

**PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR
UNIVERSITY, SOLAPUR**



NAAC Accredited-2022

'B++'Grade (CGPA2.96)

FACULTY OF SCIENCE & TECHNOLOGY

**NEP 2020 Compliant Curriculum for M.Sc. I
(Agrochemicals and Pest Management)
with effect from 2026-27**



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science & Technology NEP 2020 Compliant Curriculum

M.Sc. (AGPM)

Program Preamble

Punyashlok Ahilyadevi Holkar Solapur University since its inception, has successfully tried to meet the regional demands for socio-economic development by introducing need-based course. The Agrochemicals and Pest Management course was introduced by Punyashlok Ahilyadevi Holkar Solapur University from 2006. It is an interdisciplinary subject. The course content includes analysis and formulations of agrochemicals, applied entomology, plant pathology, biocontrol of pests, extension work, use and marketing of agrochemicals, plant protection equipment, sales and services. Moreover students have to complete one month of industrial training especially in pesticide and fertilizer industries, extension and marketing agencies, and analytical laboratories, various crop research stations, etc. So that they become acquainted with the needs of industries and application of knowledge they have. Today there is a great demand for this applied course, as students have realized that they have better chances of getting jobs in this world of competition, as compared to conventional courses which trained human resources for teaching only.

1. **Major Courses:** These core courses form the backbone of the program, providing in-depth knowledge and understanding of essential agrochemical concepts, theories, and formulation methodologies. Students will engage with topics ranging from the plant fertilizers, analysis and formulations of agrochemicals, applied entomology, plant pathology, bio control of pests, use and marketing of agrochemicals, and comprehensive education in the discipline.
2. **Minor Courses:** Students have the opportunity to choose minor courses from related or distinct disciplines, promoting an interdisciplinary approach to learning. This flexibility allows students to complement their agrochemicals & pest management education with insights from fields such as computer science, or engineering, enhancing their versatility and broadening their career prospects.
3. **Field Projects/Internships/ /On-Job Training:** To bridge the gap between theoretical knowledge and real-world applications, the program includes opportunities for field projects, internships, apprenticeships, and community engagement. These experiences provide students with practical insights, problem-solving abilities, and exposure to professional environments, enhancing their readiness for careers in AGPM and related fields.
4. **Research Methodology and Research Projects:** Research is a critical component of the M. Sc. AGPM program, with students acquiring skills in research methodology, data collection, analysis, and scientific inquiry. By engaging in independent research projects, students are encouraged to develop innovative solutions to complex scientific problems, preparing them for advanced studies and research-oriented careers.

Multiple Entry and Multiple Exit Options

In accordance with the NEP 2020, the M.Sc. AGPM program incorporates a Multiple Entry and Multiple Exit framework, offering students the flexibility to enter or exit the program at various stages. This approach ensures that students can tailor their educational journey according to their personal and professional goals, with options to earn certificates, diplomas, or degrees based on the duration of study completed.

Year 1:

Exit Option : Student can exit, after acquiring 44 credits with post graduate diploma in Agrochemicals and Pest Management after one year PG Degree

Eligibility for M. Sc. AGPM:

Admission to the course is open only to the candidates passing B.Sc. degree with Chemistry / Botany / Zoology / Microbiology / Plant protection / Biochemistry/ Biotechnology / Environment / Horticulture / Agriculture as the principal subject and B. Pharm. Candidates will be selected from the students who appeared for entrance test and fulfill the conditions as per the university rules for the entrance examination.



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NEP 2020 Compliant Curriculum**

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Program Outcomes (PO)

Students post graduating from the Master of Science in Agrochemicals and Pest Management program will be able to:

Major Courses:

- **PO1:** Demonstrate in-depth knowledge and understanding of core concepts, theories, and methodologies in the chosen major discipline.
- **PO2:** Apply disciplinary knowledge to solve complex problems, analyze data, and make informed decisions in professional and research contexts.

Minor Courses:

- **PO3:** Acquire complementary knowledge and skills from a related or distinct discipline, enhancing interdisciplinary understanding and versatility.

Field Projects/Internship/Apprenticeship/ On Job Training/ Internship:

- **PO4:** Apply theoretical knowledge to real-world situations through field projects, internships, community engagement and On Job Training for gaining practical experience and problem-solving skills.

Research Methodology and Research Project:

- **PO5:** Acquire research skills, including data collection, analysis, and interpretation, fostering a scientific approach to problem-solving to develop independent research projects handling capabilities.



