4 Years Course)

1st to 8th SEMESTER
Examinations 2018–2019 session onwards

Applicable for admissions in 2018
DAV UNIVERSITY, JALANDHAR

Scheme of Courses B.Sc. (Hons.) Agriculture
Semester 1

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<tr>
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<th>Paper Code</th>
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**- Student will have to opt either of these courses on the basis courses studied in 10+2
L: Lecture; T: Tutorial; P: Practical; Cr: Credit

** Semester 2

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L: Lecture; T: Tutorial; P: Practical; Cr: Credit
# Scheme of Courses B.Sc(Hons.) Agriculture

## Semester 3

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L: Lecture; T: Tutorial; P: Practical; Cr: Credit

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L: Lecture; T: Tutorial; P: Practical; Cr: Credit

3
### Scheme of Courses B.Sc(Hons.) Agriculture
#### Semester 5

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L: Lecture; T: Tutorial; P: Practical; Cr: Credit

**Total Credits: 24**
# Scheme of Courses B.Sc(Hons.) Agriculture
## Semester 6

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L: Lecture; T: Tutorial; P: Practical; Cr: Credit

Total Credit: 24
STUDENT READY PROGRAMME -I

Modules for Skill Development and Entrepreneurship: A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the VII semester.

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# Syllabus of the modules will be decided in the next BOS meeting

L: Lecture; T: Tutorial; P: Practical; Cr: Credit
DAV UNIVERSITY, JALANDHAR

Scheme of Courses B.Sc(Hons.) Agriculture
Semester 8

STUDENT READY PROGRAMME –II (RAWE)

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<td>Unit attachment in Univ./ College. KVK/ Research Station Attachment</td>
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L: Lecture; T: Tutorial; P: Practical; Cr: Credit
## RAWE Component-I

### Village Attachment Training Programme

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Orientation and Survey of Village</td>
<td>1 week</td>
</tr>
<tr>
<td>2</td>
<td>Agronomical Interventions</td>
<td>1 week</td>
</tr>
<tr>
<td>3</td>
<td>Plant Protection Interventions</td>
<td>1 week</td>
</tr>
<tr>
<td>4</td>
<td>Soil Improvement Interventions</td>
<td>1 week</td>
</tr>
<tr>
<td></td>
<td>(Soil sampling and testing)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Fruit and Vegetable production interventions</td>
<td>1 week</td>
</tr>
<tr>
<td>6</td>
<td>Food Processing and Storage interventions</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Animal Production Interventions</td>
<td>1 week</td>
</tr>
<tr>
<td>8</td>
<td>Extension and Transfer of Technology activities</td>
<td>1 week</td>
</tr>
</tbody>
</table>

## RAWE Component –II

### Agro Industrial Attachment

**Agro-Industrial Attachment:** The students would be attached with the agro-industries for a period of 3 weeks to get an experience of the industrial environment and working

- Students shall be placed in Agro-and Cottage industries and Commodities Boards for 03 weeks.
- Industries include Seed/Sapling production, Pesticides-insecticides, Post harvest-processing-value addition, Agri-finance institutions, etc.

### Activities and Tasks during Agro-Industrial Attachment Programme

- Acquaintance with industry and staff
- Study of structure, functioning, objective and mandates of the industry
- Study of various processing units and hands-on trainings under supervision of industry staff
- Ethics of industry
- Employment generated by the industry
- Contribution of the industry promoting environment
- Learning business network including outlets of the industry
- Skill development in all crucial tasks of the industry
- Documentation of the activities and task performed by the students
- Performance evaluation, appraisal and ranking of students
Elective Courses: A student can select three elective courses out of the following and offer during 4th, 5th and 6th semesters.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Paper Code</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AGS 229A</td>
<td>Agribusiness Management</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
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<tr>
<td>2</td>
<td>AGS 229B</td>
<td>Agrochemicals</td>
<td>2</td>
<td>0</td>
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<td>3</td>
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<tr>
<td>3</td>
<td>AGS 229C</td>
<td>Commercial Plant Breeding</td>
<td>1</td>
<td>0</td>
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<td>3</td>
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<tr>
<td>4</td>
<td>AGS 229D</td>
<td>Landscaping</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>AGS 310A</td>
<td>Food Safety and Standards</td>
<td>2</td>
<td>0</td>
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<tr>
<td>6</td>
<td>AGS 310B</td>
<td>Biopesticides &amp; Biofertilizers</td>
<td>2</td>
<td>0</td>
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<td>3</td>
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<tr>
<td>7</td>
<td>AGS 310C</td>
<td>Protected Cultivation</td>
<td>2</td>
<td>0</td>
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<tr>
<td>8</td>
<td>AGS 310D</td>
<td>Micro propagation Technologies</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>3</td>
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<tr>
<td>9</td>
<td>AGS 330A</td>
<td>Hi-tech. Horticulture</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
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<tr>
<td>10</td>
<td>AGS 330B</td>
<td>Weed Management</td>
<td>2</td>
<td>0</td>
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<td>3</td>
</tr>
<tr>
<td>11</td>
<td>AGS 330C</td>
<td>System Simulation and Agro-advisory</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>AGS 330D</td>
<td>Agricultural Journalism</td>
<td>2</td>
<td>0</td>
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<td>3</td>
</tr>
</tbody>
</table>

L: Lecture; T: Tutorial; P: Practical; Cr: Credit
Modules for Skill Development and Entrepreneurship: A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the VII semester.

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Title of the module</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Production Technology for Bioagents and Biofertilizer</td>
<td>0+10</td>
</tr>
<tr>
<td>2.</td>
<td>Seed Production and Technology</td>
<td>0+10</td>
</tr>
<tr>
<td>3.</td>
<td>Mushroom Cultivation Technology</td>
<td>0+10</td>
</tr>
<tr>
<td>4.</td>
<td>Soil, Plant, Water and Seed Testing</td>
<td>0+10</td>
</tr>
<tr>
<td>5.</td>
<td>Commercial Beekeeping</td>
<td>0+10</td>
</tr>
<tr>
<td>6.</td>
<td>Poultry Production Technology</td>
<td>0+10</td>
</tr>
<tr>
<td>7.</td>
<td>Commercial Horticulture</td>
<td>0+10</td>
</tr>
<tr>
<td>8.</td>
<td>Floriculture and Landscaping</td>
<td>0+10</td>
</tr>
<tr>
<td>9.</td>
<td>Food Processing</td>
<td>0+10</td>
</tr>
<tr>
<td>10.</td>
<td>Agriculture Waste Management</td>
<td>0+10</td>
</tr>
<tr>
<td>11.</td>
<td>Organic Production Technology</td>
<td>0+10</td>
</tr>
<tr>
<td>12.</td>
<td>Commercial Sericulture</td>
<td>0+10</td>
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</tbody>
</table>

NOTE: In addition to above ELP modules other important modules may be given to the students by the university

Evaluation of Experiential Learning Programme/ HOT

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Parameters</th>
<th>Max. Marks</th>
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<tbody>
<tr>
<td>1.</td>
<td>Project Planning and Writing</td>
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<tr>
<td>2.</td>
<td>Presentation</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Regularity</td>
<td>10</td>
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<tr>
<td>4.</td>
<td>Monthly Assessment</td>
<td>10</td>
</tr>
<tr>
<td>5.</td>
<td>Output delivery</td>
<td>10</td>
</tr>
<tr>
<td>6.</td>
<td>Technical Skill Development</td>
<td>10</td>
</tr>
<tr>
<td>7.</td>
<td>Entrepreneurship Skills</td>
<td>10</td>
</tr>
<tr>
<td>8.</td>
<td>Business networking skills</td>
<td>10</td>
</tr>
<tr>
<td>9.</td>
<td>Report Writing Skills</td>
<td>10</td>
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<tr>
<td>10.</td>
<td>Final Presentation</td>
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<tr>
<td></td>
<td>Total</td>
<td>100</td>
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</table>
DAV UNIVERSITY, JALANDHAR

SYLLABUS

I AGRONOMY

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<thead>
<tr>
<th>Paper Code</th>
<th>Course Title</th>
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<th>Cr</th>
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</thead>
<tbody>
<tr>
<td>AGS 111</td>
<td>Fundamentals of Agronomy</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

**Course Objectives:** to teach concepts of crop cultivation, crop nutrition and water management, weeds and their management, identification of important crops, and crop seeds and crop management strategies.

