Curriculum for B.Sc. Horticulture Programme

2016-17 onwards
CURRICULAM
# B.Sc. (HORTICULTURE) DEGREE PROGRAMME

## DEPARTMENT WISE DISTRIBUTION OF COURSES

### ABSTRACT

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Department / Discipline</th>
<th>No.of Courses</th>
<th>Credit Hours</th>
<th>Total Credits</th>
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<tbody>
<tr>
<td>1.</td>
<td>Horticulture</td>
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<td>Agricultural Economics</td>
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<td>Genetics and Plant Breeding</td>
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<td><strong>71+91</strong></td>
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### Non Credit Courses

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<td>All India Tour</td>
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|         | **Total Non-Credit Courses** | **6** | **0+7** | **7** |
|         | **GRAND TOTAL**            | **62** | **71+98** | **169** |
## DEPARTMENT WISE DISTRIBUTION OF COURSES
### DEPARTMENT OF HORTICULTURE

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<th>Course Title</th>
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<td>Plant Propagation and Nursery Management</td>
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<td>Growth and Development of Horticultural Crops</td>
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<td>Post Harvest Management of Horticultural Crops</td>
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<td><strong>Vegetable Science</strong></td>
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<td>Production Technology of Tropical and Sub Tropical Vegetables</td>
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<td>Breeding of Vegetable, Tuber and Spice Crops</td>
<td>2+1</td>
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<td>VSC 302</td>
<td>Crop Production in Vegetable Crops</td>
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<td>12.</td>
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<tr>
<td>18.</td>
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<td>Production Technology of Spices and Condiments</td>
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<td>SPC 301</td>
<td>Production Technology of Medicinal and Aromatic Crops</td>
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<td>21.</td>
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### DEPARTMENT OF AGRONOMY

**AGRONOMY**

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<th>Semester</th>
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<tr>
<td>1.</td>
<td>AGR 211</td>
<td>Weed management in Horticultural crops</td>
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<td>AGR 212</td>
<td>Principles of Agro-Climatology and Water Management</td>
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**TOTAL 4+4**

### AGRICULTURAL ENGINEERING

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### DEPARTMENT OF PLANT BREEDING AND GENETICS

**GENETICS AND PLANT BREEDING**

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<tr>
<td>1.</td>
<td>GPB 111</td>
<td>Principles of Genetics and Cytogenetics</td>
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<td>2.</td>
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<td>Principles of Plant Breeding</td>
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<td>GPB 311</td>
<td>Principles of Biotechnology</td>
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**TOTAL 5+3**

### SEED SCIENCE AND TECHNOLOGY

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<tr>
<td>1.</td>
<td>SST 211</td>
<td>Seed Production of Vegetable, Tuber and Spice Crops</td>
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### CROP PHYSIOLOGY

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<tr>
<td>1.</td>
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<td>Introductory Crop Physiology</td>
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### DEPARTMENT OF SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

**SOIL SCIENCE AND AGRICULTURAL CHEMISTRY**

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<td>Introduction to Soil Science</td>
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**TOTAL 3+3**

### BIOCHEMISTRY

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### ENVIRONMENTAL SCIENCE

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### DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

#### AGRICULTURAL ECONOMICS

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<tr>
<td>1.</td>
<td>AEX 211</td>
<td>Fundamentals of Extension Education</td>
<td>2+1</td>
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<td>AEX 302</td>
<td>Entrepreneurship Development</td>
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#### COMPUTER SCIENCE AND STATISTICS

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<td>1.</td>
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<td>Computer Applications in Horticulture</td>
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<td>Applied Statistics</td>
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### DEPARTMENT OF AGRICULTURAL ENTOMOLOGY

#### AGRICULTURAL ENTOMOLOGY

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<td>Fundamentals of Entomology</td>
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<td>Insect Pest of Fruits, Plantation, Medicinal and Aromatic Crops</td>
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<td>Apiculture</td>
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<td>Nematode Management in Horticultural Crops</td>
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### DEPARTMENT OF PLANT PATHOLOGY

#### PLANT PATHOLOGY

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<td>Fundamentals of Plant Pathology</td>
<td>2+1</td>
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<td>2.</td>
<td>PAT 211</td>
<td>Mushroom Culture</td>
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<td>3.</td>
<td>PAT 311</td>
<td>Diseases of Vegetables, Ornamentals and Spice Crops</td>
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<td>4.</td>
<td>PAT 312</td>
<td>Diseases of Fruit, Plantation, Medicinal and Aromatic Crops</td>
<td>2+1</td>
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## AGRICULTURAL MICROBIOLOGY

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<td>Introductory Microbiology</td>
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## EXPERIENTIAL LEARNING COURSES

### EXPERIENTIAL LEARNING - I

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<td>HEL 401</td>
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<td>Composting technology</td>
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<td>HEL 404</td>
<td>Bioinoculants production technology</td>
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### EXPERIENTIAL LEARNING - II

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<th>Course Title</th>
<th>Cr.Hr.</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>HEL 405</td>
<td>Protected Cultivation and Precision Horticulture</td>
<td>0+20</td>
<td>VIII</td>
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<tr>
<td>2.</td>
<td>HEL 406</td>
<td>Nursery production and management</td>
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<td>3.</td>
<td>HEL 407</td>
<td>Post harvest technology and value-addition</td>
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<td>4.</td>
<td>HEL 408</td>
<td>Floriculture and landscape gardening</td>
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A student can opt for any one of the courses mentioned above in VII and VIII semesters.

## NON-CREDIT COURSES

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<thead>
<tr>
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<th>Course Title</th>
<th>Cr.Hr.</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ENG 101</td>
<td>English for Effective Communication</td>
<td>0+1</td>
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<tr>
<td>2.</td>
<td>NCC 101 / NSS 101</td>
<td>National Cadet Corps / National Service Scheme</td>
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<td>3.</td>
<td>PED 101</td>
<td>Physical Education</td>
<td>0+1</td>
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<td>4.</td>
<td>PJN 301</td>
<td>Short Tour</td>
<td>0+1</td>
<td>V</td>
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<tr>
<td>5.</td>
<td>PJN 302</td>
<td>Soft Skills for Employability</td>
<td>0+1</td>
<td>VI</td>
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<td>6.</td>
<td>PJN 401</td>
<td>All India Tour</td>
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**TOTAL 0+7**
# Semester Wise Distribution of Courses

## Semester I

<table>
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<th>Course Title</th>
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<tbody>
<tr>
<td>1.</td>
<td>HOR 101</td>
<td>Fundamentals of Horticulture</td>
<td>2+1</td>
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<tr>
<td>2.</td>
<td>FOR 101</td>
<td>Introductory Agroforestry</td>
<td>1+1</td>
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<tr>
<td>3.</td>
<td>AGM 111</td>
<td>Introductory Microbiology</td>
<td>1+1</td>
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<td>4.</td>
<td>COM 111</td>
<td>Computer Applications in Horticulture</td>
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<td>5.</td>
<td>CRP 111</td>
<td>Introductory Crop Physiology</td>
<td>1+1</td>
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<tr>
<td>6.</td>
<td>GPB 111</td>
<td>Principles of Genetics and Cytogenetics</td>
<td>2+1</td>
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<tr>
<td>7.</td>
<td>SAC 101</td>
<td>Introduction to Soil Science</td>
<td>2+1</td>
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<td>8.</td>
<td>ENG 101</td>
<td>English for Effective Communication*</td>
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<td>NCC 101 / NSS 101</td>
<td>National Cadet Corps* / National Service Scheme*</td>
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<td>10.</td>
<td>PED 101</td>
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**TOTAL** 9+10 = 19

*Non-credit courses continued from First semester

## Semester II

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<td>HOR 102</td>
<td>PlantPropagation and Nursery Management</td>
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<td>FSC 101</td>
<td>Orchard Management</td>
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<td>3.</td>
<td>FSC 102</td>
<td>Production Technology of Tropical and Sub Tropical Fruits</td>
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<td>4.</td>
<td>VSC 101</td>
<td>Production Technology of Tropical and Sub Tropical Vegetables</td>
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<td>5.</td>
<td>AEG 101</td>
<td>Farm Power and Machinery</td>
<td>1+1</td>
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<tr>
<td>6.</td>
<td>AEN 111</td>
<td>Fundamentals of Entomology</td>
<td>2+1</td>
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<td>7.</td>
<td>PAT 111</td>
<td>Fundamentals of Plant Pathology</td>
<td>2+1</td>
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<td>8.</td>
<td>BIC 101</td>
<td>Fundamentals of Biochemistry</td>
<td>2+1</td>
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<td>9.</td>
<td>AEC 101</td>
<td>Principles of Agricultural Economics</td>
<td>1+1</td>
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<td>10.</td>
<td>NCC 101 / NSS 101</td>
<td>National Cadet Corps* / National Service Scheme*</td>
<td>0+1</td>
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<td>11.</td>
<td>PED 101</td>
<td>Physical Education*</td>
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**TOTAL** 14+9 = 23

*Non-credit courses continued from First semester*
### SEMESTER III

<table>
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<th>Course Title</th>
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<tbody>
<tr>
<td>1.</td>
<td>FLG 201</td>
<td>Commercial Floriculture</td>
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<td>2.</td>
<td>FSC 201</td>
<td>Production Technology of Temperate Fruit Crops</td>
<td>1+1</td>
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<tr>
<td>3.</td>
<td>SPC 201</td>
<td>Production Technology of Plantation Crops</td>
<td>2+1</td>
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<tr>
<td>4.</td>
<td>SPC 202</td>
<td>Production Technology of Spices and Condiments</td>
<td>2+1</td>
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<tr>
<td>5.</td>
<td>VSC 201</td>
<td>Production Technology of Temperate Vegetable Crops</td>
<td>1+1</td>
</tr>
<tr>
<td>6.</td>
<td>AEX 211</td>
<td>Fundamentals of Extension Education</td>
<td>2+1</td>
</tr>
<tr>
<td>7.</td>
<td>AGR 211</td>
<td>Weed Management in Horticultural Crops</td>
<td>1+1</td>
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<tr>
<td>8.</td>
<td>GPB 211</td>
<td>Principles of Plant Breeding</td>
<td>2+1</td>
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<tr>
<td>9.</td>
<td>SAC 211</td>
<td>Soil, Plant and Water Analysis</td>
<td>0+1</td>
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<tr>
<td>10.</td>
<td>NCC 101 / NSS 101</td>
<td>National Cadet Corps* / National Service Scheme*</td>
<td>0+1</td>
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<tr>
<td>11.</td>
<td>PED 101</td>
<td>Physical Education*</td>
<td>0+1</td>
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**TOTAL 13+9 = 22**

* Non-credit courses continued from First semester

### SEMESTER IV

<table>
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<tbody>
<tr>
<td>1.</td>
<td>FLG 202</td>
<td>Ornamental Horticulture</td>
<td>2+1</td>
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<tr>
<td>2.</td>
<td>FSC 202</td>
<td>Breeding of Fruit and Plantation Crops</td>
<td>2+1</td>
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<tr>
<td>3.</td>
<td>FSN 211</td>
<td>Fundamentals of Food Technology</td>
<td>1+1</td>
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<tr>
<td>4.</td>
<td>AEN 211</td>
<td>Insect Pest of Fruits, Plantation, Medicinal and Aromatic Crops</td>
<td>2+1</td>
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<td>5.</td>
<td>AGR 212</td>
<td>Principles of Agro-Climatology and Water Management</td>
<td>1+1</td>
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<td>STA 201</td>
<td>Applied Statistics</td>
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<td>7.</td>
<td>ANM 211</td>
<td>Nematode Management in Horticultural Crops</td>
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<td>PAT 211</td>
<td>Mushroom Culture</td>
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<td>SST 211</td>
<td>Seed Production of Vegetable, Tuber and Spice Crops</td>
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<td>NCC 101 / NSS 101</td>
<td>National Cadet Corps* / National Service Scheme*</td>
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<td>11.</td>
<td>PED 101</td>
<td>Physical Education*</td>
<td>0+1</td>
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**TOTAL 12+9 = 21**

* Non-credit courses continued from First semester
## SEMESTER V

<table>
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<tbody>
<tr>
<td>1.</td>
<td>HOR 301</td>
<td>Growth and Development of Horticultural Crops</td>
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<tr>
<td>2.</td>
<td>FLG 301</td>
<td>Principles of Landscape Gardening</td>
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<td>3.</td>
<td>SPC 301</td>
<td>Production Technology of Medicinal and Aromatic Crops</td>
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<td>4.</td>
<td>VSC 301</td>
<td>Breeding of Vegetable, Tuber and Spice Crops</td>
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<td>5.</td>
<td>VSC 302</td>
<td>Crop Production in Vegetable Crops</td>
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<td>AEN 311</td>
<td>Apiculture</td>
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<td>AGR 311</td>
<td>Introduction to Major Field Crops</td>
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<td>GPB 311</td>
<td>Principles of Biotechnology</td>
<td>1+1</td>
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<td>PAT 311</td>
<td>Diseases of Vegetables, Ornamentals and Spice Crops</td>
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<td>SAC 311</td>
<td>Soil Fertility and Nutrient Management</td>
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<td>PJN 301</td>
<td>Short Tour *</td>
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**TOTAL** 10+11 = 21

* Non-credit course

## SEMESTER VI

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<tr>
<td>1.</td>
<td>HOR 302</td>
<td>Post Harvest Management of Horticultural Crops</td>
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<td>2.</td>
<td>FLG 302</td>
<td>Breeding and Seed Production of Ornamental Plants</td>
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<td>3.</td>
<td>FSN 311</td>
<td>Processing of Horticultural Crops</td>
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<td>AEC 311</td>
<td>Horti - Business Management</td>
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<td>AEN 312</td>
<td>Insect Pests of Vegetables, Ornamental and Spice Crops</td>
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<td>AGR 312</td>
<td>Organic Farming in Horticultural Crops</td>
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<td>ENS 301</td>
<td>Environmental Science</td>
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<td>PAT 312</td>
<td>Diseases of Fruit, Plantation, Medicinal and Aromatic Crops</td>
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<td>AEX 302</td>
<td>Entrepreneurship Development</td>
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<td>PJN 302</td>
<td>Soft Skills for Employability *</td>
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**TOTAL** 13+10 = 23

* Non-credit course
### SEMESTER VII

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<th>Course Title</th>
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<td>1.</td>
<td>HOR 411</td>
<td>Rural Horticultural Work Experience</td>
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<td>HEL XXX</td>
<td>Experiential Learning – I</td>
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<td>PJN 401</td>
<td>All India Tour *</td>
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**TOTAL 0+20 = 20**

* Non-credit course

### SEMESTER VIII

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<tbody>
<tr>
<td>1.</td>
<td>HEL XXX</td>
<td>Experiential Learning – II</td>
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**TOTAL 0+20 = 20**

### ABSTRACT

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<th>Semester</th>
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**TOTAL 71 98 169**
I SEMESTER COURSES
HOR 101  FUNDAMENTALS OF HORTICULTURE  2+1

Theory

Unit I: Basics of Horticulture

Economic importance and classification of horticultural crops and their culture and nutritive value, area and production, exports and imports, fruit and vegetable zones of India and of different states, nursery management practices, soil and climate.