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M. Sc. (AGPM)

Program Specific Outcomes (PSOs)

Students graduating from M. Sc. (AGPM) will able to :

PSO1: Apply the knowledge of agrochemicals to the solution of agricultural related issues:

In this program, students are trained in such a way that they can gain good knowledge of theoretical and practical skills. This skilful knowledge will certainly develop a good and ample crop yield.

PSO2: Modern tool usage: To create, select, and apply appropriate techniques, resources, and modern tools including prediction and modelling to identification of various diseases. Encourage the modern tools and techniques in agriculture so as to manipulate the pest, diseases & weeds in the agricultural field.

PSO3: Application of Agrochemicals: To apply ethical principles and commit to professional ethics and responsibilities and norms of the agricultural practice. It helps to build their career in various fields like development of pest control, rearing of pest, synthesis of pesticides and its formulation.

Proposed Structure for Two Year PG Program Agrochemicals and Pest Management (AGPM) (Semester I and II)

Year (2 Yr PG)	Level	Sem. (2Yr)	Major		RM	OJT/FP	RP	Cum. Cr.	Degree
			Mandatory	Elective					
I	6.0	Sem I	DSC-1 (4+2) Soil Science, Fertilizers and micronutrients M2623-DSC-11	DSE-1 (4+2) 1.1 Plant Pathology and Weed Management M2623-DSE-1A	RM (4) Research Methodology M2623-RM- 11	-- -- -	- -	22	PG Diplom a (after 3 Yr Degree)
			DSC-2 (4+2) Chemistry of Pesticides and their Formulations M2623-DSC-12	OR 1.2 Applied Microbiology and Biostatistics M2623-DSE-1B					
		Sem II	DSC-3 (4+2) Applied and Economic Entomology M2623-DSC-23	DSE-2 (4+2) 2.1 Agronomy and Biotechnology M2623-DSE-2A	-----	OJT/FP (04) M2623- OJT-21	- - - -	22	
			DSC-4 (4+2) Analytical Techniques for Agrochemicals M2623-DSC-24	OR 2.2 Integrated Pest Management M2623-DSE-2B					
Cum. Cr. For PG Diploma			24	12	04	04	- - - -	44	
Exit option: PG Diploma (44 Credits) after Three Year UG Degree									

**M.Sc. Agrochemicals and Pest Management (AGPM): Program structure based
on NEP 2020 M.Sc. I Semester-I**

Course Type	Course	Paper Titles	Credit	Examination scheme		
				UA	CA	Total
Major Mandatory	DSC-1	Soil Science, Fertilizers and micronutrients M2623-DSC-11	04	60	40	100
		Practical's (Based on DSC-1) M2623-DSC-11P	02	30	20	50
	DSC-2	Chemistry of Pesticides and their Formulations M2623-DSC-12	04	60	40	100
		Practical's (Based on DSC-2) M2623-DSC-12P	02	30	20	50
Major Elective	DSE-1	1.1 Plant Pathology and Weed Management M2623-DSE-1A OR 1.2 Applied Microbiology and Biostatistics M2623-DSE-1B	04	60	40	100
		Practical's (Based on DSE- 1.1 or DSE-1. 2) DSE – 1.1 M2623-DSE-1A-P DSE – 1.2 M2623-DSE-1B-P	02	30	20	50
RM	RM	Research Methodology M2623-RM-11	04	60	40	100
		Total	22	330	220	550

M.Sc. I SEMESTER-II

Course Type	Course	Paper Titles	Credit	Examination scheme		
				UA	CA	Total
Major Mandatory	DSC-3	Applied and Economic Entomology M2623-DSC-23	04	60	40	100
		Practical's (Based on DSC-3) M2623-DSC-23P	02	30	20	50
	DSC-4	Analytical Techniques for Agrochemicals M2623-DSC-24	04	60	40	100
		Practical's (Based on DSC-4) M2623-DSC-24P	02	30	20	50
Major Elective	DSE-2	2.1 Agronomy and Biotechnology M2623-DSE-2A OR 2.2 Integrated Pest Management M2623-DSE-2B	04	60	40	100
		Practical's (Based on DSE- 2.1 or DSE- 2.2) DSE – 2.1 M2623-DSE-2A-P DSE – 2.2 M2623-DSE-2B-P	02	30	20	50
OJT/FP	OJT/FP	On Job Training / Field Project M2623-OJT-21	04	60	40	100
		Total	22	330	220	550
	Total for PG Diploma		44	660	440	1100

Exit

Option at Level 6: Student can exit, after acquiring 44 credits with post graduate diploma in Agrochemicals and Pest Management after 1st year.