**Theory**

**UNIT I**
Introduction of Agronomy and its scope, role of Agronomist, seeds and sowing, tillage and tilth, crop density and geometry, crop nutrition.

**UNIT II**
Manures and fertilizers, nutrient use efficiency, water resources, soil-plant-water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, water logging.

**UNIT III**

**UNIT IV**
Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

**Practical**
Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agro-climatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity, bulk density and infiltration rate, Measurement of irrigation water.

**Suggested Readings:**
**Course Objectives:** to provide an understanding earth atmosphere, monsoon, weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions, agriculture and weather relations, weather forecasting

**Theory**

**UNIT I**
Meaning and scope of agricultural meteorology; Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height. Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze.

**UNIT II**

**UNIT III**
Atmospheric humidity, concept of saturation, vapour pressure, process of condensation, formation of dew, fog, mist, frost, cloud. Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking. Monsoon- mechanism and importance in Indian agriculture, Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave.

**UNIT IV**
Agriculture and weather relations; Modifications of crop microclimate, climatic normals for crop and livestock production. Weather forecasting- types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.

**Practical**
Suggested Readings:
1. Lal, D.S. 2005 Climatology, Sharda Pustak Bhawan, Allahabad..

<table>
<thead>
<tr>
<th>Paper Code</th>
<th>Course Title</th>
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<th>P</th>
<th>Cr</th>
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</thead>
<tbody>
<tr>
<td>AGS 211</td>
<td>Crop Production Technology-I (Kharif Crops)</td>
<td>1</td>
<td>2</td>
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</tr>
</tbody>
</table>

Course Objectives: The Objective of the course is to acquaint students the origin, geographical distribution, economic importance, soil and climatic requirements, varieties, yield and package of practices of Kharif Crops including cereals, pulses, oilseeds, fibre and forage crops.

Theory

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

UNIT II
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops: Package and practices of pulse crops- pigeonpea, mungbean and urdbean;

UNIT III
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops: Cultivation practices of oilseed crops-groundnut, and soybean.

UNIT IV
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops: Production technology of fibre and forage crops: fibre crops- cotton & Jute and forage crops-sorghum, cowpea, cluster bean and napier grass.

Practical
Rice nursery preparation, transplanting of Rice, sowing of soybean, pigeonpea and mungbean, maize, groundnut and cotton, effect of seed size on germination and seedling vigour of kharif season crops, effect of sowing depth on germination of kharif crops, identification of weeds in kharif season crops, top dressing and foliar feeding of nutrients,
study of yield contributing characters and yield calculation of kharif season crops, study of crop varieties and important agronomic experiments at experimental farm. study of forage experiments, morphological description of kharif season crops, visit to research centres of related crops.

**Suggested Readings:**

<table>
<thead>
<tr>
<th>Paper Code</th>
<th>Course Title</th>
<th>L</th>
<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGS 221</td>
<td>Crop Production Technology-II (Rabi Crops)</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**Course Objectives:** The Objective of the course is to acquaint students the origin, geographical distribution, economic importance, soil and climatic requirements, varieties, yield and package of practices of Rabi crops including cereals, oilseeds, forage, medicinal and aromatic crops.

**Theory**

**UNIT II**
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops: Cereals –wheat and barley, pulses-chickpea, lentil, peas,

**UNIT II**
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops: Oilseeds-rapeseed, mustard, sunflower and sugar crops-sugarcane.

**UNIT III**
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops: Medicinal and aromatic crops-mentha, lemon grass and citronella,

**UNIT IV**
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops: Forage crops-berseem, lucerne and oat.

**Practical**
Sowing methods of wheat and sugarcane, identification of weeds in rabi season crops, study of morphological characteristics of rabi crops, study of yield contributing characters of rabi season crops, yield and juice quality analysis of sugarcane, study of important agronomic
experiments of *rabi* crops at experimental farms. Study of *rabi* forage experiments, oil extraction of medicinal crops, visit to research stations of related crops.

**Suggested Readings:**

<table>
<thead>
<tr>
<th>Paper Code</th>
<th>Course Title</th>
<th>L</th>
<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGS 226</td>
<td>Farming System and Sustainable Agriculture</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Course Objectives:** to provide knowledge on farming system, efficient cropping system, allied enterprises, sustainable agriculture and integrated farming system.

**Theory**

**UNIT I**
Farming System—scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance.

**UNITII**
Cropping system and pattern, multiple cropping system, Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system;

**UNITIII**
Sustainable agriculture—problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability,

**UNITIV**
Integrated farming system—historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques, Resource cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

**Suggested Readings:**
Course Objectives: to grow *Kharif* Crops in field by individual student

Practical
Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

Suggested Readings:

Course Objectives: to grow *Rabi* Crops in field by individual student

Practical
Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

Suggested Readings:
DAV UNIVERSITY, JALANDHAR


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<tr>
<th>Paper Code</th>
<th>Course Title</th>
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<th>P</th>
<th>Cr</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGS 327</td>
<td>Principles of Organic Farming</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**Course Objectives:** to provide students an understanding of organic farming, initiatives for promotion of organic agriculture, concepts of organic ecosystem, nutrient resources, pest, disease and weed management, certification standards and market potential of organic products

**Theory**

**UNIT I**

Organic farming, principles and its scope in India; Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture.

**UNIT II**

Organic ecosystem and their concepts; Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming; Choice of crops and varieties in organic farming.

**UNIT III**

Fundamentals of insect, pest, disease and weed management under organic mode of production; Operational structure of NPOP.

**UNIT IV**

Certification process and standards of organic farming; Processing, levelling, economic considerations and viability, marketing and export potential of organic products.

**Practical**

Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management; Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

**Suggested Readings:**

 Course Objectives: to provide an understanding on concepts and use of precision agriculture and geo-informatics, concepts and applications of remote sensing, global positioning system (GPS), use of system simulation and nanotechnology for enhancing farm productivity.

Theory

UNIT I
Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informatics - definition, concepts, tool and techniques; their use in Precision Agriculture.

UNIT II
Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS; Remote sensing concepts and application in agriculture; Image processing and interpretation.

UNIT III
Global positioning system (GPS), components and its functions; Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture.

UNIT IV
Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Practical

Suggested readings:
Course Objectives: to provide detailed knowledge on rainfed agriculture, soil and water conservation techniques, water harvesting and crop planning for aberrant weather conditions.

Theory

UNIT I
Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershed in India; Problems and prospects of rainfed agriculture in India ; Soil and climatic conditions prevalent in rainfed areas.

UNIT II
Soil and water conservation techniques, Drought: types, effect of water deficit on physio-morphological characteristics of the plants, Crop adaptation and mitigation to drought.

UNIT III
Water harvesting: importance, its techniques, Efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas.

UNIT IV
Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management.

Practical
Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapotranspiration demand of crops. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed. Field demonstration on soil & moisture conservation measures. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed.

Suggested readings:
Course Objectives: To teach students about the basic concepts of genetics like the laws of Mendelian inheritance and extensions to Mendelian genetics, structure and functions of genetic material i.e. chromosomes and DNA and gene expression and its regulation through transcription and translation.

Theory

UNIT I
Mendelian genetics: extension and exceptions to the Mendelian laws. Multiple alleles and Multiple factor hypothesis. Pleiotropism, Penetrance and expressivity. Quantitative and Qualitative traits and differences between them. Sex linked inheritance.

UNIT II
Ultra structure of cell and cell organelles and their functions. Mitosis and meiosis, their significance and differences between them. Cytoplasmic inheritance: its characteristic features and difference between chromosomal and cytoplasmic inheritance.

UNIT III
Study of chromosome structure, morphology, number and types, Karyotype and Idiogram. Numerical chromosomal aberrations (Polyploidy) and Structural chromosomal aberrations and their role in evolution of different crop species like Cotton, Wheat, Tobacco, Triticale and Brassicas. Crossing over and factors affecting it, Mechanism of crossing over and Cytological proof of crossing over. Linkage, Types of linkage and estimation of linkage.

UNIT IV

Practical
Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross, Experiments on epistatic interactions including test cross and back cross, Practice on mitotic and meiotic cell division, Experiments on probability and Chi-square test. Determination of linkage and cross-over analysis (through two point test cross and three point test cross data). Study on sex linked inheritance in Drosophila. Study of models on DNA and RNA structures.

