**Programme: M.Sc. (Ag.) Plant Pathology**

**Curriculum and Syllabus**

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| Semester | Course Code & No. | Course Title | Credit Hrs. | Mid Exam | Final Exam | Total |
| Theory | Practical |
| Ist Sem. | PPA 501 | Mycology I |  3 (2+1) | 30 | 50 | 20 | 100 |
| PPA 502 | Mycology II | 3 (2+1) | 30 | 50 | 20 | 100 |
| PPA 503 | Introductory Bacteriology | 3 (2+1) | 30 | 50 | 20 | 100 |
| STAT 551 | Statistical Method | 3 (2+1) | 30 | 50 | 20 | 100 |
|  Total 12 (8+4) |
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| IInd Sem. | PPA 504 | Principle of Plant Pathology |  3 (2+1) | 30 | 50 | 20 | 100 |
| PPA 505 | Introductory Virology | 3 (2+1) | 30 | 50 | 20 | 100 |
| PPA 506 | Disease of Field Crop | 3 (2+1) | 30 | 50 | 20 | 100 |
| PPA 507 | Plant Pathological Technique | 2 (1+1) | 30 | 50 | 20 | 100 |
|  Total 11 (7+4) |

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| Semester | Course Code & No. | Course Title | Credit Hrs. | Mid Exam | Final Exam | Total |
| Theory | Practical |
| IIIrd Sem. | PPA 508 | Diseases of Fruits & Vegetable Crops  | 3 (2+1) | 30 | 50 | 20 | 100 |
| PPA 509 | Plant Disease Management | 3 (2+1) | 30 | 50 | 20 | 100 |
| PPA 510 | Seed Pathology |  3 (2+1) | 30 | 50 | 20 | 100 |
|  Total 9 (6+3) |
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| IVth Sem. | PPA 511 | Mushroom Production Technology | 2 (1+1) | 30 | 50 | 20 | 100 |
| PPA 591 | Seminar |  1 (1+0) | - | - | - | 100 |
| PPA 599 | Research | 20(0+20) | - | - | - | 100 |
|  Total 23 (2+21) |

 **Total Credit : 55**

**Ist Semester, Plant Pathology**

**PPA 501 – MYCOLOGY I**

**(Credit Hours: 2 + 1 = 3)**

**Introduction -** Milestones in mycology, General characteristics and classification of Protists Plasmodiophora, Dictyostelium and life cycles of typical Myxomycetes, Asco and Basidio-lichens. Fungal genetics, sexuality and variability in fungi. General characteristics and classification of kingdom Straminopila with special emphasis of life cycle of following of genera-Pythium, *Phytoph- thora, Albugo, Peronospora, Achlya* and *Saprolegnia.* fungal systematics, general characteristics and classification of kingdom fungi phylum: Cytridiomycota - *Synchytrium endobioticum, Allomyces, Chytriomyces,* phylum: Zygomycota- , *Rhizopus, Mucor, Endogone* and *Glomus.*

**Practical:** Related with the Course.

**PPA 502– MYCOLOGY II**

**(Credit Hours: 2 + 1 = 3**

General characteristics and classification of kingdom fungiphylum: Ascomycota - *Saccharomyces* spp.; *Taphrina Aspergillus, Penicillium, Claviceps purpurea, Neurospora sitophila, Monilinia, venturia,* phylum: Basidiomycota -*Agaricus, pleurotus, Puccinia, Melampsora, Uromyces, Tilleiia,* - *Ustilago,* Imperfect fungi,- *Colletotrichum, Phoma, A scochyta, helmmthosporiurn, Cercospora, Botrytis, Fusarium* and *Rhizoctonia.*

**Practical :** Realated with the Course

**PPA 503 - INTRODUCTORY BACTERIOLOGY**

**(Credit Hours: 2 + 1 = 3**

**Bacteria :** History and development, origin of bacteria, fossil bacteria, classification, morphology, structure, metabolism and Reproduction. Classification and identification of phytopathogenic bacteria. Nutrition: autotrophic and heterotrophic. Comparison of Prokaryote, Eukaryote and Archeabacteria. Bacterial toxins and enzymes, elementary bacterial genetics and mechanism of variability. Bacteriophages. General characteristics of rickettsia, bdellobrios and L-form bacteria.

**Mollecutes -** Introduction, history and milestones, definition, characteristics cell morphology and replication, classification, differences between Mycoplasma, Phytoplasma and Spiroplasma.