Abbreviations: 4 Credits of Theory = 4 Hours of teaching per week 2 Credit of Practical = 4 hours per week DSC: Discipline Specific Core, DSE: Discipline Specific Elective, RM: Research Methodology, OJT: On Job Training / Internship/Apprenticeship, FP: Field Project



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

First Year M Sc (AGPM)

Semester-I

Vertical : Major Mandatory

Course Name: DSC – 1: Soil Science, Fertilizers and micronutrients

M2623-DSC-11

***Teaching Scheme**

Lectures: 04 Hours/week, 04 Credits

OR

Practical: 02 Hours/week, 02 Credits

***Examination Scheme**

UA: 60 Marks

CA: 40 Marks

Course Preamble: After studying the above paper students will acquire the knowledge of the following points. The students will get knowledge of the chemistry of pesticides. The information soil and its types for various cropping patterns. The students will have complete knowledge of fertilizer used in farming. The required information of agricultural pesticides and their formulation is given. Development of a new Agrochemical residue analysis method for Bio pesticides and Micronutrient.

Course Objectives:

During this course, the student is expected to:

1. To learn about soil formation, soil profile and different types of soil
2. To get knowledge of the physical, chemical and biological properties of soil.
3. To study soil and its types for various cropping patterns.
4. To understand essential plant nutrients and their role in plant growth
5. To study complete knowledge of fertilizer used in farming.

Course Outcomes:

At the end of this course, students will be able to:

1. Students are able to explain basic concept of soil science analyze soil formation and soil composition
2. Students are able to evaluate properties of fertilizer and its application
3. Students are able to identify essential plant nutrient, nutrient deficiency symptoms and diagnose nutrient deficiencies
4. Students are able to differentiate between organic fertilizer, chemical fertilizers and biofertilizers

Unit-1: Soil Science	No. of lectures-15	Weightage:15-23 Marks
Unit content: Importance of soil formation, properties and composition of soil, soil profile, types of soil, acidic and alkaline soils, soil reclamation, absorption of toxic metals and chemicals by soil, effect of modern agro-technology and pesticides on soil . (Theoretical Treatment)		
Unit-2: Fertilizers	No. of lectures-15	Weightage:15-23 Marks
Unit content: Classification and types of fertilizers. Nitrogenous Fertilizers: Introduction, ammonium nitrate- Raw materials and manufacturing. Action of urea, calcium cyanamide, calcium ammonium nitrate, sodium nitrate and ammonium chloride as fertilizers. Phosphate fertilizers: Normal super phosphate, triple super phosphate and ammonium phosphate. Potassic fertilizers: Potassium sulphate and the muriate of potash and current status of fertilizer industries in India (Theoretical Treatment)		
Section II		
Unit-3: Micronutrients	No. of lectures-15	Weightage:15-23 Marks
Unit content: Definition, types, properties and uses of micronutrients, manufacture of micronutrients, deficiency and reclamation Plant Growth Regulators: Introduction, Definition, and Classification. Applications of a) Gibberellins b) Auxins c) Cytokinins d) Ethylene and e) Chloro Choline Chloride (CCC) in agriculture. (Theoretical Treatment)		

Unit-4: Manures	No. of lectures- 15	Weightage:15-23 Marks
Unit content: Manures: Introduction, Definition, Humus and decomposing organic matter in soil, Natural organic Manures such as Farmyard Manure, Compost, Vermicompost, Vermiwash and Green Manure. Biofertilizers: Introduction, Definition Rhizobium as Biofertilizers: Isolation of Rhizobium from root nodules, Mass culture of Rhizobium, Inoculation of seeds with Rhizobium. Blue Green Algae as Biofertilizers: Production of BGA by Trough method, Pit Method and Field Method, Application of BGA to crop fields. Merits and demerits of Biofertilizers. (Theoretical Treatment)		
College Level Assessment (CA) Activities: M2623-DSC-11P List of Experiments/Assignments, etc. Any six of the following:		
1.	Estimation of soil moisture by gravimetric method	
2.	Determination of particle density of the soil.	
3.	Isolation and culture of nitrogen fixing bacteria.	
4.	Estimation of organic matter content in soil.	
5.	Estimation of Nitrogen in Urea.	
6.	Determination of electrical conductance of various soil samples	
7.	To study the deficiency symptoms of N, K, Mg and Fe in plants	
8.	Determination of pH of various water samples by pH meter.	
9.	Determination of Water Holding Capacity of soil samples	
10.	Determination of soil pH by pH paper and pH meter method.	
11.	Determination of salinity of soil by conductometric method.	