Suggested Readings:
**Course Objectives:** to teach students about seed and seed technology, seed certification, maintenance of seed quality standards during seed production, processing and marketing, legislation, foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables.

**Theory**

**UNIT I**
Seed and seed technology: introduction, definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production, seed quality; Definition, Characters of good quality seed, different classes of seed. Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables.

**UNIT II**

**UNIT III**
Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing. Seed storage: general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage.

**UNIT IV**
Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

**Practical**

**Suggested readings:**
DAV UNIVERSITY, JALANDHAR


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<thead>
<tr>
<th>Paper Code</th>
<th>Course Title</th>
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<th>P</th>
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</thead>
<tbody>
<tr>
<td>AGS 127</td>
<td>Fundamentals of Plant Breeding</td>
<td>2</td>
<td>2</td>
<td>3</td>
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</table>

**Course Objectives:** to acquaint students with historical developments and future prospects of plant breeding, study of floral structures, modes of pollination and reproduction and their genetic consequences, breeding methods in self and cross pollinated crops and various innovative breeding techniques

**Theory**

**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. Concepts of population genetics and Hardy-Weinberg Law.

**UNIT III**
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; Breeding methods in asexually propagated crops, clonal selection and hybridization; Maintenance of breeding records and data collection.

**UNIT IV**
Wide hybridization and pre-breeding; 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**
Plant Breeder’s kit, Study of germplasm of various crops. Study of floral structure of self-pollinated and cross pollinated crops. Emasculation and hybridization techniques in self & cross pollinated crops. Consequences of inbreeding on genetic structure of resulting populations. Study of male sterility system. Handling of segregation populations. Methods of calculating mean, range, variance, standard deviation, heritability. Designs used in plant breeding experiments, analysis of Randomized Block Design. To work out the mode of

**Suggested Readings:**

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<thead>
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<th>Paper Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>AGS 315</td>
<td>Crop Improvement – I (Kharif)</td>
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</table>

**Course Objectives:** to teach students about centers of origin and distribution of species of different *Kharif* crops, conventional and modern innovative approaches for development of hybrids and varieties for stress tolerance and quality traits in *Kharif* crops. Hybrid seed production technology, ideotype and climate resilient crop breeding in different *Kharif* crops

**Theory**

**UNIT I**

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibres; fodders and cash crops; vegetable and horticultural crops; Plant genetic resources, its utilization and conservation.

**UNIT II**

Study of genetics of qualitative and quantitative characters; Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops.

**UNIT III**

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional).

**UNIT IV**

Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea, etc. Ideotype concept and climate resilient crop varieties for future.

**Practical**

Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeonpea, Urdbean, Mungbean, Soybean, Groundnut, Seasame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous
crops. Maintenance breeding of different *kharif* crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Kharif* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

**Suggested Readings:**

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<tbody>
<tr>
<td>AGS 325</td>
<td>Crop Improvement – I (<em>Rabi</em>)</td>
<td>1</td>
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</table>

**Course Objectives:** to acquaint students with centers of origin and distribution of species of different *Rabi* crops, conventional and modern innovative approaches for development of hybrids and varieties for stress tolerance and quality traits in *Rabi* crops. Hybrid seed production technology, ideotype and climate resilient crop breeding in different *Rabi* crops

**Theory**

**UNIT I**
Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops.

**UNIT II**
Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters.

**UNIT III**
Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional).

**UNIT IV**
Hybrid seed production technology of *rabi* crops. Ideotype concept and climate resilient crop varieties for future.

**Practical**
Floral biology, emasculation and hybridization techniques in different crop species namely Wheat, Oat, Barley, Chickpea, Lentil, Field pea, Rajma, Horse gram, Rapeseed Mustard, Sunflower, Safflower, Potato, Berseem. Sugarcane, Tomato, Chilli, Onion; Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Rabi* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, study of donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

**Suggested Readings:**


Course Objectives: to provide an understanding about soil, soil genesis, soil taxonomy and classification, soil profile, physical properties of soil, soil reaction, soil organic matter and soil pollution.

Theory

UNIT I
Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Elementary knowledge of soil taxonomy classification and soils of India.

UNIT II
Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; Soil air, composition, gaseous exchange, problem and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth. Soil water retention, movement and availability.

UNIT III
Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation.

UNIT IV
Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and micro organisms, their beneficial and harmful effects; Soil pollution - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Practical

Suggested Readings:
DAV UNIVERSITY, JALANDHAR


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<tbody>
<tr>
<td>AGS 224</td>
<td>Manures, Fertilizers and Soil Fertility Management</td>
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Course Objectives: to provide knowledge to students about organic manures, fertilizer recommendation approaches, integrated nutrient management, soil fertility and plant nutrition, soil fertility evaluation and methods of fertilizer application.

Theory

UNIT I

UNIT II

UNIT III

UNIT IV
Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Practical

Suggested Readings:

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<tbody>
<tr>
<td>AGS 312</td>
<td>Problematic Soils and their Management</td>
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</tbody>
</table>

**Course Objectives:** to provide knowledge and understanding to the agriculture graduates on soil quality and health, waste land and problem soils in India, reclamation and management, irrigation water, remote sensing and GIS in diagnosis and management of problem soils and bioremediation.

**Theory**

**UNIT I**
Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties.

**UNIT II**
Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils.

**UNIT III**

**UNIT IV**
Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification. Problematic soils under different Agro-ecosystems.

**Suggested Readings:**
3. USDA, 1954. Diagnosis and improvement of Saline and Alkali Soils. Oxford & IBH.
IV ENTOMOLOGY

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<tr>
<td>AGS 124</td>
<td>Fundamentals of Entomology</td>
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<td>2</td>
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**Course Objectives:** to provide knowledge about entomology, class insecta, insect morphology and insect ecology, categories of pests, IPM, pest surveillance and pest forecasting, insect systematic.

**Theory**

**UNIT I**

**UNIT II**

**UNIT III**

**UNIT IV**
Systematics: Taxonomy –importance, history and development and binominal nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta unto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance.

**Practical**
Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Blister beetle; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper); Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera,
DAV UNIVERSITY, JALANDHAR


**Suggested Readings:**
5. Dhaliwal, G.S. and Ramesh Arora.2 003.  Integrated pest management: concepts and approaches, Kalyani Publishers, Ludhiana,

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<tbody>
<tr>
<td>AGS 313</td>
<td>Pests of Crops and Stored Grains and their Management</td>
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</table>

**Course Objectives:** to enlighten students about nature and type of damage caused by different arthropods pests, their systematic and management of major pests of field, vegetable, fruit, plantation and ornamental crops, spices and condiments, losses and deterioration of stored grains, storage structure and principles of grain store management.

**Theory**

**UNIT I**

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various crops: field crop.

**UNIT II**

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various crops: vegetable crop, fruit crop, plantation crops.

**UNIT III**

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various crops: ornamental crops, spices and condiments.

**UNIT IV**
Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

**Practical**
Identification of different types of damage. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce: (a) Field Crops; (b) Vegetable Crops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments. Identification of insect pests and Mites associated with stored grain. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticides application technique. Fumigation of grain store / godown. Identification of rodents and rodent control operations in godowns. Identification of birds and bird control operations in godowns. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi. Visit to nearest FCI godowns.

**Suggested Readings:**

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<tbody>
<tr>
<td>AGS 324</td>
<td>Management of Beneficial Insects</td>
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</table>

**Course Objectives:** to provide knowledge of beneficial insects, bees, silkworm, lac insect, identification of major parasitoids and predators commonly used in pest control and their mass multiplication techniques, identification of other important pollinators, weed killers and scavengers.

**Theory**

**UNIT I**
Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants.

**UNIT II**
Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and
harvesting of cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection.

UNIT III
Species of lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac- products. Identification of major parasitoids and predators commonly being used in biological control.

UNIT IV
Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator, weed killers and scavengers with their importance.

Practical

Suggested Readings:
Course Objectives: to provide an understanding of economic analysis, basic concepts, agricultural economics, demand, production, laws of returns, cost, supply, market structure, national income, population, money, banking, agricultural and public finance, taxes and economic systems.

Theory

UNIT I
Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macroeconomics, positive and normative analysis. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country.

UNIT II

UNIT III
Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break even points. Concepts of rent, wage, interest and profit. National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programmers on population control.