**Practical:** Related with the Course.

**STAT 551- STATISTICAL METHODS**

**(Credit Hours: 2 + 1 = 3**

Frequency distribution, classification and tabulation of data; graphical and diagramatic representation of data, measures of central tendency, measures of despersian, coefficient of variance, standard error, skewness

& kurtosis.

Consus & sample survey, population and sample, probability concept of random sampling, simple random sample, statified sampling systematic & cluster sampling parameter & sample value. Testing of hypothesis. test of signification based on Z t and F test *x2* - test f01; goodness of fit and independence of attributes.

Scattered diagram. Linear regression & correlation, regression and correlation coefficient.

 **DESIGN OF EXPERIMENTS**

Analysis of variance. Basic principal of experimental design, CRD, RBO, LSD with their analysis mission plot techniques in R.B.D. and L.S.D.

Factorial experiment its concepts and analysis of 23, factorial. Confounding in symmetrical factorial (in 23 experiments), split plot design, strip plot design, uniformity trials. Progeny row trials. Complect family black design, with over trials & simple rotational experiments. Statistical organization, statistics of livestock & fistrics source of livestock and agriculture in general. Source of official statistician. Crop cutting experiments.

**Practical :** Realated with the Course

**IInd Semester**

**PPA 504- PRINCIPLES OF PLANT PATHOLOGY**

**(Credit Hours: 2 + 1 = 3)**

Importance of plant diseases, scope & objective of plant pathology, Brief history of plant pathology. Classification of plants diseases, Symptoms and sings of plant's diseases. Environmental effects on the development of infectious plants disease. Physiologic specialization anti variation in plant pathogens. Parasitism and disease development, role of enzymes and toxins during infections. General principles of plant disease managements.

**Practical:** Related with the Course.

**PPA 505- INTODUCTORY VIROLOGY**

 **(Credit Hours: 2 + 1 = 3)**

Brief history and economic importance of viruses, plant viruses morphology and structure, composition, replication, nomenclature and classification of plant viruses. Induction of disease symptoms caused by viruses. and transmission. Physiology of virus infected plants. Detection of isolation, purification and serology of plant viruses.

Bacteriophase

**Practical :** Related With Course

**PPA 506– DISEASE OF FIELD CROP**

 **(Credit Hours: 2 + 1 = 3)**

 Symptoms, etiology, transmission and control of important disease of field and oil seed

crops.

Disease of wheat - Rust, Loose smut, Hill bunt, Karnal bunt, Leaf smut, Alternaria blight,

Ear cockle.

Diseases of paddy – Blast, Helminthosporium leaf spot, Stem rot, Kernal bunt, Leaf

smut, False smut, Bakanae disease, Sheath blight, Bacterial blight, Khaira disease. Diseases of jowar - Downy mildew, Loose, covered, head and long smuts Diseases of

bajra - Downy mildew or Green ear, Leaf rust, Grain smut and Ergot.

Disease of maize - Smut Brown spots, Pythium .stalk rots. Diseases, tobacco - Damping

off, Mosaic.

Diseases of barley - Covered smut.

Disease of sugarcane - Red Rot, Wilt, Smut.

Diseases of pigeon pea - wilt, Sterility mosaic, Phytophthora blight.

Diseases of gram - Wilt and blight.

Diseases of mung and urd - Cercospora leaf spots.

Symptoms, etiology, transmission and control of important d iscases of oil seed crops.

Ground nut – Tikka disease, rust, wilt and collar rot.

Linseed – Rust, Blight & wilt

Mustard – White rust, Leaf blight

Sunflower – Rust Leaf spot and wilt

Sesamum – Leaf spot and Phyllody

Castor – Seedling blight, rust, blight, leaf spot.

**Practical :** Realated with the Course

**PPA 507 - PLANT PATHOLOGICAL TECHNIQUE**

 **(Credit Hours: 1 + 1 = 2)**

Microscopy: Calibration and measurement of spore, camera Iucida drawing, microtomes and microtomy procedures (paraffin embedding and freeze microtome), Preparation of mount, preservation of fungi, cleaning and sterilization of glassware and culture media (natural, semi synthetic and synthetic). Determination. of pH. Inoculation and isolation of pathogens, purification of fungal culture, Koch's postulates. Methods of spore germination. Demonstration of appresoria and houstoria in plant pathogenic fungi. Stains and staining, detection of plant pathogens. In vitro evaluation of fungicides and bactricides. Field experiments, and collection of data and references. Laboratory Equipments and their use \_ Autoclave, hot air oven, laminar air flow, pH meter, spectrophotometer micro tomes and B.O.D. Incubator. **Practical:** Related with the Course.