12.	Estimation of phosphorus from soil by colorimetric method.
13.	Preparation of micronutrient solution for foliar application
14.	Determination of organic carbon in vermicompost
15.	To study the effect of plant growth regulators on germination and vegetative growth of crop
16.	Effect of IAA & GA on seed germination
17.	Isolation of beneficial microorganisms present in compost and vermicompost
18.	Preparation of vermicompost using suitable earthworm species .

Reference Books	
1.	F. E. Bear: Chemistry of the soil (ACS).
2.	Ray R. Weil and Nyle C. Brady: The Nature and Properties of Soils
3.	John L. Havlin, Samuel L. Tisdale, Werner L. Nelson, James D. Beaton: Soil fertility and Fertilizers
4.	A. M. Deshmukh: Biofertilizers
5.	D.K. Das: Soil Science
6.	M. B. Green, G.S. Hartley and T.F. West: Chemicals for crop improvement and pest management (Pergamon)
7.	J. J. Mortvedt chair :Micronutrient in Agriculture



**Punyashlok Ahilyadevi Holkar Solapur University,
Solapur**

First Year M Sc (AGPM)

Semester – I

Vertical : Major Mandatory

Course Name: DSC – 3 Chemistry of Pesticides and Their Formulations

M2623-DSC-12

***Teaching Scheme**

Lectures: 04 Hours/week, 04 Credits

OR

Practical: 02 Hours/week, 02 Credits

***Examination Scheme**

UA: 60 Marks

CA: 40 Marks

Course Carbamates Insecticides Synthesis, properties & uses of Carbamates. Organophosphorus pesticides Synthesis, properties & uses. Synthesis & properties of organochlorine Insecticides. Inorganic pesticides Synthesis, properties & uses. Synthesis of new lead molecules as pesticides. Knowledge of fungicides, herbicides, insecticides and rodenticides.

Course Objectives:

During this course, the student is expected to:

- 1 Get knowledge of synthesis of new lead molecules as pesticides.
- 2 Get information about Inorganic pesticides synthesis, properties & uses.
- 3 Get knowledge of Carbamates and Organophosphorus pesticides and Triazole fungicides

Course Outcomes:

At the end of this course, students will be able to:

- 1 Get knowledge of fungicides, herbicides, insecticides and rodenticides.
- 2 Learn synthesis & properties of organochlorine Insecticides.
- 3 Learn Synthesis & properties of organochlorine Insecticides.
- 4 Learn Synthesis of new lead molecules as pesticides.

Section I

Unit-1: Carbamate Insecticides	No. of lectures-15	Weightage: 15-23 Marks
Unit content: Synthesis, properties & uses of: Carbamates, thiocarbamic acids, oxime carbamates, phenol carbamates, ziram, zineb, maneb, carbaryl, carbofuran, bendiocarb, propoxure (Baygon) Aldicarb, Methomyl. Isomerism and kinetic studies of hydrolysis of pesticides. Structure activity relationship of carbamate with reference to acetylcholine. (Theoretical Treatment)		

Unit-2: Organophosphorus pesticides:	No. of lectures-15	Weightage: 15-23 Marks
Unit content Synthesis, Properties, Uses and environmental fate of following: Malathion, Dimethoate, Monocrotophos, Phosphamidon, Chloropyrifos, Finitrothion, Phorate (Thimate), Quinolphos. (Theoretical Treatment)		
Section II		
Unit-3: Synthesis & properties of Organochlorine Insecticides and Triazole Fungicides	No. of lectures-15	Weightage: 15-23 Marks
Unit content Endosulphan, PCNB, Butachlor, persistence of the pesticides in the environment and biota, resistance by pests. (Theoretical Treatment) Preparations, properties and applications of Triazole Fungicides: Hexaconazole, Propiconazole and Tebuconazole.		