UNIT IV
Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. Tax: meaning, direct and indirect taxes, agricultural taxation, VAT. Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning.

Suggested Readings:
DAV UNIVERSITY, JALANDHAR

3. Nanavati, M.B. and J. J. Anjaria, 1944. The Indian Rural Problem. The Indian Society of Agricultural Economics, Bombay

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<tr>
<td>AGS 213</td>
<td>Agricultural Finance and Co-Operation</td>
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Course Objectives: to teach students agricultural finance, agricultural credit, credit analysis, sources of agricultural finance, micro and macro financing institutions, preparation and analysis of financial statements and agricultural cooperation.

Theory

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. Sources of agricultural finance: institutional and non-institutional sources, commercial banks.

UNIT II
Social control and nationalization of commercial banks, Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost. 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.

UNIT III

UNIT IV
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.

Practicals
Suggested Readings:

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<tr>
<td>AGS 227</td>
<td>Agricultural Marketing, Trade and Prices</td>
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Course Objectives: to teach students agricultural marketing, product life cycle and competitive strategies, pricing and promotional strategies, marketing process and functions, marketing channels, integration, efficiency, costs and price spread, role of Govt. in agricultural marketing, agricultural prices and policy and trade.

Theory

UNIT I
Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets; demand, supply and producer’s surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer’s surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities.

UNIT II
Product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark);Market functionaries.

UNIT III
Marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs.

UNIT IV
Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of
absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture.

**Practical**
Plotting and study of demand and supply curves and calculation of elasticities; Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

**Suggested Readings:**

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<tr>
<td>AGS 328</td>
<td>Farm Management, Production and Resource Economics</td>
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**Course Objectives:** to acquaint students with concept and principles of farm management, farm business analysis, farm planning and budgeting, crop/livestock/machinery insurance and concepts of resource economics.

**Theory**

**UNITI**
Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and product-product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage.

**UNITII**
Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labor income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises. Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts.
UNIT III
Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock’s enterprises. Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies, Crop/livestock/machinery insurance – weather based crop insurance, features, determinants of compensation.

UNIT IV
Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

Practical

Suggested Readings:
VI AGRICULTURAL ENGINEERING

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<tr>
<td>AGS 116</td>
<td>Introductory Soil and Water Conservation Engineering</td>
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</table>

**Course Objectives:** to teach students about soil and water conservation, forms, causes and control of soil, water and wind erosion.

**Theory**

**UNIT I**
Introduction to Soil and Water Conservation, causes of soil erosion. Definition and agents of soil erosion, water erosion, Forms of water erosion.

**UNIT II**

**UNIT III**

**UNIT IV**

**Practical**

**Suggested Readings:**
1. Nakra, C.P., 2009. Farm machines and equipment, Dhanpat Rai Publishing Company, New Delhi,

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<tbody>
<tr>
<td>AGS 214</td>
<td>Farm Machinery and Power</td>
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</table>

**Course Objectives:** to teach students about status of farm power in India, sources of farm power, I.C. engines and familiarization with different systems of I. C. engines, tractor types and cost analysis of tractor power, familiarization with sowing and planting equipments

**Theory**

**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.

UNITII

Familiarization with different systems of I.C. engines: 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.

UNITIII

Tractor types, Cost analysis of tractor power and attached implement, Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations.

UNITIV

Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples, Familiarization with Plant Protection equipment, Familiarization with harvesting and threshing equipment.

Practicals

Study of different components of I.C. engine. To study air cleaning and cooling system of engine, Familiarization with clutch, transmission, differential and final drive of a tractor, Familiarization with lubrication and fuel supply system of engine, Familiarization with brake, steering, hydraulic control system of engine, Learning of tractor driving, Familiarization with operation of power tiller, Implements for hill agriculture, Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow. Familiarization with seed-cum-fertilizer drills their seed metering mechanism and calibration, planters and transplanter Familiarization with different types of sprayers and dusters Familiarization with different inter-cultivation equipment, Familiarization with harvesting and threshing machinery.

Suggested Readings:
1. Nakra, C.P., 2009. Farm machines and equipment, Dhanpat Rai Publishing Company, New Delhi,

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<tr>
<td>AGS 223</td>
<td>Renewable Energy and Green Technology</td>
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Course objectives: to provide working knowledge and awareness about Classification of energy sources, their contribution in agricultural sector, introduction and application of solar energy, familiarization with solar energy gadgets.

Theory

UNITI
Classification of energy sources, contribution of these of sources in agricultural sector, 
Familiarization with biomass utilization for biofuel production and their application.

UNIT II
Familiarization with types of biogas plants and gasifies biogas, bioalcohol, biodiesel and 
biooil production and their utilization as bioenergy resource.

UNIT III
Introduction of solar energy, collection and their application, Familiarization with solar 
energy gadgets: solar cooker, solar water heater, application of solar energy.

UNIT IV
Solar drying, solar pond, solar distillation, solar photovoltaic system and their application, 
introduction of wind energy and their application.

Practical
Familiarization with renewable energy gadgets. To study biogas plants, To study gasifier, To 
study the production process of biodiesel, To study briquetting machine, To study the 
production process of bio-fuels. Familiarization with different solar energy gadgets. To 
study solar photovoltaic system: solar light, solar pumping, solar fencing. To study solar 
cooker, To study solar drying system. To study solar distillation and solar pond.

Suggested Readings:
   Royal Society of Chemistry

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<tr>
<td>AGS321</td>
<td>Protected Cultivation and Secondary Agriculture</td>
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</table>

Course objectives: to teach students about green house technology, irrigation systems used 
in green houses, cost estimation and economic analysis, important engineering properties, 
drying and dehydration and material handling equipments.

Theory

UNIT I
Green house technology: Introduction, Types of Green Houses; Plant response to Green 
house environment, Planning and design of greenhouses, Design criteria of green house for 
cooling and heating purposes. Green house equipments, materials of construction for 
traditional and low cost green houses.

UNIT II
Irrigation systems used in greenhouses, typical applications, passive solar green house, hot 
air green house heating systems, green house drying. Cost estimation and economic analysis.

UNIT III
Important Engineering properties such as physical, thermal and aero & hydrodynamic 
properties of cereals, pulses and oilseed, their application in PHT equipment design and 
operation.

UNIT IV
Drying and dehydration; moisture measurement, EMC, drying theory, various drying method, commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer, recirculatory dryer and solar dryer). Material handling equipment; conveyer and elevators, their principle, working and selection.

**Practical**

Study of different type of green houses based on shape. Determine the rate of air exchange in an active summer winter cooling system. Determination of drying rate of agricultural products inside green house. Study of green house equipments. Visit to various Post Harvest Laboratories. Determination of Moisture content of various grains by oven drying & infrared moisture methods. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials). Determination of Moisture content of various grains by moisture meter. Field visit to seed processing plant.

**Suggested Readings:**

Course Objectives: to teach students about plant diseases, cause and classification of plant diseases, pathogenic organisms such as fungi, bacteria, mollicutes, viruses and nematodes and their classification

Theory

UNITI

UNITII
Fungi: General characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes.

UNITIII
Viruses: nature, architecture, multiplication and transmission. Study of phanerogamic plant parasites.

Nematodes: General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (Heterodera, Meloidogyne, Anguina etc.).

UNITIV

Practical
Suggested Reading:

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<th>Paper Code</th>
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<tbody>
<tr>
<td>AGS 314</td>
<td>Diseases of Field &amp; Horticultural Crops &amp; their Management-I</td>
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Course Objectives: to teach students symptoms, etiology, disease cycle and management of major diseases of field crops, fruit crops and vegetable crops.

Theory
Symptoms, etiology, disease cycle and management of major diseases of following crops:

UNITI
Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra: downy mildew and ergot; Groundnut: early and late leaf spots, wilt.

UNITII
Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Pigeonpea: Phytophthora blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & green gram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic; Castor: Phytophthora blight; Tobacco: black shank, black root rot and mosaic.

UNITIII
Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top; Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot and black rot.

UNITIV
Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust

Practical
Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and well-mounted specimens.
Suggested Readings:
6. Gupta, S.K and Thind, T.S. Disease problems in vegetable production, Scientific Publishers India

Course Objectives: to teach students about the symptoms, etiology, disease cycle and management of field crops, sugarcane, strawberry, potato, cucurbits.