Unit II: Orchard and kitchen garden layout

Vegetable gardens, nutrition and kitchen garden and other types of gardens – principles, planning and layout, management of orchards, planting systems and planting densities.

Unit III: Nursery and canopy management

Production and practices for fruit, vegetable and floriculture crops, nursery techniques and their management. Principles and methods of pruning and training of fruit crops.

Unit IV: Cropping systems and orchard management

Types and use of growth regulators in horticulture, water management, weed management, fertility management in horticultural crops, cropping systems, intercropping, multi-tier cropping, mulching, bearing habits, factors influencing the fruitfulness and unfruitfulness.

Unit V: Rejuvenation of orchards and organic farming

Rejuvenation of old orchards, top working, frame working, principles of organic farming.

Practical

Features of orchard, planning and layout of orchard, tools and implements, layout of nutrition garden, preparation of nursery beds for sowing of vegetable seeds, digging of pits for fruit plants, planting systems, training and pruning of orchard trees, preparation of fertilizer mixtures and field application, preparation and application of growth regulators, layout of different irrigation systems, identification and management of nutritional disorder in fruits and vegetables, assessment of bearing habits, maturity standards, harvesting, grading, packaging and storage.

References

FOR 101  INTRODUCTORY AGROFORESTRY  1+1

Theory
Unit I
Definition of Forest – Indian forest – Status – Classification of forest and forestry – Role of forest – Silvics and silviculture – Locality factors – Regeneration factors

Unit II

Unit III

Unit IV
Social forestry concepts and applications -JFM- TNAP concept- Difference between social forestry and agroforestry- Agroforestry and social forestry projects- National- Overseas.

Unit V
Selection of tree species for Agroforestry - Choice of species - Modern silvicultural techniques in site selection- Land preparation- Planting- Tending and cultural operation- Economics of cultivation in Multipurpose Tree Species (MTP) viz., Acacia catechu, Dalbergia sissoo, Tectona grandis, Populus spp, Morus spp, Grewia asiatica, Eucalyptus spp, Quercus spp, Bamboo, Tamarind, Neem, Melia dubia

Practical
Identification of seeds and seedlings of multipurpose tree species - Nursery practices for poplar, Grewia optiva, Morus alba, Acacia catechu, Dalbergia sissoo, Robinia, Leucaena etc. Visit to agro-forestry fields to study the compatibility of MPTS with agricultural crops:
silvipastoral - Alley cropping - Horti-silviculture- Agro-silvipasture - Fuel and fodder blocks.
Visit to social forestry plantations – Railway line plantations - Canal plantations - Roadside plantations - Industrial plantations and shelterbelts - Rapid assessment of farmers needs for green manure, fodder, fuel wood in selected villages - Economics and marketing of products raised in agro-forestry systems.

References


AGM 111 INTRODUCTORY MICROBIOLOGY 1+1

Theory
Unit I: History and Scope of Microbiology
Contributions of Anton Von Leeuwenhoek, Louis Pasteur, John Tyndall, Robert Koch, Edward Jenner, Joseph Lister, Beijerinck, Winogradsky and Waksman; Position of microorganisms in living world; Spontaneous Generation theory; Germ theory of disease.

Unit II: Microscopy
Microscopy – principles and types; Compound Microscopes - Bright field, Dark field, Fluorescent and Phase contrast Microscopes; Electron Microscopes
Unit III: Microbial physiology
Prokaryotes Vs Eukaryotes; Bacterial size, shape, arrangement and morphology; Structure and organization of a bacterial cell; Bacterial growth, reproduction; Growth curve.

Unit IV: Virology and Microbial Genetics
Viruses, Bacteriophages – Lytic and Lysogenic cycles; Genetic recombination – Transformation, Conjugation and Transduction.

Unit V: Soil and Applied Microbiology
Microbial interactions; Organic matter decomposition; C:N ratio; Biological nitrogen fixation; Types and importance of biofertilizers.

Practical
Microscopy - light microscopes; Staining techniques - simple and differential staining; Sterilization – Principles and techniques, equipment and apparatus used for sterilization; Media preparation; Isolation and enumeration of soil microorganisms; Purification of microorganisms; morphological and biochemical characters of bacteria. Organic matter decomposition – measurement of CO2 evolution; Demonstration of antibiosis. Isolation of N2 fixing and phosphate solubilizing microorganisms; Mass production of bacterial biofertilizers; Quality control and method of application.

References

COM 111 COMPUTER APPLICATIONS IN HORTICULTURE 0+1

Unit I
Introduction to Computers: Hardware, Software, FOSS, Block diagram of a computer system, Random Access Memory, Hard disks, Input devices, Output devices  Introduction to Internet – Browsers, Browsing World Wide Web through hyperlink, HTML, Email, CC, BCC,

Unit II

Introduction to Word processing software - Using MsWord / LibreOffice Writer / equivalent - Creating, editing, saving document, changing font, font size, font color, bold, italic, underline, align left, right, center, justify, cut, copy, paste Introduction to Electronic spreadsheet software - Using MsExcel / LibreOffice Calc / equivalent - Creating, editing, saving spreadsheet, formula, creating graphs Introduction to Presentation software - Using Ms Powerpoint / LibreOffice Impress / equivalent - Creating slide, animation, & transition Introduction to Database software Using MsAccess / LibreOffice Base / equivalent – Using wizard create Tables, Queries, Forms and Reports

Unit III


Unit IV

Introduction to Multimedia - Audio Editing – Using Audacity / equivalent – Import/Open audio file, Export/Save audio file to different format, Export/Save selection of audio file, Merge 2 audio files Introduction to Multimedia – Video Editing – Using Avidemux / equivalent – Import/Open video file, Export/Save video file to different format, Export/Save selection of video file, Add black border to video, Merge 2 video files

Unit V

Introduction to Statistical Analysis software R - Using R / equivalent - R Console, R Prompt > , q(), getwd(), Assignment operator = or <-, objects() , Saving workspace using save.image(), Loading workspace using load(), Diverting output using sink(), Import dataset from clipboard to dataframe using read. table(), Edit dataset using fix() function, data(), Stacked and Unstacked data form Statistical Analysis using R software - Using R / equivalent - Sum, Mean, Standard deviation, Descriptive Statistics, Correlation, Covariance, t test, ANOVA

References
Theory

Unit I: Water Relations in Plants

Unit II: Plant Nutrition
Essentiality of nutrients – Arnons and Leibieg; classification – based on requirement, biochemical function and mobility in plants – macro, secondary and micronutrients; Mechanism of absorption and its role in plant metabolism. Deficiency and toxicity symptoms; sand, hydroponics and aeroponic culture; Foliar nutrition and fertigation – significance and relevance.

Unit III: Photosynthesis
Photosynthesis – significance - structure and function of chloroplast; Electromagnetic radiation - Photosynthetically active radiation – resonance transfer; dark
and light reactions, cyclic and non-cyclic electron transfer, \( \text{CO}_2 \) fixation – \( \text{C}_3, \text{C}_4 \) and CAM metabolism, advantages of \( \text{C}_4 \) pathway. Photorespiration and its implications, factors affecting photosynthesis.

**Unit IV: Phytohormones**

Physiological role hormones – precursor - Auxin, Cytokinin, Gibberellic acid, Abscisic acid and Ethylene in controlling plant processes – uses in crop productivity; New generation growth regulators – Brassinosteroids – triacontanol; Growth retardants – their uses in crop productivity.

**Unit V: Stress Physiology**

Different types of Abiotic stresses - water stress - deficit and excess - physiological changes – adaptation – drought escape, avoidance and tolerance; Temperature stress - Physiological changes - low and high temperature – adaptation – mechanism of tolerance; Cold stress - Chilling and freezing injury – tolerance; Salt stress - physiological changes- adaptation – extrusion, compartmentalization and exclusion - mechanism of tolerance.

**Practical:**

Solution preparation; Measurement of water potential, osmosis, root pressure, structure of the stomata, Distribution, opening and closing of the stomata, measurement, transpiration measurement Nutritional disorders - Importance of light and chlorophyll in photosynthesis, pigment identification in horticultural crops and studying the enzyme activity of catalase, estimation of phenols, bioassay for hormones, estimation of tolerance indices – proline, Chorophyll stability index.

**References**


**GPB 111 PRINCIPLES OF GENETICS AND CYTOGENETICS 2+1**

**Unit I: Mendelian laws and its modifications**

Definition of genetics, heredity, inheritance, cytology, cytogenetics; Brief history of developments in genetics and cytogenetics; Terminologies - gene, allele, locus, homozygous, heterozygous, hemizygous, genotype, phenotype, monohybrid, dihybrid, trihybrid, polyhybrid; Pre-Mendelian ideas about heredity- Preformation theory, Lamarck’s theory,
Darwin’s theory, Germplasm theory and Mutation theory; Work of Mendel – characters studied, reasons for Mendel’s success, laws of heredity, rediscovery of Mendel’s work; Physical basis of heredity- chromosomal theory of inheritance, Morgan’s work; Deviation from Mendelian inheritance: Allelic interactions – dominance vs. recessive, complete dominance, codominance, incomplete dominance, over dominance; Non allelic interaction - interaction without modification in Mendelian ratio – Batson and Punnet’s experiment on fowl comb shape. Non allelic interaction with modification in Mendelian ratio – i.) Dominant epistasis (12:3:1) ii.) Recessive epistasis (9:3:4) iii.) Duplicate and additive epistasis (9:6:1). iv.) Duplicate dominant epistasis (15:1) v) Duplicate recessive epistasis (9:7) vi.) Dominant and recessive epistasis (13:3); Lethal genes, Pleiotrophy, penetrance and expressivity, phenocopy: Multiple alleles- blood group in humans, coat colour in rabbits, self incompatibility in plants; pseudo alleles, isoalleles.

Unit II: Quantitative inheritance, Linkage and Crossing over

Quantitative inheritance – multiple factor hypothesis of Nilsson Ehle, Polygenes and their features, transgressive segregation, comparison of quantitatively and qualitatively inherited characters, modifiers; Linkage - coupling and repulsion theory of Bateson and Punnet, chromosomal theory of linkage of Morgan, complete and incomplete linkage, linkage group; Crossing over – significance of crossing over; cytological proof for crossing over of Stern’s experiment, strength of linkage and recombination, two point and three point test cross, double cross over, interference and coincidence, genetic map.

Unit III: Sex determination, sex linkage and cytoplasmic inheritance

Sex determination- autosomes and allosomes, chromosomal theory of sex determination and different types, geneic balance theory of Bridges, barr bodies, metabolic differentiation theory; Gynandromorphs – sex reversal; Sex linked inheritance – cris cross inheritance, reciprocal difference, sex influenced and sex limited inheritance, holandric genes; Sex determination in plants – Melandrium, papaya, maize. Cytoplasmic inheritance and maternal effects – features of cytoplasmic inheritance, chloroplast, mitochondrial, plastid colour in *Mirabilis jalapa*, iojap gene of maize, cytoplasmic male sterility in rice, kappa particles of paramecium; plasmid and episome.

Unit IV: Cytogenetics

Structure and function of cell and cell organelles, differences between prokaryotes and eukaryotes; Cell division – mitosis, meiosis and their significance, cell cycle; Chromosome structure- centromere, telomere, euchromatin, heterochromatin, NOR, satellite chromosome, karyotype, ideogram, chromosome banding; Types of chromosomes based on position of centromere, based on structure and function; Special chromosomes - polytene, lampbrush, B, ring and isochromosomes; Chromosomal aberration - deletion, duplication, inversion and translocation, genetic and cytological implications; Variation in chromosome number – euploid, aneuploid, types of aneuploids and their origin; nondisjunction, types of euploids and their origin, monoploid, polyploid - auto and allopolyplods, their characters; meaning of genome; evolution of wheat, Triticale, cotton, tobacco, Brassicas.
Unit V: Molecular genetics

DNA, the genetic material – Griffith’s experiment, experiment of Avery, McCleod and McCarthy, confirmation by Hershey and Chase; RNA as genetic material – Frankel, Conrat and Singer experiment; Structure of DNA – Watson and Crick model, central dogma of life; DNA replication- models of DNA replication, proof for semi conservative method of DNA replication, steps involved in DNA replication; RNA types - mRNA, tRNA, rRNA; Gene expression- transcription, translation, genetic code, protein synthesis; Regulation of gene expression – operon model of Jacob and Monad, structural genes and regulator genes, operon; Cistron, muton and recon; Split genes- exons, introns; Mobile genetic elements-transposable elements, transposans, jumping genes.