Unit-4: Inorganic pesticides:	No. of lectures-15	Weightage: 15-23 Marks
Unit content- Inorganic Fungicides- Sulphur compounds, Copper salts, Organomercurials and Tin compounds Fumigants: Hydrogen cyanide, carbon disulphide. Rodenticide: Arsenic, Zinc oxides, Zinc phosphide and Thallium salts. Herbicides: Copper compounds and sodium chlorate.. (Theoretical Treatment)		
College Level Assessment (CA) Activities: M2623-DSC-12P		
List of Experiments/Assignments, etc. Any six of the following:		
1.	Determination of Alkalinity of water.	
2.	Determination of nitrate from water.	
3.	Analysis of lime material.	
4.	Determination of Malathion content.	
5.	Determination of Metasystox content.	
6.	Determination of hardness of bore well water sample by using EDTA method.	
7.	Determination of acidity or alkalinity of given pesticide sample.	
8.	Ion exchange chromatographic separation and determination of Zn (II) and Mg(II).	
9.	Determination of Fe ⁺⁺⁺ ion from given solution by using colorimetric method.	
10.	Estimation of Dicofol content.	
11.	Preparation of tetraamminecopper(II) sulphate.	
12.	To synthesis of benzanalide from aniline.	
13.	To estimate organic carbon in soil by the Walkley-Black method.	
14.	To prepare the standard zinc sulphate standardized of EDTA solution and to determine Zn ²⁺ zinc in the given solution.	
15.	Preparation of tris (ethylenediamine Nickel (II) thiosulphate.	
16.	Preparation of potassiumtrioxylatoaluminate (III)	

Reference Books	
1.	N. N. Melnikov: Chemistry of pesticides (English) Springer.
2.	R. Clemlyn: Pesticides.
3.	M. B. Green, G. S. Hartley and T. F. West, Chemicals for crop Improvement and pest management (Pergamon).
4.	N. B. Scher: Controlled releases Pesticides ACS Sypm. No. 53.
5.	N. E. Cardarelli: Controlled Released Pesticides Formulation CRC.
6.	Kydonius: controlled release formulation. Technologies, CRC.



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First Year MSc (AGPM) Semester-I

Vertical : Major Elective

**Course Name: DSE – 1.1 PLANT PATHOLOGY AND WEED
MANAGEMENT
M2623-DSE-1A**

*Teaching Scheme

Lectures: 04 Hours/week, 04 Credits

OR

Practical: 02 Hours/week, 02 Credits

*Examination Scheme

UA: 60 Marks

CA: 40 Marks

Course Preamble The students will have complete knowledge of concept plant diseases. Information about disease causal organisms. Overall information of symptoms produced by causal organisms. Identification and control measures of plant diseases. Knowledge of weed association in the cultivated crop. Weeds control measure (Chemical, Mechanical and Physical)

Course Objectives:

During this course, the student is expected to:

- 1 Will have complete knowledge of concept plant diseases.
- 2 Information about disease causal organisms.
- 3 Identification and control measures of plant diseases.
- 4 Knowledge of weed association in the cultivated crop. Weeds control measure (Chemical, Mechanical, Physical)

Course Outcomes:

At the end of this course, students will be able to:

1. Identification and apply control measures of plant diseases.
2. Identify symptoms produced by causal organisms.
3. Apply complete knowledge of the concept of plant diseases.
4. Knowledge of weed association in the cultivated crop.

Section I

Unit-1: The concept of plant diseases	No. of lectures-15	Weightage: 15-23 Marks
Unit content Disease causing organisms, their characters and classification. (Viruses, MLBs, Bacteria and Fungi), significance of plant diseases. Basic procedures in plant disease diagnosis (microscopic, histochemical and molecular basis), Koch's postulates. Stages in plant disease development. Chemical weapons of plant pathogens. Epidemiology: Assessment and forecasting of plant diseases- Elements of an epidemic, slow and rapid epiphytotic, factors affecting the development of epidemic.(Theoretical		

Treatment)		
Unit-2: Viral diseases: & MLO diseases	No. of lectures-15	Weightage: 15-23 Marks
Unit content Causal organism, Symptomology, Etiology, transmission of plant viruses, purification, detection and control of plant viruses. Study of viral diseases-Papaya ring spots, leaf curl of chillies, Yellow vein mosaic of bean, Tobacco mosaic virus with respect to symptomology, cause, disease cycle and control measures. Properties of mycoplasma, Causal organism, Symptomology, Etiology transmission, diseases caused by MLOs-GSD, little leaf of brinjal with respect to symptoms, cause, disease cycle and control measures (Theoretical Treatment)		
Section II		
Unit-3: Bacterial diseases & fungal diseases-	No. of lectures-15	Weightage: 15-23 Marks
Unit content: Causal organism, Symptomology of bacterial diseases, Etiology, Dispersal of bacterial pathogens and control of bacterial diseases. Study of bacterial diseases- Bacterial blight of bean, Wilt of banana, Citrus greening with respect to symptoms, causal organisms, disease cycle and control measures. Fungal diseases: Causal organism, Symptomology of fungal diseases, Etiology, Dispersal and control of fungal diseases. Study of Club root of cabbage, Rhizopus soft rot of fruits, Banana leaf spots, Ergot of bajara, red rot of sugarcane, with respect to symptoms, causal organism, disease cycle and control measures. (Theoretical Treatment)		