Theory
Symptoms, etiology, disease cycle and management of following diseases:

UNITI
Field Crops: Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng.

UNITII
Sunflower: Sclerotinia stem rot and Alternaria blight; Mustard: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; Gram: wilt, grey mould and Ascochyta blight; Lentil: rust and wilt; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildew and rust.

UNITIII
Horticultural Crops: Mango: anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose; Apple: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl.

UNITIV
Strawberry: leaf spot Potato: early and late blight, black scurf, leaf roll, and mosaic; Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch, and Stemphylium blight; Chilies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot Coriander: stem gall Marigold: Botrytis blight; Rose: dieback, powdery mildew and black leaf spot.

Practical
Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for herbarium.
Note: Students should submit 50 pressed and well-mounted specimens.
Suggested Readings:
7. Gupta, S.K and Thind, T.S. Disease problems in vegetable production, Scientific Publishers India

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<tbody>
<tr>
<td>AGS 311</td>
<td>Principles of Integrated Pest and Disease Management</td>
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Course Objectives: to teach students about the categories of insect pests and diseases, IPM, economic threshold level, methods of control, conventional pesticides for pest and disease management, implementation and impact of IPM, safety issues in pesticide uses.

Theory

UNIT I
Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis. Methods of detection and diagnosis of insect pest and diseases.

UNIT II
Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment.

UNIT III
Introduction to conventional pesticides for the insect pests and disease management. Surveysurveillance and forecasting of Insect pest and diseases. Development and validation of IPM module.

UNIT IV
Implementation and impact of IPM (IPM module for Insect pest and disease). Safety issues in pesticide uses. Political, social and legal implication of IPM. Case histories of important IPM programmes.

Practical
Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM,Identification of biocontrol agents, different predators and natural enemies. Mass multiplication of Trichoderma, Pseudomonas, Trichogramma, NPV etc. Identification and nature of damage of important insect pests and diseases and their management. Crop (agro-ecosystem) dynamics of a selected insect pest and diseases. Plan &
assess preventive strategies (IPM module) and decision making, crop monitoring attacked by insect, pest and diseases. Awareness campaign at farmers fields.

**Suggested Readings:**
DAV UNIVERSITY, JALANDHAR

VIII HORTICULTURE

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<tr>
<td>AGS 125</td>
<td>Fundamentals of Horticulture</td>
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**Course Objective:** This is a basic course on horticulture, which will enlighten the students with the new areas in horticulture and acquaint them with the broad field of horticulture including various horticultural tools, layout, canopy management, nutrition and usage of plant hormones.

**Theory**

**UNITI**

Horticulture - Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops; Plant propagation-methods and propagating structures.

**UNITII**

Seed dormancy, Seed germination, principles of orchard establishment; Principles and methods of training and pruning, juvenility and flower bud differentiation; unfruitfulness;

**UNITIII**

Pollination, pollinizers and pollinators; fertilization and parthenocarpy; medicinal and aromatic plants

**UNITIV**

Importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops.

**Practical**


**Suggested Readings:**


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<tbody>
<tr>
<td>AGS 225</td>
<td>Production Technology for Fruit and Plantation Crops</td>
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</table>

**Course Objective:** To provide knowledge regarding economic importance, varietal wealth and scientific package of practices for various fruit and plantation crops.
DAV UNIVERSITY, JALANDHAR

Theory

UNIT I
Importance and scope of fruit and plantation crop industry in India; Importance of rootstocks; Production technologies for the cultivation of major fruits - mango, banana, citrus, grape, guava, litchi, papaya, sapota.

UNIT II
Production technologies for the cultivation of Apple, pear, peach, walnut, almond.

UNIT III
Production technologies for the cultivation of minor fruits - date, ber, pineapple, pomegranate, jackfruit, strawberry.

UNIT IV
Production technologies for the cultivation of plantation crops - coconut, arecanut, cashew, tea, coffee & rubber.

Practical

Suggested Readings

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<tbody>
<tr>
<td>AGS 216</td>
<td>Production Technology for Vegetable and Spices</td>
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</table>

Course Objectives: To make students aware of package of practices of growing important vegetables and spices

Theory

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, sowing, transplanting techniques, planting distance, fertilizer
requirements, irrigation, weed management, harvesting and yield, physiological disorders, of Tomato, Brinjal, Chilli, Capsicum, Cucumber, Melons, Gourds, Pumpkin.

UNIT II
Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of French bean, Peas; Cole crops such as Cabbage, Cauliflower, Knol-khol.

UNIT III
Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of bulb crops such as Onion, Garlic; Root crops such as Carrot, Radish.

UNIT IV
Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices Tuber crops such as Potato; Leafy vegetables such as Amaranth, Palak.

Practical

Suggested Readings:

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<tr>
<td>AGS 222</td>
<td>Production Technology for Ornamental Crops, MAPs and Landscaping</td>
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Course Objectives: To make students aware of package of practices of growing important ornamental crops, medicinal and aromatic plants. The students will be acquainted with basic principles landscaping.

Theory

UNIT I
Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping. Landscape uses of trees, shrubs and climbers. Production technology of important cut flowers like rose, gerbera, carnation under protected conditions.
UNIT II
Production technology of important cut flowers like lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions. Package of practices for loose flowers like marigold and jasmine under open conditions.

UNIT III
Production technology of important medicinal plants like ashwagandha, asparagus, aloe, Cinnamomum, isabgol.

UNIT IV
Production technology of important aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, Processing and value addition in ornamental crops and MAPs produce.

Practical

Suggested Readings:

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<tr>
<td>AGS 323</td>
<td>Post-harvest Management and Value Addition of Fruits and Vegetables</td>
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Course Objectives: to teach about importance of fruits and vegetables, extent and possible causes of post harvest losses, harvesting and field handling, storage, value addition concept, principles and methods of preservation, drying/ dehydration of fruits and vegetables, canning.

Theory

UNIT I
Importance of post-harvest processing of fruits and vegetables, extent and possible causes of post harvest losses; Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening.

UNIT II
Respiration and factors affecting respiration rate; Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept.

UNIT III
Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade, preserve, candy – Concepts and Standards; Fermented and non-fermented beverages. Tomato products- Concepts and Standards.

UNIT IV

Practical

Suggested Readings:
5. Girdharilal, Sidappa G.S. and Tondan, G.L.1967. Fruits and Vegetable preservation Indian Council of Agricultural Research

IX FOOD SCIENCE & TECHNOLOGY

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<tr>
<td>AGS 329</td>
<td>Principles of Food Science and Nutrition</td>
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Course Objectives: to provide students knowledge about the concepts of food science, food composition and chemistry, food microbiology, principles and methods of food processing and preservation, food and nutrition

Theory

UNIT I
Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.);

UNIT II
Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions);

UNIT III
DAV UNIVERSITY, JALANDHAR

Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods); Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.);

UNIT IV

Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders; Energy metabolism (carbohydrate, fat, proteins); Balanced/ modified diets, Menu planning, New trends in food science and nutrition.

Suggested Readings:
1. Srilakshmi, B. 2010. Text Book of Food Science. New age international (P) limited, publisher, New Delhi

X AGRICULTURAL EXTENSION and COMMUNICATION

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<tr>
<td>AGS 122</td>
<td>Fundamentals of Agricultural Extension Education</td>
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Course Objectives: to teach students about principles of extension education, extension programme, extension systems in India, rural development, rural leadership, extension administration, monitoring and evaluation, extension teaching methods and agriculture journalism

Theory

UNIT I
Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development.

UNIT II
Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/e-extension, market-led extension, farmer-led extension, expert systems, etc.

UNIT III
Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel.

UNIT IV
Extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Practical
To get acquainted with university extension system. Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skills exercise; micro teaching exercise; A visit to village to understand the problems being encountered by the villagers/ farmers; to study organization and functioning of DRDA and other development departments at district level; visit to NGO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning; exposure to mass media: visit to community radio and television studio for understanding the process of programme production; script writing, writing for print and electronic media, developing script for radio and television.

Suggested Readings:

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<tr>
<td>AGS 219</td>
<td>Rural Sociology &amp; Educational Psychology</td>
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**Course Objectives:** to teach students about sociology and rural sociology, rural society and culture, social stratification and institutions, social change and development, educational psychology, behaviour, motivation and intelligence.