Practical


References


SAC 101 INTRODUCTION TO SOIL SCIENCE 2+1

Theory

Unit I: Soil definition and formation

Soil: Pedological and edaphological concepts, Origin of the earth, Earth’s crust; Composition: Formation and classification of Rocks and minerals. Weathering, Soil forming factors and processes. Components of soils; Soil profile.
Unit II: Soil physical properties

Soil physical properties, Soil texture, Textural classes, Particle size analysis, Soil structure Classification, Soil aggregates, evaluation of soil structure and its significance, Bulk density and particle density of soils & porosity, their significance and manipulation, Soil consistency, soil crusting, Soil compaction, Soil Colour, Soil water- Retention and potentials, Soil moisture constants, Movement of soil water, Infiltration, percolation, permeability, conductivity, Drainage, Methods of determination of soil moisture. Thermal properties of soils, Soil temperature, Soil air, Gaseous exchange, Influence of soil temperature and air on plant growth.

Unit III: Soil Chemical properties


Unit IV: Soil organisms

Soil biology, Biomass, Soil organisms and their beneficial and harmful roles.

Unit V: Soil Survey

Soil survey- types and methods, soil classification, soil taxonomy, and soils of India and Puducherry.

Practical


References

ENG 101  ENGLISH FOR EFFECTIVE COMMUNICATION  0+1

Practical
Introduction to listening, - kinds of listening, process of listening, - listening mechanism - listening TOEFL, IELTS, BEC.

Reading: skimming, scanning,SQ3R, intensive reading, extensive reading, critical reading, Cloze texts for integrated grammar and vocabulary, including subtle differences between synonyms, Reading comprehension texts for civil service exams, Bank P.O. exams, IELTS, TOEFL and GRE

English phonemes – stress, intonation and rhythm - genres of speaking, techniques of speaking – public speaking (welcome address, vote of thanks, extempore talk)

Mechanics of writing, writing genres, five types of writing, précis paragraph writing, Essay writing- issue- based writing and argument based writing

Note-taking, note- making, summarizing, brainstorming and simulation

References
2. Steven Brown and Dorokyn Smith 2006. Active Listening: CUP, U.K.

NCC 101  NATIONAL CADET CORPS  0+1

Specialised subject – Navy - Naval Orientation - Naval communication - Navigation - Seamanship - Oceanic wealth-Gunnery - Fire Fighting and Damage control and Safety - Ship and Boat modeling - Submarine-Search and Rescue – Antisubmarine - Swimming

**NSS 101 NATIONAL SERVICE SCHEME 0+1**


**PED 101 PHYSICAL EDUCATION 0+1**

Exercises for strength, agility, co-ordination, flexibility, co-operation, vital capacity endurance, speed and for various systems of our body and team spirit.

Exercise for Good Posture – Conditioning and calisthenics for various Athletic activities *i.e* (a) Before start – Arm stretch, hand stretch and cat stretch (b) Loosening up jogging, bending and twisting (c) Standing – Lateral Arc, triangle and hands to feet pose (d) Sitting – camel kneel, spinal twist and supine knee bend (e) Relaxation – The corpse pose, quick and deep relaxation. Basic gymnastic exercises – participation of athletic events – running, throwing and jumping events.

Skill development in anyone of the following games

Warming up, suitable exercise, lead up games, advance skill for all the games.

**Basket Ball:** Dribbling, pass, two or three men pass, pivot, lay up shot, shooting, pass break, hook pass, screening, positional play, defence and offence tactics.

**Volley Ball:** Fingering, under arm pass, over head pass, setting, spiking, back pass, jump pass, stunts, elementary dive, flaying dive, roll, blacking and various types of services.

**Ball Badminton:** Grip, service, foot work, fore hand stroke, back hand stroke, lob, smash, volley, wall practice, spin service and defence tactics.
Foot ball: Dribbling, passing, dodging, kicking, heading, screening, chest pass, throwing, dragging, goal kick, defence and offence tactics.

Hockey: Grip, bully, dribbling, hitting, drive, push strokes, scoop, flick, stopping, various types of passes, dodging, defence and offence tactics.

Kho-Kho: Quadra ped, bi-ped, how to given kho, taking a direction, recede, parallel toe method, bullet tow method, distal method, foot out, dive, ring game, chains and persue and defence skills.

Chess: Moves, move of king, move of pawns, move of rooks, move of bishops, move of queen, move of knights, en passant, castling, check and notation.

Kabaddi: Raid, touch, cant, catch, struggle, various types of defence and offence tactics.

Cricket: Grip, bowling, spin, leg spin, off spin, medium, batting, dive, sweep, mode of delivery, fielding, rolling etc.

Tennis: Grip, forehand drive, back hand drive, stroke, backhand ground stroke, service, volley, smash, wall practice, foot work, defence and offence tactics.

Table Tennis: Grip, tossing and serving, spin serve, rally, smash, flick, defence and offence tactics.

Shuttle Badminton: Grip, foot work, service, setting, smash, volley, forehand and back hand stroke, back hand serve and defence.

Gymnastics: Balanced walk, execution, floor exercise, tumbling/acrobatics, grip, release, swinging, parallel bar exercise, horizontal bar exercise, flic-flac-walk and pyramids.

ATHLETICS

(a) Sprint: Medium start, long start, bunch start, set, pick up, finish, upsweep, downsweep, placement, receiving and exchanging.

(b) Jumps: Western roll, belly roll, eastern cut off, fass ferry flop, approach, take off, straddle, hitch-kick, hanging, clearance, landing, strides etc.

(c) Throws: Grip, momentum, pre shift, sub phase, the wind up, foot work, entry to the turn, shift, angle of release, follow throw, delivery, front cross step, rear cross step, hop step, fuck method pary obraine, discoput, rotation, carry and glide.

(d) Hurdles: Finding lead leg, use of lead leg and trial leg, flight, clearing, finish.

Lead up games, advance skills and game for any one of the above games.

Rules and regulations of anyone of the games and athletic events.

Fundamentals of Yoga

Introduction, Definition, Stages of Yoga, Benefits of Yoga

Asanas

Backward Bending Asanas (10 asanas); Forward Bending Asanas (10 asanas); Twisting Asanas (10 asanas); Inversion Asanas (10 asanas); Seated Asanas (10 asanas); Balancing Asanas (10 Asanas); Suryanamaskar

Aspects to be covered in each and every asana: Warm – up and preparation techniques, steps, breathing methods, approach to final postures, variation, modifications, benefits, contraindications, injury prevention.
Pranayamas

Nadi Shuddi Pranayama, Anuloma Viloma Pranayama, Seetkari Pranayama, Seetali Pranayama, Sadanta Pranayama, Bhashrika Pranayama, Ujjayi Pranayama, Moorcha Pranayama, Plavini Pranayama

Mudras

Aswini Mudra, Yoga Mudra, Maha Mudra, Shanmukhi Mudra, Veepareetha Karani Mudra.
II SEMESTER COURSES
Theory
Unit I: Basics of Propagation
   Need and potentialities for plant multiplication, sexual and asexual methods of propagation, advantages and disadvantages.

Unit II: Seed dormancy mechanism
   Seed dormancy (scarification & stratification) internal and external factors, nursery techniques, apomixis – monoembryony, polyembryony, chimera and bud sport.

Unit III: Propagation Structures and growth regulators
   Mist chamber, humidifiers, greenhouses, glasshouses, cold frames, hot beds, poly houses, nursery (tools and implements), use of growth regulators in seed and vegetative propagation

Unit IV: Asexual propagation methods
   Methods and techniques of cutting, layering, grafting and budding, physiological & bio chemical basis of rooting, factors influencing rooting of cuttings and layering, graft incompatibility. Anatomical studies of bud union, selection and maintenance of mother trees, collection of scion wood stick, scion-stock relationship, and their influences, bud wood certification, techniques of propagation through specialized organs, corm, runners, suckers.

Unit V: Micro Propagation

Practical
References


FSC 101  ORCHARD MANAGEMENT  1+1

Theory

Unit I

Definition- Importance - Objectives of orchard management - Merits and Demerits - Selection of location and site - Nature of soil and subsoil - Planning of suitable kinds and varieties of fruits-Proper planting distance and purchasing of plants from reliable nurseries.

Unit II


Unit III

Soil management in relation to nutrient and water uptake - Effects on soil environment and moisture- Relation to soil properties and soil environment

Unit IV

Integrated nutrient management - Other integrated management in horticulture crops

Unit V

Crop regulation and quality crop - manual thinning, chemical thinning, selective harvesting, training, summer and winter pruning.
Practical

Planning and layout of orchard-Orchard components- Records maintenance in orchard- Planting and lay out of different planting systems of orchard - Study of clean cultivation - Inter-cropping systems in orchards - Visit to different local fruit orchards - Use of organic and inorganic mulches in orchards - Observations on weed growth under different systems of management - Use of different herbicides in orchards – irrigation systems in orchards.

References
7. Jitendra Singh – Scientific Fruit culture - Basic Horticulture

FSC 102 PRODUCTION TECHNOLOGY OF TROPICAL AND 2+1 SUB TROPICAL FRUITS

Theory

Unit I

Definition of Horticulture – Importance of Horticulture – Horticultural classification of fruits- Climatic Zones of horticultural crops – Scope and importance of tropical and subtropical fruits cultivation – Overview on global, national and regional level – Area, production and export potential – Horticultural zones of India and Tamil Nadu with emphasis on tropical and sub tropical fruits.

Unit II

Unit III

Composition and uses – Origin and distribution – Species and cultivars – Varieties
Soil and climatic requirements – Propagation techniques – Main field preparation – Spacing
Planting – Planting density and cropping systems – After care – Nutrients, Water and Weed
management – Training and Pruning – Flowering – Pollination and Fruit set – Use of plant
growth regulators – Physiological disorders and remedies – Maturity indices and harvest –
Post harvest handling – Ripening and Storage – production constraints of: Pomegranate,
Pineapple, Avocado, Mangosteen, Litchi, Carambola, Durian and Passion fruit.

Unit IV

Composition and uses – Origin and distribution – Species and cultivars – Varieties
Soil and climatic requirements – Propagation techniques – Main field preparation – Spacing
Planting – Planting density and cropping systems – After care – Nutrients, Water and Weed
management – Training and Pruning – Flowering – Pollination and Fruit set – Use of plant
growth regulators – Physiological disorders and remedies – Maturity indices and harvest –
Post harvest handling – Ripening and Storage – production constraints of: Ber, Aonla,
Annona, Bael.

Unit V

Composition and uses – Origin and distribution – Species and cultivars – Varieties
Soil and climatic requirements – Propagation techniques – Main field preparation – Spacing
Planting – Planting density and cropping systems – After care – Nutrients, Water and Weed
management – Training and Pruning – Flowering – Pollination and Fruit set – Use of plant
growth regulators – Physiological disorders and remedies – Maturity indices and harvest –
Post harvest handling – Ripening and Storage – production constraints of Carissa, Date palm,
Phalsa, Fig.

Practical

Description and identification of varieties of Mango, banana and grapes, citrus,
papaya, sapota, guava, pine apple, pomegranate, avocado, litchi, jack fruit, passion fruit,
carambola, durian and mangosteen and minor fruits; arid zone and semi-arid zone fruits.
Training and Pruning of Grapes, Mango, Guava and Citrus. Pre-treatment of Banana suckers
and de-suckering in Banana - sex forms in Papaya.

Use of plastics in fruit production - Visit to commercial orchards and cold storage
units - Manure and fertilizer application in different fruit crops Use of growth regulators
and its application in fruit crops. Seed production in Papaya, latex extraction and
preparation of crude papain Post harvest handling and production economics for tropical
and sub-tropical fruits.

References

   Naya Udyog, Calcutta.
   New Delhi.

VSC 101 PRODUCTION TECHNOLOGY OF TROPICAL AND SUB TROPICAL VEGETABLES

Theory
Area, production, economic importance and export potential of tropical and sub-tropical vegetable crops. Description of varieties and hybrid, climate and soil requirements, seed rate, preparation of field, nursery practices; transplanting of vegetable crops and planting for directly sown/transplanted vegetable crops. Spacing, planting systems, water and weed management; nutrient management and deficiencies, use of chemicals and growth regulators. Cropping systems, harvest, yield and seed production. Economics of cultivation of tropical and sub-tropical vegetable crops; post-harvest handling and storage. Marketing of tomato, brinjal, chillies, sweet pepper, okra, amaranthus, cluster beans, vegetable cowpea, lab-lab, snap bean, cucurbits, tapioca, sweet potato, yam, dioscorea, colocasia, Onion, moringa, portulaca and basella, chekkurmanis.

Unit I
Tomato, brinjal, chilli and sweet pepper

Unit II
Okra, cowpea, cluster bean, lab lab and snapbean.

Unit III
Cucurbitaceous crops

Unit IV
Tapioca, sweet potato, yam, dioscorea, colocasia and Onion
Unit V
Moringa, amaranthus, basella and portulaca

Practical
Identification and description of tropical and sub-tropical vegetable crops; nursery practices and transplanting, preparation of field and sowing/planting for direct sown and planted vegetable crops. Herbicide use in vegetable culture; top dressing of fertilizers and interculture; use of growth regulators; identification of nutrient deficiencies. Physiological disorder. Harvest indices and maturity standards, post-harvest handling and storage, marketing, seed extraction (cost of cultivation for tropical and sub-tropical vegetable crops), project preparation for commercial cultivation.

References
Selection of tractors and cost of tractor power - Tractor and implement selection for different agricultural operations

**Unit II: Tillage implements**
Tillage implements - primary and secondary tillage implements - ploughing methods - Field capacity and field efficiency.

