

### Ph. D. Syllabus in the Department of Horticulture

Course code	Name of the course	Credits
HOR 600	Research methodology for horticultural science	4+0
HOR 602	Advances in production of fruit crops	4+0
HOR 603	Advances in vegetable production	4+0
HOR 661	Course on thesis writing etc.	4+0

#### **HOR 600 Research methodology for horticultural science**

**4+0**

#### **Objective:**

Students are expected to know the detail about ethics of research, aspects of data and statistical approaches, experimental design, laboratory techniques, scientific writing methods, research project formulation etc.

#### **Syllabus:**

##### UNIT I

Concept of research, values and ethics in research, copy right, plagiarism etc; research methodology.

##### UNIT II

Nature and scope of horticultural research; defining research problems and technologies involved; research designing.

##### UNIT III

Sources and types of data, methods of data collection, logistic arrangement of data, data processing and analysis, Testing of hypothesis, parametric and non-parametric approaches, concept of error, test of significance. Data interpretation and presentation of result.

##### UNIT IV

Basic principles of experimental designing, field plot techniques and biometric observations.

##### UNIT V

Basic principles of laboratory techniques commonly used in horticulture research. Laboratory safety.

##### UNIT VI

Technique of scientific writing; abstract on a research article, review of literature, citation technique; literature search in library and internet.

##### UNIT VII

National and international agricultural research and development system, concept of patent, intellectual property and its management etc.

##### UNIT VIII

Formulation of research project.

##### UNIT IX

Lay out of field plot experimental design; biometric observation recording, data analysis, interpretation, graphical and tabular presentation of data; statistical analysis of data using software; collection of soil and plant samples and processing for laboratory analysis; Common lab techniques used in horticultural research; literature search in library and internet; development of concept note on research problem; handling of presentation media (camera, OHP, LCD etc.); seminar preparation and presentation.

**Learning Outcome:**

Students will gather the knowledge of ethics of research, aspects of data and statistical approaches, principles of experimental design, laboratory techniques used in horticultural research, scientific writing methods (viz. abstracts, reviews, research papers), research project formulation etc.

**HOR 602**

**Advances in production of fruit crops**

**4+0**

**Objective:**

Students are expected to gain the knowledge on recent advances in propagation and rootstock management, high density planting, precision farming, crop regulation, modern approaches of water and nutrient management with special reference to different major tropical, subtropical and temperate fruits.

**Syllabus:**

National and International scenario in fruit production, Recent advances in propagation - root stock influence, planting systems, High density planting, crop modeling, Precision farming, decision support systems - aspects of crop regulation- physical and chemical regulation effects on physiology and development, influence of stress factors, strategies to overcome stress effects, integrated and modern approaches in water and nutrient management, Total quality management(TQM) - Current topics.

Crops

UNIT I: Mango and banana

UNIT II: Papaya, grapes and citrus

UNIT III: Guava, sapota and aonla

UNIT IV: Pineapple, avocado and jack

UNIT V: Apple, pear, plums, strawberry, peach, apricot, cherries and nut crops

UNIT VI:

Survey of existing fruit cropping systems and development of a model cropping system, Estimating nutrient deficiency- estimation of water use efficiency, soil test-crop response correlations, practices in plant growth regulation, studying physiological and biochemical responses, quality analysis.

**Learning Outcome:**

Students will gather the advanced knowledge on different types of propagation and management of rootstock, high density planting, precision farming, crop regulation,

modern approaches of water and nutrient management with special reference to different major tropical, subtropical and temperate fruits.

**HOR 603**

**Advances in vegetable production**

**4+0**

**Objective:**

Students are expected to gather details on advances in nutritional and economical value, edaphic factors of production, choice of variety, nursery management, water, nutrient and weed management, protected and year round cultivation, export oriented production etc.

**Syllabus:**

Present status and prospects of vegetable cultivation; nutritional and medicinal values; climate and soil as critical factors in vegetable production; choice of varieties; nursery management; modern concepts in water and weed management; physiological basis of growth, yield and quality as influenced by chemicals and growth regulators; role of organic manures, inorganic fertilizers, micronutrients and biofertilizers; response of genotypes to low and high nutrient management, nutritional deficiencies, disorders and correction methods; different cropping systems; mulching; containerized culture for year round vegetable production; low cost polyhouse; net house production; crop modeling, organic gardening; vegetable production for pigments, export and processing of:

UNIT I

Tomato, brinjal, chilli, sweet pepper and potato

UNIT II

Cucurbits, cabbage, cauliflower and knol-khol

UNIT III

Bhendi, onion, peas and beans, amaranthus and drumstick

UNIT IV

Carrot, beet root and radish

UNIT V

Sweet potato, tapioca, elephant foot yam and taro

UNIT VI

Seed hardening treatments; practices in vegetable growing and organic gardening; portraits and ball culture; diagnosis of nutritional and physiological disorders; analysis of physiological factors like anatomy; photosynthesis; light intensity in different cropping situation; assessing nutrient status, use of plant growth regulators; practices in herbicide application; estimating water requirements in relation to crop growth stages, maturity indices; dryland techniques for rainfed vegetable production; production constraints; analysis of different cropping system in various situation like cold and hot set; vegetable waste recycling management; quality analysis ;marketing survey of the above crops; visit to vegetable and fruit mals, farm and packing houses.

**Learning Outcome:**

Students will acquire advanced knowledge in nutritional and economical value, edaphic factors of production, choice of variety, nursery management, water, nutrient and weed management, protected and year round cultivation, export oriented production etc.

**HOR 661**

**Thesis writing**

**4+0**

**Objective:**

Students are expected to know the basics of research designing and synopsis writing, methods of collection of review of literature, identification of research problem, framing research methodology as well as acquire the concepts of thesis and its preparation techniques including seminar preparation.

**Syllabus:**

UNIT 1

Components of thesis and their importance.

UNIT II

Defining research problems, research designing and synopsis writing.

UNIT III

Origin of research problem and writing introduction; developing theoretical orientation and conducting review of literature; framing research methodology; writing result and discussion chapter; drawing summary and conclusion; future scope of work related to the research problem.

UNIT IV

Citing the references and appendices.

UNIT V

Seminar preparation.

UNIT VI

Copy right, plagiarism etc.

Practical

Practice in writing the Introduction, Review of literature, Methodology, Result and Discussion, Summary and Conclusion, References and Appendices. Seminar presentation.

**Learning Outcome:**

Students will gather the basic knowledge of designing and writing synopsis, methods of collection of review of literature, identification of research problem, framing research methodology as well as they will acquire the concepts of thesis and its preparation techniques including seminar preparation.