**Theory**

**UNIT I**
Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology, Rural society, Social Groups.

**UNIT II**
Social Stratification, Culture concept, Social Institution, Social Change & Development.

**UNIT III**

**UNIT IV**
Psychomotor domain, Personality, Learning, Motivation, Theories of Motivation, Intelligence.

**Suggested Readings:**

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<tr>
<td>AGS 316</td>
<td>Entrepreneurship Development and Business Communication</td>
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**Course Objectives:** to provide knowledge about concept of entrepreneur, entrepreneurship development, impact of economic reforms on agribusiness/agri enterprises, developing managerial skills and business leadership skills, project planning, formulation and report preparation

**Theory**

**UNIT I**
DAV UNIVERSITY, JALANDHAR

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development.

UNIT II
Impact of economic reforms on Agribusiness/ Agri enterprises, Entrepreneurial Development Process; Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation).

UNIT III
Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management.

UNIT IV
Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise.

Practical
Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation, exercise in creativity, time audit through planning, monitoring and supervision, identification and selection of business idea, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

Suggested Readings:

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<tr>
<td>AGS 114</td>
<td>Communication skills and Personality Development</td>
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Course Objectives: to develop communication skills, listening and reading and comprehension, writing, individual and group presentations, organization of group discussion, seminars and conferences.

Theory

UNIT I
Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and nonverbal communication;

UNIT II
Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures.

UNIT III
DAV UNIVERSITY, JALANDHAR

Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting;

UNITIV
Individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

Practical
Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations.

Suggested Readings:
XI BIOCHEMISTRY/ PHYSIOLOGY/ MICROBIOLOGY/ ENVIRONMENTAL SCIENCES

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<tr>
<td>AGS 126</td>
<td>Fundamentals of Plant Biochemistry and Biotechnology</td>
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**Course Objectives:** To teach students about basic of biochemistry of macromolecules like DNA, RNA, Proteins, Carbohydrates, fats etc. To teach students about basic plant tissue culture and DNA fingerprinting techniques.

**Theory**

**UNIT I**

**UNIT II**

**UNIT III**

**UNIT IV**
Somaclonal variation: Types, Reasons and molecular basis. Protoplast: isolation, Culture, Manipulation and Fusion; Products of somatic hybrids and cybrids. Applications in crop improvement. Genetic engineering by Recombinant DNA Technology: Restriction enzymes, Vectors for gene transfer, Gene cloning, Direct and indirect method of gene transfer, Selectable and Scorable markers; GUS, GFP and LacZ etc., Transgenic plants and their applications. DNA finger printing: DNA markers; DNA Probes, RFLP, AFLP, RAPD and SSR. Applications and prospects of DNA Markers in crop improvement through QTL mapping and MAS.

**Practical**
propagation, hardening and acclimatization. Demonstration on isolation of DNA. Demonstration of gel electrophoresis techniques and DNA finger printing.

**Suggested Readings:**

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<tr>
<td>AGS 123</td>
<td>Fundamentals of Crop Physiology</td>
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**Course Objectives:** to provide students an understanding of plant cell, diffusion and osmosis, mineral nutrition of plants, photosynthesis, respiration, fat metabolism, plant growth regulators and physiological aspects of growth and development of major crops.

**Theory**

**UNITI**

Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology.

**UNITII**

Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants.

**UNITIII**

Respiration: Glycolysis, TCA cycle and electron transport chain; Fat Metabolism: Fatty acid synthesis and Breakdown.

**UNITIV**

Plant growth regulators: Physiological roles and agricultural uses, Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.

**Practical**

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, estimation of relative water content, Measurement of photosynthetic CO₂ assimilation by Infra Red Gas Analyser (IRGA).
**Suggested Readings:**

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<tr>
<td>AGS 121</td>
<td>Agricultural Microbiology</td>
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**Course objectives:** to give students knowledge about microorganisms, prokaryotic and eukaryotic microbes, bacteria and bacterial genetics, role of microbes in soil fertility and crop production and role of microbes in human welfare

**Theory**

**UNIT I**
Introduction to Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth.

**UNIT II**
Bacterial genetics: Genetic recombination- transformation, conjugation and transduction, plasmids, transposon.

**UNIT III**

**UNIT IV**
Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation.

**Practical**

**Suggested Readings:**
Paper Code | Course Title | L | P | Cr
---|---|---|---|---
EVS 212 | Environmental Studies and Disaster Management | 2 | 2 | 3

**Course Objectives:** to teach students about natural resources such as forest, water, mineral, energy resources etc., ecosystems, biodiversity, environmental pollution and management, social issues, population and environmental, disasters and their management.

**Theory**

**UNITI**

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 non-renewable 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.

**UNITII**

**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)


**UNITIII**

61
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.


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

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

Suggested Readings:
Course Objectives: to teach students about forestry, Indian Forest Policies, forest regeneration, crown classification, forest mensuration, instrumental and non-instrumental methods of height measurement and agroforestry.

Theory

UNIT I
Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations.

UNIT II
Crown classification. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning. Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method.

UNIT III
Instrumental methods of height measurement - geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.

UNIT IV
Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast growing tree species of the region.

Practical

Suggested Readings:
Course Objective: to provide student acquaintance with statistics and its applications in agriculture, correlation, chi-square test, analysis of variance and introduction to sampling methods.

Theory

UNITI

UNITII
Definition of Correlation, Scatter Diagram. Karl Pearson’s Coefficient of Correlation. Linear Regression Equations. Introduction to Test of Significance, One sample & two sample test t for Means.

UNITIII
Chi-Square Test of Independence of Attributes in 2 ×2 Contingency Table. Introduction to Analysis of Variance, Analysis of One Way Classification.

UNITIV
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

Suggested Readings:
Course Objectives: to provide basic knowledge on computers, operating systems, e-Agriculture, applications of MS-Office for creating, editing and formatting a document, MS-EXCEL, hands on Crop Simulation Models.

Theory

UNIT I
- Introduction to Computers, Study of Computer Components and accessories.
- Operating Systems, definition and types., practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/Linux.
- Creating, Files & Folders, File Management.
- Applications of MS-Office for document creation & Editing.
- Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document.

UNIT II
- e-Agriculture, concepts and applications, Use of ICT in Agriculture.
- 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.
- 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.

UNIT III
MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data.
- Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions.
- MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system.
- Introduction to World Wide Web (WWW). Introduction of programming languages
- Database, concepts and types, uses of DBMS in Agriculture.
- Introduction to computer programming languages, concepts and standard input/output operations.

UNIT IV
- Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/Wofost.
- Computation of water and nutrient requirements of crop using CSM and IT tools.
DAV UNIVERSITY, JALANDHAR


**Practical**
Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system. Introduction to World Wide Web (WWW). Introduction of programming languages. Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/ Wofost; Computation of water and nutrient requirements of crop using CSM and IT tools. Introduction of Geospatial Technology for generating valuable information for Agriculture. Hands on Decision Support System. Preparation of contingent crop planning.

**Suggested Readings:**

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<tr>
<th>Paper Code</th>
<th>Course Title</th>
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<tr>
<td>AGS 319</td>
<td>Intellectual Property Rights</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Course Objectives:** to acquaint students with intellectual property, treaties for protection of IPR, types of intellectual property and legislations covering IPR in India, Patents Act 1970 and Patent system in India, introduction to UPOV for protection of plant varieties, convention on Biological Diversity.

**Theory**

**UNIT I**
Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc.

**UNIT II**

**UNIT III**
UNIT IV

Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

Suggested Readings:
Course Objectives: to teach students role of livestock in the national economy, reproduction in farm animals and poultry, housing principles, management of sheep, goat and swine, digestion in livestock and poultry, introduction to livestock and poultry diseases

Theory

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. Management of calves, growing heifers and milch animals.

UNIT II

UNIT III

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

Practical

Suggested Readings:
**Paper Code** | **Course Title** | **L** | **P** | **Cr**
--- | --- | --- | --- | ---
ENG 153B | Comprehension and Communication Skills in English | 1 | 2 | 2

**Course Objectives:** to develop command on spoken English and broken English, reading comprehension, vocabulary, exercises to help the students in the enrichment of vocabulary, functional grammar and writing skills.

**Theory**

**UNIT I**

**UNIT II**
Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations.

**UNIT III**
Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration.

**UNIT IV**

**Practical**
**Course Objectives:** to teach students about Indian agricultural heritage, scope of Agriculture and national agriculture setup in India.