**Unit III: Sowing and planting machinery**
Sowing methods - seed drills, seed cum fertilizer drills - implements for intercultural operations - wet land equipment - Paddy transplanters - field and nursery requirements

**Unit IV: Plant protection equipments**
Plant protection equipments - sprayer - dusters - their functions, classification - operation and maintenance.

**Unit V: Harvesting machinery**

**Practical**
Study of different components of IC engine, four stroke petrol engine, two stroke petrol engine. Study of MB plough, disc plough, seed-cum-fertiliser drills, their mechanisms. Operation of tractor and implements - operation and maintenance power tiller - Study of different inter-cultivation equipments - Sprayers and dusters - their operation, repairs and adjustment - Harvester for paddy, sugarcane and horticultural crops - Field capacity and cost analysis

**References**
1. Nakra C.P 1970. Farm Machinery and equipment,: Dhanpat Rai & Son

**AEN 111**
**FUNDAMENTALS OF ENTOMOLOGY**

**Theory**
**Unit I: History and importance**
Entomology as a science - its importance in Agriculture. History of Entomology in India, Position of insects in the animal kingdom and their relationship with other classes of
Arthropoda, Reasons for insect dominance.

Unit II: Morphology
General organisation of insect body wall - structure and function, cuticular appendages, moulting. Body regions - insect head, thorax and abdomen, their structures and appendages

Unit III: Anatomy and physiology

Unit IV: Taxonomy of apterygota and exopterygota
Taxonomy, Classification and nomenclature of insects. Distinguishing characters of agriculturally important orders and families of Apterygotes - Collembola and Thysanura, Exopterygotes - Ephemeroptera, Odonata, Orthoptera, Phasmida, Dictyoptera, Embioptera, Dermaptera, Hemiptera, Isoptera, Psocoptera, Mallophaga, Siphunculata and Thysanoptera.

Unit V: Taxonomy of endopterygota
Distinguishing characters of agriculturally important families of Lepidoptera, Coleoptera, Diptera, Hymenoptera, Siphonaptera, Strepsiptera and Neuroptera.

Practical

References
Theory
Unit I: Plant Pathogenic Organisms


Unit II: Phylogenetic Classification of Fungi


Unit III: Bacteria, Viruses, Viroids, Algae and Phanerogamic parasites


Unit IV: Plant Disease Epidemiology

Epidemiology of crop diseases - Types of disease epidemics - Role of host, pathogen and weather factors in disease epidemics - Disease surveillance, Assessment and forecasting - Methods of forecasting and assessment
Unit V: Plant Disease Management


Practical

Familiarity with lab and field equipments – Isolation and Identification of Plant pathogens – Koch Postulates - General characters of fungi - Study of Disease symptoms / Signs, Systematic position, Important taxonomic characters and Host parasite relationship of Plasmodiophora (Club root), Spongospora (Powdery scab), Synchytrium (Wart), Pythium (Damping off), Phytophthora (Late blight and Bud rot), Albugo (White blister), Plasmopara, Peronospora, Pseudoperonospora (Downy mildew), Rhizopus (Fruit rot), Taphrina (Leaf curl), Protomyces (Stem gall), Capnodium (Sooty mould), Mycosphaerella (Leaf spot), Lewia (Leaf blight), Botryosphaeria (Die back and stem end rot), Venturia (Scab), Talaromyces (Mould), Erysiphe, Leveillula, Phyllactinia Uncinula, Podosphaeria and Sphaerethca (Powdery mildew), Nectria (Wilt), Verticillium (Wilt), Glomerella (Anthracnose), Pestalosphaeria (grey blight), Macrophomina (Dry root rot), Puccinia, Uromyces, Hemileia (Rust), Urocystis, Ustilago (Smut), Ganoderma (Basal stem rot), Exobasidium (Blister blight), and Athelium (Wet root rot), Symptoms of plant Bacterial, Candidatus Phytoplasmal, Spiroplasmal, Fastidious vascular bacterial, Viral, Viroids, Algal diseases and Phanerogamic parasitic plants - Various groups of fungicides and antibiotics - Preparation of Bordeaux mixture and Bordeaux paste - fungicidal spray solution – Methods of application - Production of immunized seedlings in citrus – Mass production and Methods of application of Biological control agents – Trichoderma and Pseudomonas - Preparation of botanical extracts, neem based extracts and antiviral principles - Survey and assessment of plant diseases.

References


BIC 101          FUNDAMENTALS OF BIOCHEMISTRY         2+1

Theory

Unit I: Carbohydrates

Unit II: Lipids

Unit III: Proteins and Enzymes

Unit IV: Metabolism
Unit V: Secondary metabolites

Secondary metabolites - occurrence, classification and functions of phenolics, terpenes and alkaloids. Applications of secondary metabolites in food and pharma industries.

Practical


References


AEC 101 PRINCIPLES OF AGRICULTURAL ECONOMICS 1+1

Theory

Unit I: Nature and Scope of Economics

Unit II: Theory of Consumption


Unit III: Theory of Production


Unit IV: Theory of Distribution


Unit V: Macroeconomic Concepts


Practical


References

New Delhi.
III SEMESTER COURSES
Theory
Unit I

Unit II

Unit III

Unit IV

Unit V

Practical
Botany – description and identification of species and varieties in rose, jasmine, crossandra, chrysanthemum, tuberose, marigold, nerium, gomphrena, celosia, cut rose, carnation, gerbera, gladiolus, orchids and anthurium – propagation and planting – seed treatment and sowing – planting of tubers and suckers – lay out and planting of rose and
jasmine – media preparation and potting of orchids and anthurium – After culture practices in rose, jasmine, chrysanthemum, marigold and dahlia – harvesting, postharvest handling and storage – extraction of floral concrete from rose, jasmine and tuberose – visit to commercial fields, extraction units and flower markets – working out benefit cost ratio for loose flowers and cut flowers – preparation of project reports for fresh flower production and floral concrete extraction.

References


FSC 201  PRODUCTION TECHNOLOGY OF TEMPERATE FRUIT CROPS

Theory

Unit I

Definition of temperate region- Temperate horticulture – Temperate fruits- Climatic conditions of temperate zone- Scope and importance of Temperate fruits cultivation – An overview on global, national economy - Area, production and export potential – Horticultural zones of India and Tamil Nadu with emphasis on temperate fruits.

Unit II

Composition and uses – Origin and distribution – Species and cultivars – Varieties- Soil and climatic requirements – Propagation techniques – Rootstock influence - Main field preparation – Spacing - Planting density - Planting and after care – Cropping systems - Nutrients, water and weed management – Training and pruning – Flowering, pollination and

Unit III

Unit IV

Unit V
Cherry, persimmon, walnut, Kiwi, Queens land nut (Macadamia nut), pecan nut, hazel nut and chest nut.

Practical
Description and identification of varieties of apple, pear, peach and plum - Use of growth regulators in growth and development of temperate fruit crops - Nutrient management in temperate fruit crops - Physiological disorders of temperate fruit crops

Description and identification of varieties of apricot, almond, Cherry, strawberry, Kiwi, persimmon, walnut, pecan nut, hazel nut, chest nut and Queens land nut - Training and pruning methods followed in temperate fruit crops - Visit to private temperate fruit orchards - Economics for cultivation of temperate fruits

References

SPC 201 PRODUCTION TECHNOLOGY OF PLANTATION CROPS 2+1

Theory
Unit I
Plantation crops, History, scope and importance, area and production, export and import potentials, role of plantation crops in economy of our country.

Unit II
Introduction, importance, area and production, origin and distribution, uses, soil, climate, propagation, preparation of pits, spacing and planting, planting systems, care of young palm, irrigation, soil moisture conservation, manuring and fertilization, methods of application of fertilizers, weeding, cropping system, physiological disorder, harvesting, yield, processing, deficiency disorders and byproducts for the following crops
Crops: Coconut, Arecanut, Oil Palm and Palmyrah

Unit III
Introduction, area and production, origin and distribution, uses, varieties, classification, climate, soil, propagation, preparation of land, shade regulation, spacing, planting, intercropping, irrigation, manuring, weeding, types of branching, pruning, top-working harvesting, processing, physiological disorder and byproducts.
Crops: Cocoa and Coffee.

Unit IV
Introduction, area, origin and distribution, production, export, soil, climate, types, varieties, propagation, preparation of main field and planting, shade regulation, irrigation, manuring, training and pruning inter cultural practices, mulching, weeding, cropping pattern, harvesting and processing.
Crops: Tea and Cashew

Unit V
Introduction, origin and distribution, area and production, uses, climate and soil, varieties and types of clones, propagation, spacing, planting, polyclonal seed garden manuring, cover crops, irrigation, weeding, tapping, tapping, use of growth regulators for latex flow, rain guarding, latex collection, yield of latex, processing and storage of rubber.
Practical

Description and identification of coconut varieties, selection of coconut and arecanut mother palm and seed nut, planting of seed nuts in nursery, layout and planting of coconut, arecanut, oil palm, cashew nut, cocoa gardens, manuring, irrigation; mulching, raising masonry nursery for palm, nursery management in cocoa. Description and identification of species and varieties in coffee, harvesting, grading, pulping, fermenting, washing, drying and packing of coffee, seed berry collection, seed extraction, treatment and sowing of coffee, epicotyl, softwood, grafting and top working in cashew, working out the economics for coconut, arecanut, oil palm, cashew nut, cocoa, etc. Mother plant selection, preparation of cuttings and rooting of tea under specialized structure, training, pruning, tipping and harvesting of tea.

References

7. Shanmugavelu, K.G. and Madhavrao, Spices and Plantation Crops - Madras popular Depot, Sterling Road, Nungambakkam.

SPC 202 PRODUCTION TECHNOLOGY OF SPICES AND CONDIMENTS 2+1

Theory

Unit I

Introduction, history of spices, definition of spices and condiments, important spice crops of India, importance, role of spices in human nutrition, industry, exports and imports of spices in improving the national economy. Classification of Spices - Different classifications based on economic importance, cultivation methods, family, longevity of spice plants, type of the spice, origin and flavour, plant part used, active principle. Institutes working on spices and condiments, role of organizations for improvement of spices and condiments.
Unit II

Origin and distribution, area and production, uses, botany, varieties, soil and climate, propagation, intercrop and mixed crop, shade and shade regulation, training and pruning, role of growth regulators, nutritional management, irrigation, weed control, maturity indices, harvesting, post harvest technology and value added products.

**Crops:** Black pepper, Cardamom, Turmeric, Ginger.

Unit III

Importance, origin and distribution, area and production, importance, uses, botany, varieties, soils and climate, propagation, nursery management, planting, staking, weeding, manuring, irrigation, pruning, mixed cropping system, harvesting, curing and processing, grading, packing, storage and value added products.

**Crops:** Clove, Nutmeg, Cinnamon, All spice, Curry leaf, Tamarind and Kokum

Unit IV

Importance, origin and distribution, area and production, uses, botany, varieties, soil and climate, field preparation, season, seed rate, spacing, seed treatment and sowing, nutritional management, thinning, irrigation, hoeing, weeding, harvesting and threshing and value added products.

**Crops:** Coriander, Fenugreek, Fennel, Cumin, Dill, Celery, Bishop weed, Rosemary, Thyme, Vanilla, Saffron, Asafoetida

Unit V

Organic spice production, GAP in spices and condiments, cropping systems in spices and condiments.

Practical

Identification of varieties, propagation, seed treatment, sowing, layout, planting, hoeing and earthing up, manuring and use of weedicides, training and pruning, fixing maturity standards, harvesting, curing, processing, grading and extraction of essential oils and oleoresins. Visit to commercial plantations.

References

Theory
Importance of cool season vegetable crops in nutrition and national economy. Area, production, export potential, description of varieties and hybrids, origin, climate and soil, production technologies, seed production, post-harvest technology. Marketing of potato, cabbage, cauliflower, Chow chow, knol-khol, sprouting broccoli, Brussels’ sprout, lettuce, palak, Chinese cabbage, spinach, garlic, leek, radish, carrot, turnip, beet root, peas, broad beans, rhubarb, asparagus, globe artichoke.

Unit I
Area, production, world scenario, industrial importance, export potential of temperate vegetable crops.
Potato.

Unit II
Cabbage, cauliflower, sprouting broccoli, Brussels sprout and Chinese cabbage, Chow chow

Unit III
Carrot, radish, beetroot, turnip and knol khol

Unit IV
Garlic, leek

Unit V
Peas and beans, green leafy cool season vegetables.

Practical
Identification and description of varieties/hybrids; propagation methods, nursery management; preparation of field, sowing/transplanting; identification of physiological and nutritional disorders and their corrections; post-harvest handling; cost of cultivation and field visits to commercial farms.

References
AEX 211  
FUNDAMENTALS OF EXTENSION EDUCATION  
2+1

Theory  

Unit I

Extension education: meaning, definition, nature, scope, objectives, principles, approaches and history. Forestry/Horticulture extension: process, principles and selected programmes of leading national and international forest/horticulture institutes. People’s participation in forestry programmes. Motivation of women community, children, youth and voluntary organizations for forestry/horticulture extension work.

Unit II

Rural Development: meaning, definition, objectives and genesis. Transfer of technology programmes like lab to land programme (LLP) national demonstration (ND), front line demonstration (FLD) Krishi Vigyan Kendras (KVK), Technology Assessment and Refinement Programme (TARP) etc. of ICAR. Reorganised extension system -ATMA, Extension infrastructure of GOI – NIRD, EEI, MANAGE.

Unit III


Unit IV

Unit V

Management and administration: meaning, definition, principles and functions. Concepts of human resource development (HRD), rural leadership.

Practical

Visit to study structure, functions, linkages and extension programmes of state department of Horticulture/forests/NGO/Panchayats. All India Radio. Exercise on preparation and presentation of poster, charts, leaflet, folders. Script writing for radio and TV. Visit to All India Radio. Identification of village leaders. Visit to village to discuss about thee prospects and problems of the village. Preparation and presentation of village horticultural production plan.