Unit-4: Weeds:	No. of lectures-15	Weightage: 15-23 Marks
Unit content definition, classification, life cycle, dispersal of weed, growth and development of weeds, assessment of losses and measurement of losses factors affecting competitive ability, associations of weeds with certain crops. Methods of weed controls- physical, chemical, biological and modern tools and techniques. (Theoretical Treatment)		
College Level Assessment (CA) Activities: M2623-DSE-1A-P List of Experiments/Assignments, etc. Any six of the following:		
1.	Study of viral, MLO, bacterial and fungal diseases of vegetables.	
2.	Study of viral, MLO, bacterial and fungal diseases of cash crops.	
3.	Study of viral, MLO, bacterial and fungal diseases of pulses.	
4.	Estimation of chlorophyll from healthy and infected leaves.	
5.	Determination of percentage of organic carbon from the compost.	
6.	Preparation of culture media, dilution technique, inoculation of soil fungi and Identification of soil borne pathogen.	
7.	Staining techniques in bacteria.	
8.	Measurement of disease intensity.	
9.	Study of morphological and biochemical defense mechanisms in plants.	
10.	Classification and identification of weeds.	

Reference Books	
1.	G.N. Agrios, Plant Pathology.
2.	M.B.Green, Chemicals for crop improvement and pest management.
3.	T.J.Masik (Tata McGraw Hill) Weed biology and control.
4.	Mundkar B.B. (1972, Edition), Fungi and plant diseases.
5.	Sharma P.D., Plant pathology Rastogi Publication Merrut.
6.	Guptoa V.K. and R.C.Sharma, (1988). Integrated disease management and plant health.



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First Year M. Sc. (AGPM) Semester-I

Vertical: Major Elective

**Course Name: DSE – 1.2 Applied Microbiology and Biostatistics
M2623-DSE-1B**

*Teaching Scheme

Lectures: 04 Hours/week, 04 Credits

OR

Practical: 02 Hours/week, 02 Credits

*Examination Scheme

UA: 60 Marks

CA: 40 Marks

Course Preamble Soil microbiology & Soil as an ecosystem. Pathogenesis of viruses: Host and virus factors involved in pathogenesis, patterns of infection. Microbial World: General characteristics and outline classification of Bacteria, Yeasts, Molds, Viruses, Protozoa, Lichens. General study of microbes and their characters

Course Objectives:

During this course, the student is expected to:

- 1 Soil microbiology & Soil as an ecosystem.
- 2 Microbial World: General characteristics and outline classification of Bacteria, Yeasts, Molds, Viruses, Protozoa, Lichens.
- 3 General study of microbes and their characters
- 4 Apply statistical concepts to real-world problems.
- 5 Identify, analyze, and interpret data patterns
- 6 Design experiments and surveys using proper sampling methods.
- 7 Use statistical tools to draw meaningful conclusions.

Course Outcomes:

At the end of this course, students will be able to:

- 1 Identification and Soil microbiology & Soil as an ecosystem.
- 2 Identify and classification of Bacteria, Yeasts, Molds, Viruses, Protozoa, Lichens.
- 3 Apply complete knowledge of concepts to plant diseases.
- 4 General study of microbes and their characters Identify variables and apply appropriate measurement scales in research.
- 5 Apply probability sampling techniques to collect unbiased data.
- 6 Construct frequency distributions and represent data using histograms, polygons, and curves.