**Theory**

UNITI
Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture; Past and present status of agriculture and farmers in society.

UNITII
Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world.

UNITIII
Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications.

UNITIV
National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

**Suggested Readings:**
UNIT II
Binomial nomenclature and classification Cell and cell division.

UNIT III
Morphology of flowing plants. Seed and seed germination.

UNIT IV
Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

Practical

Suggested Readings:

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<tbody>
<tr>
<td>AGS 118A</td>
<td>Elementary Mathematics</td>
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</table>

Course Objective: This is a basic course which will provide basic knowledge of straight lines, circle, differential calculus, integral calculus and matrices and determinants.

Theory

UNITI
Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line,

UNITII
General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral. Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points \((x_1, y_1)\) & \((x_2, y_2)\), Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line \(y = mx + c\) to the given circle \(x^2 + y^2 = a^2\).

UNIT III
Differential Calculus : Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of \(x^n\), \(e^x\), \(\sin x\) & \(\cos x\) from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic
differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form y=f (x) (Simple problems based on it).

**UNIT IV**

Integral Calculus: Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).

Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

**Suggested Readings:**
XV NSS/NCC/PHYSICAL EDUCATION & YOGA PRACTICES and HUMAN VALUES AND ETHICS

Courses Objectives: Course aims at evoking social consciousness among students through various activities viz., working together, constructive and creative social work, to be skilful in executing democratic leadership, developing skill in programme development to be able for self employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

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<td>AGS 101</td>
<td>NSS</td>
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Theory
Course aims at evoking social consciousness among students through various activities viz., working together, constructive and creative social work, to be skilful in executing democratic leadership, developing skill in programme development to be able for self employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

Following activities are to be taken up under the NSS course:
- Introduction and basic components of NSS: Orientation
- NSS programmes and activities
- Understanding youth
- Community mobilisation
- Social harmony and national integration
- Volunteerism and shramdan
- Citizenship, constitution and human rights
- Family and society
- Importance and role of youth leadership
- Life competencies
- Youth development programmes
- Health, hygiene and sanitation
- Youth health, lifestyle, HIV AIDS and first aid
- Youth and yoga
- Vocational skill development
- Issues related environment
- Disaster management
- Entrepreneurship development
- Formulation of production oriented project
- Documentation and data reporting
- Resource mobilization
- Additional life skills
- Activities directed by the Central and State Government

Semester I
Course Title: National Service Scheme I
Introduction and basic components of NSS:
Orientation: history, objectives, principles, symbol, badge; regular programmes under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health.
NSS programmes and activities
Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary.
Understanding youth
Definition, profile, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change.
Community mobilisation
Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilisation involving youth-adult partnership.
Social harmony and national integration
Indian history and culture, role of youth in nation building, conflict resolution and peace-building.
Volunteerism and shramdan
Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism.
Citizenship, constitution and human rights
Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information.
Family and society
Concept of family, community (PRIs and other community based organisations) and society.

Semester II
Course Title: National Service Scheme II
Importance and role of youth leadership
Meaning, types and traits of leadership, qualities of good leaders; importance and roles of youth leadership.
Life competencies
Definition and importance of life competencies, problem-solving and decision-making, interpersonal communication.
Youth development programmes
Development of youth programmes and policy at the national level, state level and voluntary sector; youth-focused and youth-led organisations.
Health, hygiene and sanitation
Definition needs and scope of health education; role of food, nutrition, safe drinking water, water born diseases and sanitation (Swachh Bharat Abhiyan) for health; national health programmes and reproductive health.
Youth health, lifestyle, HIV AIDS and first aid
Healthy lifestyles, HIV AIDS, drugs and substance abuse, home nursing and first aid.
Youth and yoga
History, philosophy, concept, myths and misconceptions about yoga; yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method.

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<tr>
<td>PHE110</td>
<td>Physical Education and Yoga Practices</td>
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</table>

Semester I: Physical Education and Yoga Practices

1. Teaching of skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
2. Teaching of different skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
3. Teaching of advance skills of Football – involvement of all the skills in game situation with teaching of rules of the game
4. Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation
5. Teaching of skills of Basketball – demonstration, practice of the skills, involvement in game situation
6. Teaching of skills of Basketball – involvement of all the skills in game situation with teaching of rule of the game
7. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
8. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
9. Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game
10. Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation
11. Teaching of skills of Ball Badminton – involvement of all the skills in game situation with teaching of rule of the game
12. Teaching of some of Asanas – demonstration, practice, correction and practice
13. Teaching of some more of Asanas – demonstration, practice, correction and practice
14. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
15. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
16. Teaching of skills of Table Tennis – involvement of all the skills in game situation with teaching of rule of the game
17. Teaching – Meaning, Scope and importance of Physical Education
18. Teaching – Definition, Type of Tournaments
19. Teaching – Physical Fitness and Health Education
20. Construction and laying out of the track and field (*The girls will have Tennikoit and Throw Ball).

Semester II: Physical Education and Yoga Practices

1. Teaching of skills of Hockey – demonstration practice of the skills and correction.
2. Teaching of skills of Hockey – demonstration practice of the skills and correction. And involvement of skills in games situation
3. Teaching of advance skills of Hockey – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
4. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction.
5. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of the skills in games situation
6. Teaching of advance skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
7. Teaching of different track events – demonstration practice of the skills and correction.
8. Teaching of different track events – demonstration practice of the skills and correction.
9. Teaching of different track events – demonstration practice of the skills and correction with competition among them.
10. Teaching of different field events – demonstration practice of the skills and correction.
11. Teaching of different field events – demonstration practice of the skills and correction.
12. Teaching of different field events – demonstration practice of the skills and correction.
13. Teaching of different field events – demonstration practice of the skills and correction with competition among them.
14. Teaching of different asanas – demonstration practice and correction.
15. Teaching of different asanas – demonstration practice and correction.
16. Teaching of different asanas – demonstration practice and correction.
17. Teaching of different asanas – demonstration practice and correction.
18. Teaching of weight training – demonstration practice and correction.
20. Teaching of calisthenics – demonstration practice and correction.

Note: 1) Compulsory Uniform: Half pants, Tee Shirts, Shoes and socks all white (Girls will have white Tee Shirt and Track pants) 2) The games mentioned in the practical may be interchanged depending on the season and facilities.

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<tr>
<td>AGS 107A</td>
<td>Human Values and Ethics</td>
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Theory

UNITI

UNITII
Self Exploration. Self Awareness. Self Satisfaction.

UNITIII

UNITIV

**Suggested Readings:**
DAV UNIVERSITY, JALANDHAR

ELECTIVE COURSES

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<tr>
<td>AGS 229A</td>
<td>Agri-business Management</td>
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</table>

**Course Objectives:** to teach students about agri-bussiness, features of agribusiness management, Agri-value chain, business environment, management functions, capital and financial management of agribusiness, marketing, distribution and project management.

**Theory**

**UNIT I**
Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries

**UNIT II**

**UNIT III**

**UNIT IV**

**Practical**

**Suggested Readings:**
3. Kotler, Philip, 1999, Marketing Management, Prentice Hall of India, New Delhi,

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<tr>
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<tr>
<td>AGS 229B</td>
<td>Agrochemicals</td>
<td>2</td>
<td>0</td>
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</table>

**Course Objectives:** to introduce students to various agrochemicals, their management for sustainable agriculture, classification of herbicides, fungicides, insecticides, fertilizers, and biopesticides.

**Theory**

**UNIT I**
An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture.

**UNIT II**
Herbicides-Major classes, properties and important herbicides. Fate of herbicides.
Fungicides - Classification – Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride.
Organic fungicides- Mode of action- Dithiocarbamates-characteristics, preparation and use of Zineb and maneb.

**UNIT III**
Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use. Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroidsNeonicotinoids, Biorationals, Insecticide Act and rules. Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.

**UNIT IV**

**Practical**


**Suggested Readings:**


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<tr>
<td>AGS 229C</td>
<td>Commercial Plant Breeding</td>
<td>1</td>
<td>4</td>
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</table>

**Course Objectives:** to teach students about mode of reproduction, development and maintenance of lines and hybrids in self and cross pollinated crops, advances in hybrid seed production in field crops and vegetable crops, innovative strategies for variety development, IPR issues in commercial plant breeding.