References


AGR 211 WEED MANAGEMENT IN HORTICULTURAL CROPS 1+1

Theory

Unit I: Introduction to Weeds

Weeds: Introduction, harmful and beneficial effects, characteristics of weeds, classification, propagation and dissemination; Weed biology and ecology, crop weed association, crop weed competition and allelopathy.

Unit II: Methods of Weed control

Concepts of weed prevention, eradication and control; Methods of weed control: preventive, physical, cultural, chemical and biological methods. Integrated weed management.

Unit III: Herbicides


Unit IV: Selectivity and activity of herbicides

Unit V: Weed management

Weed management in major horticultural crops, shift of weed flora in cropping systems, aquatic, parasitic and problematic weeds and their control.

Practical

Identification and preparation of herbarium of weeds; Survey of weeds in crop fields and other habitats; Biology of nut sedge, bermuda grass, parthenium and celosia. Calculations on weed control efficiency and weed index; Herbicide label information; Computation of herbicide doses; Study of herbicide application equipment and calibration; Demonstration of methods of herbicide application; Preparation of list of commonly available herbicides; Study of phytotoxicity symptoms of herbicides in different crops; Economics of weed control practices; Tours and visits of problem areas.

References


GPB 211 PRINCIPLES OF PLANT BREEDING 2+1

Theory

Unit I: Reproductive and pollination systems

Objectives and role of plant breeding - historical perspective, activities in plant breeding; Centres of origin – contribution of Vavilov, Harlan, Zhukovosky, law of homologous series; Plant genetic resources – importance, germplasm, types, activities, gene erosion, gene bank, collection, conservation, types of conservation, evaluation, national and international agencies, germplasm exchange; Modes of reproduction – sexual, asexual, self and cross fertilization; Modes of pollination- self, cross and often cross pollination, causes for self pollination and cross pollination; Self incompatibility – classifications, mechanisms, application, measures to overcome and limitations; Sterility – male sterility, classification, CMS,GMS,CGMS, TGMS, PGMS, gametocides, transgenic male sterility, their inheritance and applications; Apomixis – classification, applications, parthenocarpy and its types.
Unit II: Breeding methods of self pollinated crops

Plant introduction as a breeding method – types of introduction, objectives, quarantine, acclimatization, achievements, merits and demerits; Genetic basis of self pollinated crops – Vilmorin principle of progeny selection, Johannsen’s pure line theory; Breeding methods for self pollinated crops: Pure line selection – procedure, merits and demerits, achievements; Mass selection– procedure, comparison of mass and pureline selection, achievements; Hybridization- objectives, types, choice of parents, combination breeding and transgressive breeding, selection in segregating populations; Pedigree breeding – procedure, mass pedigree, merits and demerits, achievements; Bulk breeding – procedure, merits and demerits, achievements, comparison of pedigree and bulk breeding methods; Single Seed Descent method – procedure, application, merits and demerits; Backcross breeding – genetic principles, prerequisites, procedures for transferring dominant and recessive genes, merits and demerits; Multilines and multiblends; Population improvement approach in self pollinated crops.

Unit III: Breeding methods of cross pollinated crops

Genetic structure of a population in cross pollinated crop; Hardy Weinberg law – gene frequencies in random mating population – principles in population improvement; Breeding methods of cross pollinated crops: Mass selection - modified mass selection, unit selection, progeny selection, half sib selection, full sib selection; Recurrent selection- principles, types, merits and demerits; Heterosis breeding – genetic basis, hybrid vigour and inbreeding depression, estimation of heterosis, procedure- development of inbreds, selection of inbreds for combining ability, types of hybrids, use of male sterility systems and manual emasculation in hybrid seed production, maintenance of parental lines, achievements, merits and demerits; Synthetics and composites – steps in development of synthetics and composites, achievements, merits and demerits.

Unit IV: Breeding methods of asexually propagated crops

Genetic structure of a population in asexually reproducing crop; Clone – features; Breeding methods – Clonal selection – procedure- achievements- merits and demerits; Hybridization and clonal selection – procedure, achievements, merits and demerits; Synthetics- procedure- polycross test, achievements; Chimeras and its types; Tree breeding – clonal orchards.

Unit V: Special breeding methods

Polyploidy breeding – classification, amphidiploid, induction of auto and allo polyploids, features, induced triploids and tetraploids, induced allopolyploids, achievements, limitations; Wide hybridization - importance, barriers and techniques for overcoming barriers - achievements; Mutation breeding – mutation and its features, spontaneous and induced mutations, mutagen nad its types, procedure, applications, achievements, limitations; Stress breeding – abiotic and biotic stresses, virulence, pathogenesity, mechanisms of resistance, levels of resistance, vertical and horizontal resistance; Quality breeding - quality parameters, antinutritional factors, achievements; Basic biometrics – nature and significance of qualitative and quantitative variation, phenotypic, genotypic and environmental variability- heritability and genetic advance; Types of cultivars and procedure for release of new varieties.
Practical

Observation on reproductive and pollination systems in plants – Alternation of generation and life cycle; Description and drawing of different pollination systems – Mechanisms enforcing self and cross pollination; Breeder kit – emasculation technique – selfing and crossing techniques; Studies on segregating populations and maintenance of records; Morphology of pollen grains and assessment of pollen fertility and sterility in A, B and R lines; Maintenance of A, B, R and TGMS lines; Estimation of different types of heterosis; Irradiation – dosimetry, half life period – procedure for irradiation; Chemical mutagenesis – molar solution, procedure for treatment; Wild species- maintenance and utilization; Germplasm conservation and preservation, records maintained; Polyploid and its induction using colchicines; Screening method for biotic and abiotic stresses; Quality parameters of horticultural crops; Calculation of PCV, GCV, heritability, genetic advance; Layout of different breeding trails and procedure for release of varieties.

References


SAC 211  

SOIL, PLANT AND WATER ANALYSIS  

Practical

References
IV SEMESTER COURSES
FLG 202  ORNAMENTAL HORTICULTURE  2+1

Theory
Unit I
Importance and scope of gardening – History of gardening – Gardens in India –
definition, principles and concepts of landscape gardening - Types of garden – Hindu,
Moghul, Persian, Japanese, English, French and Italian garden – Formal, Informal and
Picturesque types – Bio – aesthetic planning – definition and need – ornamental landscaping
in environmental protection.

Unit II
Garden components and adornments – importance and designing – plant
components and non-plant components - rosary, topiary, trophy, rockery, pond, sunken
garden, flower beds, arboretum, conservatory, roads, walks, paths, hedges, edges, carpet
garden, arch, pergola, arbour, fountains, cascades, garden seats, statues, hanging baskets,
trellis, ornamental vases, ornamental urns, Decks, Bird bath, Sundial and window boxes.
Special types of gardens - principles and design – dish, terrarium, water and bog garden,
traffic islands - roof garden, rockery, vertical garden and tree transplanting.

Unit III
Study of foliage and flowering plants and their design and values in landscaping –
ornamental annuals - shrubs - trees – herbaceous perennials – climbers and creepers –
palms and palmatum- ferns and fernery – cacti and succulents. Dry flower – principles and
types - Flower arrangement – principles, designs and styles – ikebana, moribana - bouquet
making - bonsai - methods, styles and maintenance.

Unit IV
Landscape architecture – design, planning and management of natural and built
environments. Computer aided design (CAD) - landscape planning– home garden, public,
urban and industrial gardening. Avenue planting – principles, plants suitability and planting.

Unit V
Importance and scope – turf grasses – species and types – selection of site –media
and field preparation – types of lawn making – turf establishment for golf ground, cricket
pitch and football field – turf management - renovation of lawns –astro turf and
management.

Practical
Identification and description of annuals – shrubs – trees – herbaceous perennials –
collectors and creepers – palms and ferns – cacti and succulents. Software tools in landscape
architecture – landscape with CAD - Planning and designing of garden components – special
types of gardens – avenue planting – site design creation – urban and rural planting- Dry
flower and bonsai making - turf management - visit to gardens - visit to institutional garden,
sports ground with lawn and to turf nurseries – renovation of lawns .
FSC 202       BREEDING OF FRUIT AND PLANTATION CROPS       2+1

Theory

Fruit breeding - History, importance in fruit production, distribution, domestication and adaptation of commercially important fruits, variability for economic traits, breeding strategies, clonal selection, bud mutations, mutagenesis and its application in crop improvement – policy manipulations – in vitro breeding tools (important fruit and plantation crops).

Unit I: Coconut, arecanut, coffee, tea
Unit II: Cashew, cococa
Unit III: Rubber, oilpalm and palmyrah
Unit IV: Tropical and Sub tropical fruits
Unit V: Temperate and arid zone fruits

Practical

Exercises on floral biology, pollen viability; emasculation and pollination procedures; hybrid seed germination; raising and evaluation of segregating populations; use of mutagens to induce mutations and polyploidy.

References

Theory

Unit I: Foods and their nutrients

Importance of food and its function, food groups, food pyramid, physico-chemical properties of food, method of food preparation, nutrition, food in relation to health, malnutrition.

Unit II: Energy

Definition, determination of energy value of food, total energy requirement, Basal metabolic rate and its measurement, measuring total energy requirement, energy requirement during work and thermic effect of food.

Unit III: CHO [Carbohydrates], Proteins and fats

CHO: Classification, function, digestion and absorption source and utilization

Protein – Function, classification, digestion and absorption, functions of Amino acids, quality of protein, PER/ NPR/ NPU.

Lipids – Classification, Functions, sources, requirement digestion, absorption and utilization, saturated and unsaturated fatty acids.

Unit IV: Vitamins and minerals

Vitamins: Water soluble vitamins – Thiamin, Riboflavin and niacin, Folic acid and B12 – function, sources, effects of deficiency and its requirement. Fat soluble vitamins – A, D, E, K – function, source, deficiency and their requirement


Unit V: RDA and assessment of nutritional status:

Balanced diet, RDA and factors affecting RDA, RDA for various age groups. Assessment of Nutritional status – Anthropometric, clinical, biophysical, functional, biochemical dietary assessments and vital health statistics.

Practical

Methods of measuring food ingredients, effect of cooking on volume and weight, determination of percentage of edible portion. Browning reaction of fruits and vegetables. Microscopic examination of starches, estimation of energy value protein and fats of food, planning diet for various age groups.
AEN 211 INSECT PESTS OF FRUITS, PLANTATION, MEDICINAL AND AROMATIC CROPS

Theory

Unit I: Insect ecology and components of pest management

Insect Ecology- Effect of abiotic and biotic factors on insect population. Pest – definition, categories of pests, factors governing pest outbreaks. Concept of economic threshold level and economic injury level. Principles and components of pest management

Unit II: Methods of pest control


Unit III: Pests of fruits

Distribution, bionomics, symptoms of damage and management strategies of insect and non insect pests of Mango, Guava, Sapota, Citrus, Banana, Grapevine, Jack, Jamun, Aonla, Pomegranate, Papaya, Ber, Apple, Pear, Peach and Plum, Pineapple.

Unit IV: Pests of plantation crops, medicinal and aromatic plants

Distribution, bionomics, symptoms of damage and management strategies of insect and non insect pests of coconut, arecanut, oilpalm, cinchona, coffee, tea, cashew, rubber, cocoa, cardamom, pepper, betel vine, aswagantha, senna, hemp, belladonna, pyrethrum, camphor, costus, crotalaria, datura, dioscorea, mint, opium, Solanum viarum, Tephrosia, neem, teak, subabul, eucalyptus.

Unit V: Stored product pests

Storage insects, distribution, host range, bioecology, injury, integrated management of important insect pests attacking stored fruits, plantation, medicinal and aromatic crops and their processed products. Insecticide residue problem in fruits, plantations, medicinal and aromatic crops and their tolerance limits.

References
Practical

Study of symptoms of damage, collection, identification, preservation, assessment of damage and population of important insect pests affecting fruits, plantation, medicinal and aromatic crops in field and storage.

References


AGR 212 PRINCIPLES OF AGRO-CLIMATOLOGY AND WATER MANAGEMENT

Theory

Unit I: Agro Climatology and Weather Parameters

Agro climatology - Atmosphere - Composition and vertical layers of atmosphere- Factors affecting climate and weather – Agroclimatic zones of India, Tamil Nadu and Puducherry; Weather parameters - Solar radiation, Light, Air and Soil temperature, Relative Humidity, Wind, Atmospheric pressure, Precipitation, Evapotranspiration and Transpiration; PET- Its effect on horticultural crops

Unit II: Climate Change and Weather Forecasting

Climate change- climate variability – definition and causes of climate change - Impact of climate change on Horticulture. -Weather forecasting types and Agromet Advisory Services.

Unit III: Importance of Water and Soil-Water-Plant relationship


Unit IV: Crop Water Requirement, Scheduling of Irrigation and Methods

Crop water requirement – consumptive use – Definition and estimation – Factors affecting water requirement – Critical stages of irrigation and water requirement of horticultural crops. Scheduling of irrigation – Different approaches - Methods of irrigation:

**Unit V: Quality of Irrigation Water and Drainage**

Quality of irrigation water – Agronomic practices for use of poor quality water (saline, effluent and sewage water) for irrigation – Agricultural drainage, importance and methods of drainage.

**Practical**

Site selection and lay out of Agromet Observatory. Sunshine recorder - Maximum, Minimum, Grass minimum and Soil thermometers - Dry and wet bulb thermometers - Wind vane - Anemometer - Rain gauge - Ordinary and Self-recording; - Evaporimeters – Lysimeters - Dew gauge. Estimation of soil physical parameters (Bulk density and Particle density) and soil moisture – Measurement of irrigation water through water measuring devices (flumes and weirs) – Calculation of irrigation water requirement (problems) – Acquiring skill on land shaping for different surface irrigation methods – Operation and economics of sprinkler and drip irrigation systems – Estimation of crop water requirement – Scheduling of irrigation based on different approaches – Water Use Efficiency (WUE) - Irrigation water quality - Methods of drainage and observation of drainage structures.