Section I

Unit-1: Soil Microbiology	No. of lectures-15	Weightage: 15-23 Marks
Unit content: Introduction: Definition, approaches to soil microbiology, current topics in soil		

microbiology, Soil as an ecosystem Soil formation, structure and properties, Soil microorganisms: Types and their role in Carbon cycle, Nitrogen cycle, Sulphur cycle, Phosphorous cycle Applications of Biotechnology in Agriculture Surface properties of bacteria and its significance. (Theoretical Treatment)		
Unit-2: Pathogenesis of Viruses	No. of lectures-15	Weightage: 15-23 Marks
Unit content Host and virus factors involved in pathogenesis, patterns of infection, pathogenesis of plant [TMV], Satellite viruses and their role in plant virus replication. Insect viruses [NPV], Viruses pathogenic to algae and fungi. Host cell transformation by viruses, oncogenesis by DNA and RNA viruses. Outline classification of algae, micro algae, algal cell structure and reproduction & use (Theoretical Treatment)		
Section II		
Unit-3: Bacterial nomenclature and classification:	No. of lectures-15	Weightage: 15-23 Marks
Unit content Bacterial nomenclature and classification: Classification of prokaryotic organisms – an overview, Introduction to Bergey’s manual of Determinative Bacteriology and Bergey’ Manual of Systemic Bacteriology Principles of bacterial nomenclature Outline classification of fungi, structure of fungal cell- hyphae and nonmotile unicells, motile cells and spores. General characteristics of Lichens and Mycorrhizae. (Theoretical Treatment)		

Unit-4: Microbial Diversity Microbial World:	No. of lectures-15	Weightage: 15-23 Marks
Unit content General characteristics and outline classification of Bacteria, Yeasts, Molds, Viruses, Protozoa, Lichens, Mycorrhiza Viroids and Prions and their role in the biosphere Differentiation: In Bacillus ,Azotobacter, Candida, Mycoplasma and Aureobasidium spp. General characteristics and molecular architecture of Mycoplasmas.		
Biostatistics		
Types of Variables and measurements – Quantitative, Qualitative, Semi-Quantitative along with measurement scales, Probability sampling, simple random sampling, Frequency distribution, histogram, frequency polygon, frequency curve, Measures of Central Tendency and Location – Mean, Median, Mode, Measures of Dispersion – Range Deviation, Quartile Deviation etc., Standard Deviation, Coefficient of Variation, Measures of Central Tendency and Variation for Qualitative Variables, Karl Pearson’s Coefficients, Correlation and Concepts of Regression		
(Theoretical Treatment)		
College Level Assessment (CA) Activities: M2623-DSE-1B-P		
List of Experiments/Assignments, etc.		
Any six of the following:		
1.	Demonstration of: Bacterial and yeast DNA.	
2.	Induction of ascospore in yeasts of <i>Saccharomyces cerevesiae</i> ..	
3.	Preparation of yeast protoplasts.	
4.	Single cell and single spore isolation techniques.	
5.	Isolation and purification of lysozyme from egg white and preparation of bacterial protoplasts.	
6.	Isolation of bacterial cell wall and study of cell wall polysaccharide by chromatographic	

	technique.
7.	Single cell and single spore isolation techniques.
8.	Demonstration of: Bacterial and yeast DNA.
9.	Induction of ascospore in yeasts of <i>Saccharomyces cerevesiae</i> .
10.	Preparation of yeast protoplasts.
11	Preparation of frequency distribution for discrete and continuous variables for raw data.
12.	Diagrammatic representation of statistical data: simple bar diagram, subdivided bar diagram
13.	Diagrammatic representation of statistical data: pie diagram.
14.	Graphical representation of statistical data : Histogram and frequency curve.
15.	Computation of measures of central tendency.
16.	Computation of measures of dispersion (ungrouped data and grouped data).
17.	To calculate the Mean, median and mode.

Reference Books	
1.	Bacterial cell structure by Rogers, ASM publications.
2.	General Microbiology by stanier etal, 5th Edn.
3.	Microbial Ultra structure by Fuller R.
4.	Chemical Microbiology by Rose.
5.	Microbial and Plant Protoplasts by Peberdy Etal.
6.	Biology of Mycoplasma by Smith P. I.
7.	Agarwal B. L. (2003). Programmed Statistics, 2nd edition, New Age International Publishers, New Delhi.
8.	Ghosh, J. K. and Mitra, S. K., Parthsarathi, K. R. (1993). Glimpses of India's Statistics Heritage, Wiley publishing Co. 6. Goon,
9.	A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.
10 .	Gupta, S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics, Eighth Edition, Sultan Chand and Sons Publishers, New Delhi.
11 .	Gupta, S. C. and Kapoor, V. K. (1997). Fundamentals of Applied Statistics, Third Edition, Sultan Chand and Sons Publishers, New Delhi.
12	Heumann C., Schomaker, M., Shalabh (2016). Introduction to Statistics and Data Analysis. 1st Edition, Springer, Germany.
13 ..	Moore D. S., Notz W. I., Fligner M. A. (2013). The Basic Practice of Statistics, 6th Edition, Ruth Baruth.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