**Theory**

UNITI
Types of crops and modes of plant reproduction. Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production.

UNIT II
Genetic purity test of commercial hybrids. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc. Quality seed production of vegetable crops under open and protected environment.

UNIT III
Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools. IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act.

UNIT IV
Variety testing, release and notification systems in India. Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

Practical
Floral biology in self and cross pollinated species, selfing and crossing techniques. Techniques of seed production in self and cross pollinated crops using A/B/R and two line system. Learning techniques in hybrid seed production using male-sterility in field crops. Understanding the difficulties in hybrid seed production, Tools and techniques for optimizing hybrid seed production. Concept of rouging in seed production plot. Concept of line its multiplication and purification in hybrid seed production. Role of pollinators in hybrid seed production. Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops. Sampling and analytical procedures for purity testing and detection of spurious seed. Seed drying and storage structure in quality seed management. Screening techniques during seed processing viz., grading and packaging. Visit to public private seed production and processing plants.

Suggested Readings:
**DAV UNIVERSITY, JALANDHAR**


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<tr>
<td>AGS 229D</td>
<td>Landscaping</td>
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**Course Objectives:** to provide knowledge to students about importance, scope and principles of landscaping, selection, propagation and planting schemes of trees, shrubs, herbaceous perennials, annuals and pot plants, bio-aesthetic planning, landscaping of public places, bonsai management and lawns establishment.

**Theory**

**UNIT I**
Importance and scope of landscaping. Principles of landscaping, garden styles and types, terrace gardening, vertical gardening, garden components, adornments, lawn making, rockery, water garden, walk-paths, bridges, other constructed features etc. gardens for special purposes.

**UNIT II**

**UNIT III**

**UNIT IV**
Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions. Bonsai: principles and management, lawn: establishment and maintenance. CAD application.

**Practical**
Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals, care and maintenance of plants, potting and repotting, identification of tools and implements used in landscape design, training and pruning of plants for special effects, lawn establishment and maintenance, layout of formal gardens, informal gardens, special type of gardens (sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house. Use of computer software, visit to important gardens/parks/institutes.

**Suggested Readings:**
DAV UNIVERSITY, JALANDHAR


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<tr>
<td>AGS 310A</td>
<td>Food Safety and Standards</td>
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</table>

Course Objectives: to acquaint students with food safety, hazards and risks in food safety, food storage, establishments, food safety measures, food safety management tools, accreditation and auditing, packaging, Indian and International Standards for food products.

Theory

UNIT I

UNIT II

UNIT III
Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene. Food laws and Standards- Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related to food. Recent concerns- New and Emerging Pathogens.

UNIT IV

Practical

Suggested Readings:
Course Objectives: to teach students about biopesticides, classification, mass production technology, applications methods, limitation and uses of biopesticides, biofertilizers, features of bacterial and cyanobacterial biofertilizers and their production technology.

Theory

UNIT I

UNIT II
Methods of application of biopesticides. Methods of quality control and Techniques of biopesticides. Impediments and limitation in production and use of biopesticide.

UNIT III

UNIT IV
Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertilizers. FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers - Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.

Practical
Isolation and purification of important biopesticides: Trichoderma Pseudomonas, Bacillus, Metarhyzium etc. and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition. Quality control of biopesticides.

Suggested Readings:
1. Purohit SS and Singh T. 2108 Biofertilizers Technology. Agrobios (India)

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<tr>
<td>AGS 310C</td>
<td>Protected Cultivation</td>
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Course Objectives: to teach students about protected cultivation, soil preparation and management in protected structures, green house cultivation of horticultural, medicinal and aromatic crops, off - season production and insect pest and disease management in protected structures.

Theory

UNITI
Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate. Cladding material involved in greenhouse/ poly house. Greenhouse design, environment control, artificial lights, Automation.

UNITII
Soil preparation and management, Substrate management. Types of benches and containers. Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops.

UNITIII
Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc.

UNITIV
Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and disease management.

Practical
Raising of seedlings and saplings under protected conditions, use of protrays in quality planting material production, Bed preparation and planting of crop for production, Inter cultural operations, Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip, fogging ad misting.

Suggested Readings:
DAV UNIVERSITY, JALANDHAR


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<tr>
<td>AGS 310D</td>
<td>Micro propagation Technologies</td>
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Course Objectives: to teach students about history and basic concepts of plant tissue culture, tissue culture laboratory, micropropagation, cell suspension cultures and production of secondary metabolites and cryopreservation

Theory

UNIT I
Introduction, history and advantages and Plant tissue culture. Organization of plant tissue culture laboratory, culture media and PGRs used in plant tissue culture.

UNIT II
Basic concepts of plant tissue culture. Various types of cultures (cell, callus, organ, embryo and seed). Somaclonal variations

UNIT III
Micropropagation, Stages of micropropagation. Axillary bud proliferation, organogenesis, somatic embryo, somatic embryogenesis

UNIT IV
Cell suspension cultures, Production of secondary metabolites and cryopreservation

Practical: Various equipments used in plant tissue culture laboratory, Media composition, preparation of MS media, sterilization techniques, Explant preparation, Culturing of explant, shoot proliferation, callus induction, rooting and hardening.

Suggested readings:

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<tr>
<td>AGS 330A</td>
<td>Hi-tech. Horticulture</td>
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Course Objectives:
To enlighten the students with technological and advanced cultivation practices for horticultural crops developed in India as well as those adopted globally for quality production.

Theory

UNITI
Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods.

UNITII
Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC, pH based fertilizer scheduling.

UNITIII

UNITIV
Variable Rate applicator (VRA), Application of precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized harvesting of produce.

Practical
Types of polyhouses and shade net houses, Intercultural operations, tools and equipments identification and application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.

Suggested Readings:

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<tr>
<td>AGS 330B</td>
<td>Weed Management</td>
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Course Objectives: to introduce students about different weeds, harmful and beneficial effects of weeds, herbicides and weed management using herbicides, application of bio-herbicides in agriculture, management of herbicide resistance.

Theory

UNITI
Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds.

UNITII
Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity. Allelopathy and its application for weed management.
UNIT III


UNIT IV

Integration of herbicides with non chemical methods of weed management. Herbicide Resistance and its management.

Practical


Suggested Readings:

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<tr>
<td>AGS 330C</td>
<td>System Simulation and Agroadvisory</td>
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Course Objectives: to teach students about crop models, elementary crop growth models, crop production in moisture and nutrient deficit conditions, weather forecasting, crop-weather calendars, use of crop simulation models in agro-advisory.

Theory

UNIT I

System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, relational diagrams. Evaluation of crop responses to weather elements;

UNIT II

Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modelling techniques for their estimation.

UNIT III

Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance. Weather forecasting, types, methods, tools & techniques, forecast verification; Value added weather forecast, ITK for weather forecast and its validity;

UNIT IV
Crop-Weather Calendars; Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

**Practical**

**Suggested Readings:**

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<tr>
<td>AGS 330D</td>
<td>Agricultural Journalism</td>
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**Course Objectives:** to acquaint students with comprehensive knowledge of agricultural journalism, newspapers and magazines as communication media, writing agricultural stories.

**Theory**

**UNITI**
Agricultural Journalism: The nature and scope of agricultural journalism characteristics and training of the agricultural journalist, how agricultural journalism is similar to and different from other types of journalism.

**UNITII**
Newspapers and magazines as communication media: Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers and magazines: Style and language of newspapers and magazines, parts of newspapers and magazines.

**UNITIII**
The agricultural story: Types of agricultural stories, subject matter of the agricultural story, structure of the agricultural story. Gathering agricultural information: Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural news sources.

**UNITIV**
Writing the story: Organizing the material, treatment of the story, writing the news lead and the body, readability measures. Illustrating agricultural stories: Use of photographs, use of
artwork (graphs, charts, maps, etc.), writing the captions. Editorial mechanics: Copy reading, headline and title writing, proofreading, lay outing.

**Practical**

Practice in interviewing. Covering agricultural events. Abstracting stories from research and scientific materials and from wire services. Writing different types of agricultural stories. Selecting pictures and artwork for the agricultural story. Practice in editing, copy reading, headline and title writing, proofreading, layouting. Testing copy with a readability formula. Visit to a publishing office.

**Suggested Readings:**

3. Bhatnagar, R. 2001. Print Media and Broadcast Journalism. Indian Publisher Distributors, Delhi