**References**

STA 201  APPLIED STATISTICS  1+1

Theory

Unit I
Introduction: Definition of Statistics and its use and limitations; Frequency Distribution and Frequency Curves; Measures of Central Tendency: Arithmetic Mean; Median, Mode, Geometric mean and Harmonic mean for raw data, Properties. Measures of Dispersion: Standard Deviation, Variance and Coefficient of Variation for raw data.

Unit II
Probability: Definition and concept of probability; Binomial and Poisson distribution Normal Distribution and its properties; Introduction to Sampling: Random Sampling; the concept of Standard Error.

Unit III
Tests of Significance- Types of Errors, Null Hypothesis, Level of Significance and Degrees of Freedom, Steps involved in testing of hypothesis; Large Sample Test- SND test for Means (Single Sample and Two Sample); Small Sample Test for Means, Student's t-test for Single Sample, Two Samples (with equal variance) and Paired t test. Chi-square test for application of attributes and test for goodness of fit of Mendelian ratios.

Unit IV

Unit V
Experimental Designs: Basic Designs, Completely Randomized Design (CRD), Layout and analysis with equal number of observations, Randomized Block Design (RBD), Layout and analysis, Latin Square Design (LSD), Layout and analysis.

Practical
Construction of Frequency Distribution Tables and Frequency Curves; Computation of Arithmetic Mean for Un-Grouped and Grouped data; Computation of Median for Un-Grouped data; Computation of Mode for Un-Grouped data; Computation of Standard Deviation, Variance and Coefficient of Variation for Un-Grouped data; SND test for Means, Single Sample; SND test for Means; Two Samples; Student's t-test for Single Sample; Student's t-test for Two Samples; Paired t test and F test; Chi-Square Test in 2x2 Contingency Table, Yates' Correction for continuity; Computation of Correlation Coefficient 'r'; Fitting of regression equations - Y on X and X on Y; Analysis of Completely Randomized Design (CRD); Analysis of Randomized Block Design (RBD); Analysis of Latin Square Design (LSD).
References

7. www.statssoft.com

ANM 211    NEMATODE MANAGEMENT IN HORTICULTURAL CROPS     1+1

Theory

Unit I: Introduction and economic importance
Introduction to Nematology – History of development of Nematology - economic importance of nematodes- beneficial nematodes

Unit II: Morphology, anatomy and taxonomy

Unit III: Lifecycle, symptom and interaction
Life cycle of important nematodes – Meloidogyne, Globodera, Rotylenchulus, Tylenchulus, Radopholus and Pratylenchus. Symptoms of nematode damage interaction of nematodes with other microorganisms.

Unit IV: Nematode management
Principles of nematode management - legislative (plant quarantine); physical methods (soil solarisation, hot water treatment, seed cleaning); cultural methods (deep ploughing, falling, crop rotation, antinemic plants, other land management practices); host plant resistance to nematodes; Improved techniques for nematode resistance breeding; biological control (nematode trapping fungi, egg parasitic fungi, obligate parasites, PGPR bacteria and predators); chemical control. Integrated nematode management.

Unit V: Nematode diseases of crops
Nematode diseases of fruits (banana, citrus, grapevine, papaya) – vegetables (tomato, brinjal, bhendi, chilli, potato) - spices (turmeric, pepper, cardamom) flowers
Practical

Sampling techniques for nematode assay. Processing of soil samples for extraction of active nematodes - Extraction of nematodes by centrifugal floatation method and separation of cyst nematodes - Extraction of nematodes from plant samples. Staining techniques, direct examination of nematodes and warring blender technique. Killing, fixing, preservation and counting of nematodes - Processing and mounting of nematodes. Observation of morphological characters of Tylenchida (Hoplolaimus) and Dorylaimida (Xiphinema) - Identification of nematodes Holoctylenchus and Tylenchorhynchus – Pratylenchus, Longidorus, Xiphinema – Hemicriconemoides, Aphelenchoides, Tylenchulus. Study of life stages of Meloidogyne, Globodera, Rotylenchulus and Radopholus. Nematode disease symptoms in fruits, vegetables, spices, flower crops and medicinal and aromatic plants. Nematicides, bio control agents, application methods and calculation of dosages.

References

PAT 211 MUSHROOM CULTURE 0+1

Practical

Unit I: Introduction to mushroom Science

Unit II: Mushroom Cultivation Technology


Unit III: Problems in Mushroom Cultivation

Pest and Disease management - Competitor Moulds – Fungal, bacterial and viral Diseases - Insect Pests – Nematodes in Mushroom Production and Their Management – Abiotic disorder of mushroom – Integrated pest management in mushroom mushroom cultivation – Exclusion – Cultural control – Biological control and chemical control

Unit IV: Economics of mushroom cultivation


Unit V: Post harvest technology of mushrooms

Post harvest technology: methods of preservation and value addition - Mushroom recipes - Cooking methods, Value added products, pickling, sauce, ketchup and chutney, Instant food mixes, extruded and bakery products, Quality and Sensory evaluation

References


SST 211  SEED PRODUCTION OF VEGETABLE, TUBER AND SPICE CROPS  2+1

Theory

Unit I: Introduction to Seed Production

Seed Production- Principles – Difference between seed and grain –Importance and scope of vegetable seed production –History of Indian Seed Industry - Deterioration of crop varieties – Factors affecting deterioration and their control- Maintenance of genetic purity during seed production – Seed quality - Definition, Characteristics of good quality seed – Different classes of seed – Generation system of seed multiplication- Seed Multiplication ratio - Seed Replacement Rate- Factors affecting vegetable seed production.

Unit II: Seed Production & Certification

Unit III: Post Harvest Handling

Seed Drying – Principles- moisture equilibrium between seed and air –Types of Drying –Seed Driers-Seed processing – Air screen machine and its working principle, different upgrading equipments and their use –Seed extraction- Seed treatment – Importance- types- Equipments used (Slurry and Mist –O-matic treater) - Seed quality enhancement - Establishing Seed Testing Laboratory.

Unit IV: Seed Storage and Marketing

Seed packing– Types of containers-Seed storage- Principles of seed storage - Stages of seed storage - factors affecting seed longevity during storage - conditions required for good storage – Seed godown sanitation – Seed marketing – Seed demand forecasting and planning- marketing structure - marketing organizations - sales generation activities, promotional media, pricing policy-Factors affecting seed marketing.

Unit V: Seed quality control


Practical

Identification of seed and seed structure - Seed quality analysis in Horticultural crops - Principles and procedures - Seed sampling –Physical purity analysis- Germination testing-Moisture determination - Viability test - Vigour tests - Seed dormancy and breaking methods – Seed health test - Studies on Physiological maturity, Harvesting, Threshing & Seed Extraction- techniques- Seed Quality enhancement - Visit to seed production plots and examining field standards - Varietal identification- Emasculation & pollination, Planting ratios, isolation distance, roguing, yield assessment, etc. in seed production plots- Grow out tests and electrophoresis for varietal identification - Seed production planning- Visit to Seed Processing Unit - Visit to seed testing laboratory and Seed Certification Agency.

References

6. Bhaskaran, M. A.Bharathi, K.Vanangamudi, N.Natarajan, P.Natesan, R.Jerlin and
V SEMESTER COURSES
Theory
Unit I: Definition, stages and photosynthetic productivity
Growth and development - definitions, optimum leaf area index (LAI), photosynthetic productivity, canopy development; different stages of growth and growth regions.

Unit II: Growth analysis
Structure and function of cells, cell division, cell enlargement and differentiation, growth curves, growth analysis in horticultural crops.

Unit III: Plant growth regulators
Plant growth regulators - auxin, gibberellin, cytokinin, ethylene, inhibitors and retardants, basic functions, biosynthesis, role in crop growth and development, propagation, flowering, fruit setting, fruit thinning, fruit development, fruit drop, and fruit ripening.

Unit IV: Flowering and its physiology
Flowering - factors affecting flowering, physiology of flowering, photoperiodism-long day, short day and day neutral plants, vernalisation and its application in horticulture, pruning and training, translocation of assimilates.

Unit V: Physiology of ripening and seed development
Physiology of seed development and maturation, seed dormancy and bud dormancy, causes and methods of breaking dormancy in horticultural crops. Factors affecting fruit set and development, physiology of ripening of fruits- climacteric and non-climacteric fruits.

Practical
Leaf area index, growth analysis parameters including harvest index, identification of synthetic plant hormones and growth retardants, preparations of hormonal solution and induction of rooting in cuttings, ripening of fruits and control of flower and fruit drop. Important physiological disorders and their remedial measures in fruits and vegetables, rapid tissue test, seed dormancy, seed viability by tetrazolium test, seed germination and breaking seed dormancy with chemicals and growth regulators, biostimulants.

References
FLG 301 PRINCIPLES OF LANDSCAPE GARDENING 0+1

Practical
Principles and elements of landscape design, plant material for landscaping, symbols, tools and implements used in landscape design, layout of formal gardens, informal gardens, special type of gardens (bog garden, sunken garden, terrace garden, rock garden) and designing of conservatory and lath house. Landscape design for specific areas.

References

SPC 301 PRODUCTION TECHNOLOGY OF MEDICINAL AND AROMATIC CROPS 2+1

Theory
Unit I
History, scope, opportunities and constraints in the cultivation and maintenance of medicinal and aromatic plants in India. Importance, origin, distribution, area, production, climatic and soil requirements, propagation and nursery techniques, planting and after care, cultural practices, training and pruning, nutritional and water requirements, harvesting and processing.

Crops: Betel vine, Periwinkle, Rauvolfia, Dioscorea, Isabgol, Gloriosa, Cinchona and Pyrethrum.

Unit II
Importance and uses, origin, distribution, area, production, climatic and soil requirements, propagation and nursery techniques, planting and after care, cultural practices, training and pruning, nutritional and water requirements, harvesting and processing.

Crops: Senna, Coleus, Aswagandha, Aloe, Centella, Insulin Plant, Noni and Indian long pepper.
Unit III

History, importance and uses—industrial and cosmetic values, area and production, future prospects, opportunities and constraints in the cultivation of aromatic plants. Extraction methods for essential oil crops—distillation methodology and advantages and disadvantages of water distillation, water and steam distillation, enfleurage or cold fat extraction, Maceration or Hot fat extraction, Solvent extraction, Expression, Supercritical Fluid Extraction (SCFE), storage of essential oils, Technical terms used in the trade.

Unit IV

Importance and uses, origin, distribution, area and production, botany, varieties, soil, climate, land preparation, propagation, spacing, planting, manures and fertilizers, irrigation, interculture, harvesting and extraction of oil yield.

Crops: Lemongrass, Citronella grass, Palmarosa, Lavender, Geranium and Patchouli.

Unit V

Importance and uses, origin, distribution, botany, varieties, soil, climate, land preparation, propagation, transplanting, spacing, manures and fertilizers, irrigation, interculture, harvesting and yield.

Crops: Ambrette (Musk), Bursera, Ocimum, Davana, Vetiver, Mint and Sweet flag

Practical

Collection of medicinal and aromatic plants from their natural habitat and study their morphological description, nursery techniques, harvesting, curing and processing techniques and extraction of essential oils.

References

Theory


Unit I: Solanaceous vegetables
Unit II: Cole crops
Unit III: Cucurbits
Unit IV: Bulb crops, root crops, potato
Unit V: Leafy vegetables, okra, leguminous crops, tuber and spice crops

Practical

Floral biology and pollination mechanism in self and cross pollinated vegetables, tuber crops and spices. Working out phenotypic and genotypic variability, heritability, genetic advance. Preparation and uses of chemical and physical mutagens. Polyploidy breeding and chromosomal studies. Techniques of F1 hybrid seed production. Maintenance of breeding records.

References

VSC 302  CROP PRODUCTION IN VEGETABLE CROPS  0+1

Practical
Hands on experience to the students on crop production aspects, practical training and experience in vegetable production in one transplanted crop (tomato or brinjal or chillies) and one direct sown crop (bhendi or amaranthus or radish or aggregatum onion) – seed treatment – raising nursery – sowing seeds – field preparation – transplanting, manuring, irrigation, fertigation, weed control, after culture – growth regulators – plant protection – maturity indices and harvesting – maintenance of cultivation sheet – working out cost benefit ratio.

References

AEN 311  APICULTURE  0+1

Practical

References

AGR 311 INTRODUCTION TO MAJOR FIELD CROPS 1+1

Theory
Unit I: Introduction
Classification and distribution of major field crops (Cereals, Pulses, Oilseeds, Cash crops and Fodder crops); definitions and concepts of multiple cropping, mixed cropping, intercropping, relay and alley cropping and crop rotation

Unit II: Cereals

Unit III: Pulses

Unit IV: Oil seeds

Unit V: Cash crops, Fodder Crops and Green Manuring
Green Manuring: Importance and classification

Practical
Identification of crop plants, seeds and weeds - Calculation of seed rate - Seed treatment techniques – Nursery preparation and management for Rice, Pearl millet and Finger millet - Raising of crop cafeteria - Main field preparation and Sowing - Estimation of population – Nutrient management - Weed management - Study of growth and yield
parameters - Harvesting of major field crops and Yield estimation – Preparation of cropping scheme

References


GPB 311 PRINCIPLES OF BIOTECHNOLOGY 1+1

Theory

Unit I: Basics in molecular biology
Structure of nucleic acids—an overview: nucleoides, DNA structure, central dogma of life; replication, transcription and translation; regulation of gene expression, fine structure of gene; Genome- Genomics, omics’ terminology

Unit II: Plant tissue culture
History and concepts; General techniques- sterilization, media and their nutritional requirements, explants, callus induction, morphogenesis, organogenesis and embryogenesis, environmental conditions, hardening, nomenclature; Tissue culture techniques- meristem culture, anther and pollen culture, embryo culture, ovule culture, protoplast and fusion culture, and cell suspension culture, their types, applications and achievements.