**IIIrd Semester**

**PPA 508 - DISEASES OF FRUIT AND VEGETABLE CROPS**

**(Credit Hours: 2 + 1 = 3)**

**S**ymptoms etiology, transmission and control of the following disease of fruits crops.

Mango - Anthracnose, scab malformation, Loranthus, black tip, powdery mildew.

Apple - Scab, powdery mildew, soft rot.

Citrus - Canker, Fruit rots, Greening & Tristeza, Die-back. Root rots.

Guava - Wilt and Fruit blotch.

Papaya - Foot rot, mosaic, Leaf curl.

Grapes - Downy mildew and powdery Mildew

Jack fruit - Brown leaf spot & Rhizopus rot

Banana - Panama disease & bunchy top.

Disease of forest trees including neem and stored timber.

Turmeric - Rhizome rot, soft rot

Ginger - Rhhizome rot, soft rot, wilt/yellow diseases

Coriander- stem gall, wilt and powdery mildew

Cumin - Powdery mildew, damping off,

Cardamom: Rhizome rot, leaf rust, leaf spot

Diseases of brinjal- Phomosis, Fruit rot, Little leaf.

Diseases of pea - Downy mildew, powdery mildew, rust.

Diseases of coriander - Stern gall.

Diseases of cabbage and cauliflower - Club root, Damping Off, Black rot.

Diseases of okra - Yellow vein mosaic.

Diseases of onion - Smut.

Diseases of garlic - Garlic blotch.

Diseases of chillies - Anthracnose, Fruit rot, Virus diseases'.

Disease of tomato - Early blight, Leaf curl, Root - knot.

Diseases of cucurbits - Powdery mildew, Downy mildew. Practical - Related with the

course. **Practical:** Related with the Course.

**PPA 509– PLANT DISEASE MANAGEMENT**

 **(Credit Hours: 2 + 1 = 3)**

Principles of plant disease management by cultural, physical, biological, chemical, organic amendments and botanicals methods of plant disease control, integrated control measures of plant diseases. Disease resistance and molecular approach for disease management. History of fungicides, bactericides, concepts of pathogen immobilization, chemical protection and chemotherapy, nature, properties and mode of action of antifungal, antibacterial and antiviral chemicals. Foliage, seed and soil application of chemicals, role of stickers, spreaders and other adjuvants, health vis-a-vis environmental hazards, residual effects and safety measures.

**Practical :** Realated with the Course

**PPA 510- SEED PATHOLOGY**

**(Credit Hours: 2 + 1 = 3)**

History and importance of seed pathology. International seed testing association its role and functions. Morphology and anatomy of seed; Entry points of seed infection. Plant-seed and seed-plant transillission. Establishment of infection and Course of disease. Environment affecting establishment, seed crop management. Seed treatment, quarantine for seed certification. Detection of seed borne pathogen. Seed health testing methods. Important seed transmitted disease, their symptoms and disease cycles. Storage fungi. Impact of storage fungi on stored grains seeds. Factors influencing invasion of stored grain seed by fungi. Management of seed brone pathogens.

**Practical:** Related with the Course.

**IVth Semester**

**PPA 511 – MUSHROOM PRODUCTION TECHNOLOGY**

 **(Credit Hours: 1 + 1 = 2)**

Mushroom morphology different parts of a typical mushroom & variations in mushroom morphology. Key to differentiate Edible from Poisonous mushrooms. Mushroom Classification: Based on occurrence- Epigenous & Hypogenous, Natural Habitats-Humicolous, Lignicolous & Coprophilous, Color of spores- white,yellow ,pink, purple brown & black, Morphology- fruiting layers exposed to air, fruiting layers not exposed to air, plants with predominantly pitted cap, cap saddled shape & saucer shape, Structure and texture of fruit bodies-gilled fungal& pore fungal, Fruit bodies and spores- Ainsworth et al ( 1973) classification. Recent Classification- 8 th edition of Ainsworth & Bisby’s ‘Dictionary of Fungi’. Biology of Mushrooms: Button, Straw& Oyster- General morphology, distinguishing characteristics, spore germination and life cycle. Cultivation Technique.

 **Practical :** Realated with the Course

**PPA 591 - SEMINAR**

 **(Credit Hours: 1 + 0 = 1)**

 **PPA 599 -RESEARCH**

 **(Credit Hours: 0 + 20 = 20)**