Unit III: Principles of recombinant DNA technology
Restriction endonucleases, isolation of desired gene, vectors, constructing recombinant DNA, transformation, gene cloning, selection of recombinant cells, polymerase chain reaction, blotting techniques, DNA sequencing methods.
Unit IV: Genetic transformation in plants

Direct gene transfer- types, microinjection, electroporation, particle bombardment, achievements, limitations; Indirect gene transfer- Agrobacterium mediated gene transfer, selectable markers, reporter genes, promoters, achievements in resistance, nutritional quality etc.

Unit V: Molecular markers in crop improvement

DNA based markers – RFLP, AFLP, RAPD, SSR and DNA Probes – Role of molecular markers- gene mapping and gene tagging, marker assisted breeding, MAS and its application in crop improvement.

Practical


References


PAT 311 DISEASES OF VEGETABLES, ORNAMENTALS AND SPICE CROPS 2+1

Theory

Unit I: Vegetable crops
Symptoms, etiology, mode of spread, survival, epidemiology and integrated management of important diseases of tomato, brinjal, chilli, bhendi, cucurbits, crucifers, peas, beans, cabbage, cauliflower, carrot, radish, beetroot and knol- khol

Unit II: Tuber crops
Symptoms, etiology, mode of spread, survival, epidemiology and integrated management of important diseases of potato, sweet potato, cassava, yam and colacasia
Unit III: Ornamental Crops
Symptoms, etiology, mode of spread, survival, epidemiology and integrated management of important diseases of Jasmine, rose, crossandra, chrysanthemum, marigold, carnation, dahlia, zinnia, tuberose and geranium.

Unit IV: Spice crops
Symptoms, etiology, mode of spread, survival, epidemiology and integrated management of important diseases of onion, garlic, fenugreek, ginger, turmeric, pepper, cumin, cardamom, nutmeg, coriander, clove, curry leaf and cinnamon.

Unit V: Post harvest diseases of vegetables and ornamental crops and their management
Post harvest diseases of vegetables and ornamental crops, factors influencing post harvest diseases - preharvest and post harvest factors - Management of post harvest diseases - physical, chemical, biological methods – Postharvest treatments for organic produces – Application methods - Integrated management of post harvest diseases - Emerging technologies for postharvest disease control

Practical
Study of symptoms and host parasite relationship of the following crops: Vegetables: tomato, brinjal, chilli, bhendi, cucurbits, crucifers, peas, beans, cabbage, cauliflower, radish, knol- khol, Tuber crops: potato, beetroot, sweet potato, carrot, cassava, yam and colacasia, Ornamental Crops: Jasmine, rose, crossandra, chrysanthemum, marigold, carnation, dahlia, zinnia, tuberose and geranium, Spices and condiments: onion, garlic, fenugreek, ginger, turmeric, pepper, cumin, cardamom, nutmeg, coriander, clove, curry leaf and cinnamon and Post harvest diseases of vegetables and ornamental crops and their management.

References

SAC 311 SOIL FERTILITY AND NUTRIENT MANAGEMENT 1+1

Theory
Unit I: Essential Nutrients

Unit II: Nutrient Dynamics
Sources, forms, mobility, transformations, fixation, losses and availability of nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, zinc, copper, boron and molybdenum in soils.Luxury consumption and Hidden hunger-pH in plant nutrition.

Unit III: Fertilizers

Unit IV: Manures

Unit V: Management
Nutrient management concepts – STCR, INM, IPNM, SSNM and RTNM.Salt affected soils- Acid, Saline, alkali and Calcareous soils-Characteristics and Management.

Practical
References


PJN 301 SHORT TOUR 0+1

The students will undertake the short tour during fifth semester for seven days covering KVK’s, Research stations, other SAU campuses and ICAR institutes in Puducherry and Tamil Nadu. The study tour will provide an exposure to the students to know about the soil, climatic conditions and cropping patterns in various agro-climatic zones. The students will also have first-hand information on latest technologies on various crops and allied activities.
VI SEMESTER COURSES
Theory

Unit I: Importance, post harvest handling
Importance of post-harvest technology in horticultural crops. Maturity indices, harvesting, handling, grading of fruits, vegetables, cut flowers, plantation crops, medicinal and aromatic plants.

Unit II: Factors influencing shelf life and fruit ripening
Pre-harvest factors affecting quality, factors responsible for deterioration of horticultural produce. Physiological and bio-chemical changes, hardening and delaying ripening process.

Unit III: Pre harvest, pre storage and post harvest treatments
Pre-harvest treatment and pre-cooling, pre-storage treatments and post-harvest treatments of horticultural crops.

Unit IV: Packaging
Packaging methods and types of packages, recent advances in packaging. Types of containers and cushioning materials, vacuum packaging, cold storage, poly shrink packaging, grape guard packing treatments.

Unit V: Storage and transport
Different systems of storage, cold chain management and modes of transport.

Practical
Practice in judging the maturity of various horticultural produce, determination of physiological loss in weight and quality. Grading of horticultural produce, post-harvest treatment of horticultural crops, physical and chemical methods. Packaging studies in fruits, vegetables, plantation crops and cut flowers by using different packaging materials, methods of storage, post-harvest disorders in horticultural produce. Identification of storage pests and diseases. Visit to markets, packaging houses and cold storage units.

References

FLG 302  BREEDING AND SEED PRODUCTION OF ORNAMENTAL PLANTS  2+1

Theory
Unit I: Breeding methods
Introduction, selection, hybridization, mutation and biotechnological technique for improvement of ornamental plants. Role of heterosis and its exploitation, production of F1 hybrids and utilization of male sterility

Unit II: Breeding for improvement of characters
Disease resistance. Development of promising cultivars of important ornamentals.

Unit III: Introduction
Introduction to Flower Seeds and the Flower Seed Industry-Scopes and Importance of commercial Floriculture in Production techniques of ornamental plants-Factors considered for efficient seed production in Ornamental plants.

Unit IV: Seed Production methods in Annuals
Methods of seed production in ornamental plants - Annuals and biennials-Marigold, Zinnia, Ageratum, Alyssum, Aster, Calendula, Dahlia, Geranium, Pansy, Petunia, Snapdragon, Balsam, Hollyhock, Begonia, Cockscomb, Cosmos, Coreopsis, Gaillardia, Gomphrena - Climbers - Clitoria, Quamoclit, Thunbergia alata, Nasturtium.

Unit V: Seed Production methods in perennials
Herbaceous perennials-Vinca rosea – Golden rod-Aster amellus Ornamental trees - Delonix regia, Peltophorum ferrugenum, Samanea saman, Cassia siamea, Acacia auriculiformis, Cordia sebestena.

Practical
Introduction, selection, hybridization, selfing, emasculation and crossing; Mutation and Polyploidy breeding and Biotechnological breeding techniques in ornamentals. Floral biology, selfing, emasculation and crossing technique in Rose, Jasmine, Marigold, Anthurium, Gladiolus, Orchids, Gaillardia, Gerbera, Zinnia, Ageratum, Alyssum, Aster and Calendula.

Seed collection - Methods of seed extraction - Identification of seed and seed structure - Seed germination and viability testing - Seed Dormancy & Methods of breaking of seed dormancy - Seed germination, test evaluation and seed enhancement techniques in ornamental plants. Study of seed storage, seed package and packaging materials - Visit to ornamental seed production plots and Commercial flower seed production industries
References

4. McDonald, M. Flower seeds - Biology and Technology- Department of Horticulture and Crop Science, Ohio State University, USA, F Kwong, PanAmerican Seed Company, West Chicago, USA, F Bongers, Wageningen University

FSN 311 PROCESSING OF HORTICULTURAL CROPS 1+1

Theory

Unit I: Production and processing scenario of fruits and vegetables

Fruits and vegetables production and processing, scope of fruits and vegetables preservation industry, constraints in popularization of food processing technology, future of fruits and vegetables processing, principles and guidelines for location, tools, equipments, layout and other requirements of small scale processing units.

Unit II: Principles and method of preservation

(i) Asepsis, high temperature – pasteurization, sterilization, canning, low temperature, chemicals – sulphur dioxide, Benzoic acid, filtration, sugar, carbonation, fermentation, salt, acids, oil and spices, antibiotic and irradiation.
(ii) Freezing – methods, changes during freezing and storages, thawing, freezing process for fruit and vegetables
(iii) Drying and dehydration – definition, types of driers: Solar, cabinet, spray drier, drum, fluidized bed drier, freeze drying schedule for drying.
Methods of concentration: Open kettle, blast evaporators, changes during concentration Canning: Principle and process of canning, spoilage of canned foods and its prevention.

Unit III: Principles of processing and value addition

Processing using sugar – principles – processing of Juices, squashes, syrups, cordials, R.T.S, Jam, Jelly, marmalade, preserve candies, crystallized fruits, chutneys and sauces / ketchups
Processing using salt: Pickles - preservation with salt, vinegar, oil, mixture of salt, oil, spices and vinegar, problems in pickle making

**Unit IV: Recent technologies in fruits and vegetable processing**
Minimal processing of fruits and vegetables – Techniques involved. Recent trends in processing – high pressure processing and processing using pulse electric field - utilization of fruits and vegetable waste.

**Unit V: Food safety and quality control of processed products**
Quality management systems in processed foods, standards for food safety and quality control and food law – ISO, BIS, HACCP, FSSAI, GFSI, BRC, SQF

**Practical**
Equipment used in food processing units. Survey on processed foods – shelf life studies of fruits and vegetables at different temperature and atmospheric condition. Preparation of Jam, jelly, squash, R.T.S, pickles, dehydrated, canned and frozen products.

**References**
2. Rathore, N.S., Mathur, G.K. and Chasta, S.S. Post harvest management and processing of fruits and vegetable ICAR. New Delhi 2012
4. Journal of food science and Technology. Indian food Industry beverage and food world

**AEC 311 HORTI-BUSINESS MANAGEMENT 2+1**

**Theory**
**Unit I: Farm Management**
UNIT II: Marketing


UNIT III: Finance


Unit IV: Agribusiness


Unit V: Management Functions


Practical

Problems on factor-product relationship- determination of least-cost combination- determination of optimum product combination-computation of cost
concepts- cost of cultivation and cost of production horticultural products -
depreciation-methods of calculation of depreciation. Visit to village shandy and
important marketing institutions/Commodity boards. Visit to agri/Horti hi-tech bank branch/
commercial banks/ NABARD. Project appraisal – undiscounted and discounted measures.
Exercise on Operations Management in agribusiness firms - Inventory Management -
Inventory types, costs and Economic Order Quantity- ABC analysis - Exercise on Logistics and
Supply Chain Management. Market Research and Segmentation –Marketing mix- 4Ps of
marketing –New agri/horti-business venture proposal preparation.

References
    New Delhi
    Oxford & IBH, New Delhi
    Educational Publishers, New Delhi.

AEN 312 INSECT PESTS OF VEGETABLES, ORNAMENTALS AND SPICE CROPS

Theory
Unit I: Economic importance of insects in vegetables, ornamental and spice crops
    Economic importance of insects in vegetables, ornamental and spice crops, Ecology
    and pest management in these crops, Pest surveillance in important vegetables, ornamental
    and spice crops.

Unit II: Pests of Vegetables
    Distribution, bionomics, symptoms of damage and management strategies of insect
    and non insect pests of Brinjal, Bhendi, Tomato, Crucifers, Cucurbits, Moringa, Amaranthus,
    cowpea, lab lab.
Unit III: Pests of Ornamental crops
Distribution, bionomics, symptoms of damage and management strategies of insect and non insect pests of Rose, Jasmine, Crossandra, Chrysanthemum, Marigold, Tuberose, daisy, lily, Neriumand Gloriosa, Coleus, Phyllanthus, and Aswagantha.

Unit IV: Pests of Spices
Distribution, bionomics, symptoms of damage and management strategies of insect of Chillies, Onion, Garlic, Ginger, Turmeric, Coriander, fenugreek, mustard, fennel, clove, nutmeg, all spice, cinnamon, tamarind, vanilla, paprika, Cocoa, Cardamom, black Pepper.

Unit V: Pests of stored products and insecticide residues
Insect pests of processed vegetables and ornamental crops, bioecology, injury and IPM, insecticidal residues problems in vegetables and ornamental crops, tolerance limits.

Practical
Study of symptoms, damage, collection, identification, preservation, assessment of damage/ population of important insect- pests affecting vegetable, ornamental and spices crops in field and during storage.

References
AGR 312 | ORGANIC FARMING IN HORTICULTURAL CROPS | 1+1

Theory

Unit I: Types of farming and impacts of green revolution farming

Types of farming – Impacts of green revolution farming – Fate of chemicals in agro ecosystem

Unit II: Organic farming - Concepts and principles


Unit III: Nutrient sources

Organic sources of nutrients – on farm and off farm sources – organic waste recycling-methods – Vermicomposting - Soil and crop management - inter cropping, crop rotation, green manures, cover crops, mulching - bio fertilizers. Panchagavya and other organic solutions – Preparation and usage

Unit IV: Pest and disease management

Bio intensive pest and diseases management - physical, cultural, mechanical and biological methods – non-chemical weed management methods: preventive, physical, cultural, mechanical and biological control measures - good crop husbandry practices

Unit V: Certification and exports & Indigenous Technical Knowledge (ITK) in Organic Agriculture


Practical

Raising of vegetable crops – experiencing organic farming practices – soil, seed, nutrient, weed, water, pest and diseases - hands on experience on bio composting, vermicomposting, organic base solutions preparations, bio-inoculants – Raising of vegetable & ornamental nursery – Macro quality analysis - grading, packaging, post-harvest management – visit to organic farms, certification agencies and market outlets

References


ENS 301 ENVIRONMENTAL SCIENCE 1+1

Theory
Unit I: Introduction to Ecology and Environment
   Introduction – Ecology – Environment: components, segments (hydrosphere, atmosphere, lithosphere and biosphere) - Ecosystem concepts – Species, Population, Community and Succession, Species interaction – Energy efficiencies and Energy flow – Food chain, food web and ecological pyramids, cropping pattern

Unit II: Natural resources and Biodiversity
   Natural resources – Soil, Water, Air, Mineral, Energy, Forest resources; Bio diversity - importance, hot spots and conservation

Unit III: Environmental Pollution
   Pollution: Problems, types and sources – Soil, Water and Air pollution: Sources, effects and control measures - Noise Pollution: Sources, effects and control measures - Radioactive, thermal and nuclear pollution - Global warming and climate change: GHG emission, GH effect, impact on environment and agriculture- mitigation strategies.

Unit IV: Solid and liquid waste management

Unit V: Environmental protection

Practical
   Estimation of population indices of an agro-ecosystem – Diversity of flora and fauna in agricultural ecosystem - Laboratory safety and handling of chemicals and Glass wares - Characterization of waste water and collection and sampling methods - Estimation of pH, EC and total Solids – Dissolved oxygen, biochemical oxygen demand and chemical oxygen demand- acidity, alkalinity, hardness, chlorides and sulfates - Visit to Common effluent treatment plant and degraded ecosystem - Assessment of water quality indicators (bio-
- Treatment of waste water: Physical, chemical and biological methods – Monitoring Air Pollution – Solid waste management - Composting of various solid wastes using microorganisms and vermicomposting – Heavy metals in contaminated soil and water ecosystem.

References

2. Sharma, P.D. 2009, Ecology and Environment, Rastogi Publications, Meerat, India

PAT 312   DISEASES OF FRUITS, PLANTATION, MEDICINAL AND   2+1 AROMATIC CROPS

Theory

Unit I: Tropical Fruit Crops
Symptoms, etiology, mode of spread, survival, epidemiology and integrated management strategies of important diseases of mango, banana, grapes, citrus, guava, sapota, papaya, jack fruit, pineapple, pomegranate and ber

Unit II: Temperate Fruit Crops
Symptoms, etiology, mode of spread, survival, epidemiology and integrated management strategies of important diseases of apple, pear, peach, plum, almond, walnut and strawberry

Unit III: Plantation Crops
Symptoms, etiology, mode of spread, survival, epidemiology and integrated management strategies of important diseases of arecanut, coconut, oilpalm, coffee, tea, cocoa, cashew, rubber and betelvine

Unit IV: Medicinal and aromatic crops
Symptoms, etiology, mode of spread, survival, epidemiology and integrated management strategies of important diseases of senna, neem, hemp, belladonna, pyrethrum, camphor, costus, crotalaria, datura, dioscorea, mint, opium, Solanum khasianum and Tephrosia
Unit V: Post harvest diseases of fruits, plantation and medicinal and aromatic crops and their management

Post harvest diseases of fruits, plantation and medicinal and aromatic crops, factors influencing post harvest diseases - preharvest and post harvest factors - Management of post harvest diseases - physical, chemical, biological methods – Postharvest treatments for organic produces – Application methods - Integrated management of post harvest diseases - Emerging technologies for postharvest disease control

Practical

Study of symptoms and host parasite relationship of the following crops : Tropical fruits - mango, banana, grapes, citrus, guava, sapota, papaya, jack fruit, pineapple, pomegranate, and ber Temperate fruits - apple, pear, peach, plum, almond, walnut and strawberry; Plantation crops - arecanut, coconut, oilpalm, coffee, tea, cocoa, cashew, rubber and betelvine; Medicinal and Aromatic crops - senna, neem, hemp, belladonna, pyrethrum, camphor, costus, crotalaria, datura, dioscorea, mint, opium, Solanum khasianum and Tephrosia and and Post harvest diseases of fruits, plantation and medicinal and aromatic crops and their management.

References

Theory
Unit I
Concept of entrepreneurship; entrepreneurial and managerial characteristics; Assessing overall business environment in the Indian economy. Globalisation and the emerging business / entrepreneurial environment. Overview of Indian social, political and economic systems and their implications on agricultural entrepreneurs.

Unit II
Managing an enterprise; motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up; SWOT analysis and Market Survey, Generation, incubation and commercialization of ideas and innovations.

Unit III

Unit IV

Unit V
Communication skills for entrepreneurs – Meaning, definition, process and importance, types of communication skills. Leadership – Definition, styles, difference between leaders and Managers.

Practicals
Listening and note taking, writing skills, oral presentation skills; Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting, individual and group presentations. Analysing cases, Practicing SWOT analysis. Visiting Agri clinics/Agri based industries/Agri Financing Institutions. Sample Project formulation and report preparation.

References
PJN 302

SOFT SKILLS FOR EMPLOYABILITY

0+1

Practical

Soft skills and hard skills – career skills and corporate skills – lateral thinking - ego styles – different types – on being a professional.

Attitude - Psychological and Sociological definitions – types of attitude (positive and negative) and consequences – suggestions to keep a good attitude. Emotional Intelligence - Introduction and Definitions – four branch model of EQ and its detailed explanation - five point scale to measure EI – suggestions to improve EI. Inter personal skills - Study of character traits - discussion of formal interpersonal skills like greeting, enquiring, answering, complimenting and acknowledging. Self Development/Empowerment - Self awareness and motivation – Maslow’s theory of hierarchy and needs - Self analysis through SWOT and Johari Window – Elements and seven rules of motivation – Goal setting based on principle of SMART – Strategies of self motivation – Knowledge enhancing through reading of Newspapers, magazines and journals.


References
VII SEMESTER COURSES
HOR 411  RURAL HORTICULTURAL WORK EXPERIENCE (RHWE) 0+10

The students will spend eight weeks working with State Department of Horticulture; Horticulture based industries, commercial horticulture farms, plantation industries etc., to gain first hand information and hands-on training in the chosen area of interest.

The course will be jointly conducted by the faculties from the Departments of Horticulture and Agricultural Extension.

EXPERIENTIAL LEARNING COURSES – I
HE 401 COMMERCIAL SEED PRODUCTION 0+8
Offering Department: Seed Science and Technology

Objective
To enable students to gain hands-on experience in commercial seed production and also to train the students to start a commercial seed production unit/farm.

Activities

Deliverables
Students who complete this course will gain enough confidence and technical skills to start a seed business.

References
HEL 402 COMPOSTING TECHNOLOGY 0+8
Offering Department: Soil Science and Agricultural Chemistry

Objective
To enable students to gain hands on experience in composting techniques and to train the students in establishing a commercial large scale composting unit.

Activities
Identification of raw materials, availability, types and segregation of wastes – Characterization – Preparation of Indore, Bangalore, Coimbatore method of composting – Windrow compost making – Vermicomposting – Acceleration of composting and enrichment of compost with bio-inoculants – Instrumentation techniques in compost analysis – Monitoring the changes during composting – Compost maturity analysis – Physical, Chemical and biological maturity tests – Quality standards – Economics of compost making and marketing – Field visit to small scale compost units – Agro-industrial composting sites and municipal waste composting – Preparation of large scale composting project.

Deliverables
The student who completes this course will gain enough skill and confidence to run a commercial composting unit.

References

HEL 403 PRODUCTION OF BIOCONTROL AGENTS 0+8
Offering Departments: Agricultural Entomology and Plant Pathology

Objective
To develop biocontrol agent and biopesticides production skills for entrepreneurial activity.

Activities
Requirements of a biocontrol unit - rearing of host insects for parasitoids and pathogens - rearing of prey insects for predators - rearing of egg parasitoid Trichogramma
Rearing of egg - larval parasitoid *Chelonus* - Larval parasitoids *Goniozus, Bracon* and *Eriborus* pupal parasitoids *Tetrastichus israeli, Thchospilus pupivora, Brachymeria, Acerophagous papaya* - rearing of predators - *Coccinellids – Cryptolaemus montrouzieri, Scymnus coccivora* - Rearing of *Chrysoperla carnea* - Mass production of entomopathogens - production of nuclear polyhedrosis virus of *Helicoverpa armigera* and *Spodoptera litura* granulosis virus of sugarcane early shoot borer *Chilo infuscataellus, Metarhizium anisopliae, Beauveria bassiana* and *Verticillium lecanii* - Standardization of insect pathogens - Field utilization techniques of biocontrol agents - Improving the efficacy of biocontrol agents - Isolation and mass multiplication of fungal biocontrol agents (*Trichoderma* and VAM) and PGPR (*Pseudomonas fluorescens* and *Bacillus subtilis*) - Delivery systems - Quality parameter studies - Cost analysis and Project preparation - Specifications for establishing biocontrol laboratory - Agricultural Finance - Preparation of botanical pesticides and antiviral principles - Delivery systems Cost analysis and project preparation: Principles of enterprise management - preparation of agricultural project reports - project analysis and financial management - agricultural finance - source of finance - acquisition - ratio analysis - principles of costing - economics of farm enterprise - Visit to biocontrol laboratory at KVK, Puducherry.

**Deliverables**

Students who complete this course will gain technical competence to start biocontrol agent production unit independently.

**References**

Objective
Understanding the principles of bioinoculants production technology; to update the knowledge on bioinoculants technology with current scenario and to impart entrepreneurship to the undergraduate students.

Activities

1. To understand and gain practical knowledge on various techniques related to bioinoculant production and application methods.
2. To build confidence on planning entrepreneurial tasks for bioinoculant production.

Deliverables
The student who completes this course will gain skill and technical knowledge to start bio-inoculants production unit.

References


PJN 401  ALL INDIA TOUR  0+2

The students will visit various National and International Institutions related to Agriculture, Horticulture, Forestry and other allied fields in various regions of the country. The students will gain first hand knowledge about different agro-climatic zones, crops grown, cultivation practices, socio-cultural and economic status of the farming communities in different parts of the country. The duration of the tour will be 15 days (institutional visits and intermediate journey) exclusive of onward and return journey.
VIII SEMESTER COURSES
EXPERIENTIAL LEARNING COURSES – II

HEL 405 PROTECTED CULTIVATION AND PRECISION HORTICULTURE 0+20

Offering Department: Horticulture

Objectives

1. Understanding the principles and theoretical aspects of protected cultivation of high value vegetable crops
2. Developing skills in erection of protected structures and cultivation of vegetable crops

Activities

- Study of various protected structures, importance and function – Location, planning and various components of green house – Layout and erection of different types of structures – Green house heating, cooling, shading and ventilation system – CO2 generation and monitoring – Lighting systems – Growing of vegetables crops i.e., Cucumber and Capsicum – Containers and substrates – Soil Sterilization – Drip and fertigation system – Water and nutrient management – Weed management – Special horticultural practices i.e. training and pruning – IPM & IDM – Harvest indices – Harvesting techniques, post harvest handling techniques – visit to commercial vegetables production units – Precision horticulture; principles and concepts; GPS, GIS, remote sensing, variability management in precision farming, GAP, precision equipments. Project preparation to establish a commercial green house.

Deliverables

Students who complete this course will gain confidence and technical skills to establish a commercial green house.

References


HEL 406 NURSERY PRODUCTION AND MANAGEMENT 0+20

Offering Department: Horticulture

Objective

To enhance the technical expertise related to propagation of commercial horticultural crops and to inculcate entrepreneurial capacity by providing hands on training and practical exposure for the students to effectively manage horticultural nurseries.
Activities

Types of nurseries and economical importance – Tools and implements – Different types of media – Practices in preparation of media for fruit plants – Flowering annuals, foliage and indoor plants – Containers for propagation – Seed propagation – Visit to community nurseries producing hybrid vegetable seedlings in pro trays – Visit to shade net houses to study cost of erection of net house – Calculating requirement and working out cost economics – Mother plant block or scion block establishment – Hands on training in preparation of various types of cuttings, layering, budding and grafting – Raising of root stocks - After care of propagated plants - Commercial propagation of horticultural crops – Mango, Sapota, Aonla, Guava, Jasmine, foliage ornamental plants, important flowering climbers, ornamental trees – Maintenance of records in nursery – Project preparation for the establishment of commercial nursery.

Deliverables

Students who complete this course will gain confidence and technical skills to establish a commercial nursery.

References


HEL 407 POST HARVEST TECHNOLOGY AND VALUE-ADDITION
Offering Department: Horticulture

Objective

To emphasize the importance in post harvest technology and value – addition in horticultural crops

Activities

Design and project formulation - Design and lay out of pilot plant, cold store, grading – packing line, cool chain - Pre harvest practices to extend shelf life - Quality standards of fruits and vegetables for processing - Procurement of raw material, inventory control - Post harvest handling; grading; packaging; cool chain transportation and storage of fresh produce - Processing (juice/pulp extraction, concentration, product preparation; dehydration; waste Management; In-plant quality control) - Packaging (bottling, corking, sealing, labeling, aseptic packaging, storage) - Quality laboratory exercises, quality assurance, analytical tools, hygiene, machinery Maintenance, HACCP, International standards, FPO Licence, PFA standards, codex Laws - Sales promotion of processed products, certification, distribution and marketing, pricing of the produce, banking, finance and Institutional management.
Deliverables
Students on completing the course will gain confidence to start a processing unit

References
6. Rathore, N.S., Mathur, G.K. and Chasta, S.S. Post harvest management and processing of fruits and vegetable ICAR. New Delhi 2012
8. Journal of food science and Technology. Indian food Industry beverage and food world

HEL 408 FLORICULTURE AND LANDSCAPE GARDENING 0+20
Offering Department: Horticulture

Objective
To equip students in identifying various landscape elements and application in landscape designing

Activities

Deliverables
Students on completing the course will become professionals in landscaping home and other gardens of public importance
References

1. Arora, J.S. Introductory Ornamental Horticulture