First Year M Sc (AGPM) Semester-I

Vertical: Major Mandatory

**Course Name: Research Methodology (RM):
M2623-RM-11**

*Teaching Scheme

Lectures: 04 Hours/week, 04 Credits

OR

Practical: 02 Hours/week, 02 Credits

*Examination Scheme

UA: 60 Marks

CA: 40 Marks

Course Preamble Recall and identify key concepts and terminology related to research methodology. Analyze the strengths and weaknesses of different research methodologies in relation to specific research contexts or objectives. Apply the principles of a specific research methodology to design a research study or experiment. Instrumental Techniques: pH Meter, Potentiometry & Electrical conductivity. Computer in pesticide development

Course Objectives:

During this course, the student is expected to:

- 1 To introduce the fundamentals of research methodology, literature searching, and the formulation of research designs.
- 2 To impart training in scientific writing, publication ethics, project proposal drafting, and computer applications in pesticide development.
- 3 To explain the principles and instrumentation of pH metry and potentiometry for environmental analysis.
- 4 To familiarise students with electrochemical methods and the diverse forms of Intellectual Property Rights (IPR).

Course Outcomes:

At the end of this course, students will be able to:

- 1 Explain the types of research, experimental designs, and methods for database literature searching and index tracking.
- 2 Draft structured scientific reports, research papers, funding proposals, and presentation slides adhering to ethical publication practices.

3	Describe the computer-based optimization techniques, applications, and equipment utilized in pesticide and formulation development.
4	Illustrate the working principles and instrumentation of pH meters and potentiometers for soil and water analysis.
5	Analyze the specific and equivalent conductivities of electrolytes to determine soil moisture, salinity, and halides.
6	Distinguish between various categories of Intellectual Property Rights (IPR) including patents, copyrights, trademarks, and geographical indication

Section I

Unit-1: Introduction of Research	No. of lectures-15	Weightage: 15-23 Marks
Unit content: Meaning and objectives of research, criteria of good research, types of research, selection of research problems, literature review, types of hypotheses. Research Design: Types of research design exploratory, descriptive, diagnostic and experimental. Maintaining a laboratory record; On-line literature searching, Database, Sci-finder, Scopus, Citation Index, Impact Factor. (Theoretical Treatment)		
Unit-2: Writing scientific report	No. of lectures-15	Weightage: 15-23 Marks
Unit content Planning, preparation, draft, revision and refining; writing project proposal to funding agency, Paper writing for International Journals, Conference presentation, preparation of effective slides and presentation. Numbers, units, abbreviations and nomenclature used in scientific writing. Writing references. Scientific writing and ethics, Introduction to copyright-academic misconduct/plagiarism. Intellectual Property Rights: Introduction to IPR, Kinds of Intellectual property rights—Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication, Plant Varieties and Traditional Knowledge, Patent right and Copy right, Design, Trademarks.		
Section II		
Unit-3: Instrumental Techniques	No. of lectures-15	Weightage: 15-23 Marks
Unit content pH metry - Introduction, instrumentation of pH meter; glass electrode, reference electrode, measurement of pH and its application in the pH soil and water sample. Potentiometry: Introduction types of electrodes, instrumentation, working measurement of EMF, Application for measurement of pH. (Theoretical Treatment)		

Unit-4: Electrochemical Method	No. of lectures-15	Weightage: 15-23 Marks
Unit content – Computer in pesticide development: Computer assisted correction analysis in the development of pesticide. Computer optimization in emulsion formulations, computer-based application of pesticide development and formulation development. Use of computer-based equipment for pesticide analysis. (Theoretical Treatment)		
College Level Assessment (CA) Activities: List of Experiments/Assignments, etc.		

Reference Books	
1.	G.R.Chatwal, Instrumental method of chemical analysis.
2.	A text of inorganic quantitative analysis by Shree Ramulu.
3.	Instrumental methods of chemicals analysis by Willard, Meritt
4.	Rastogi S.C. Mendecutta, N.Bioinformatics Methods and application
5.	Sharma B.K. Instrumental Methods of chemical analysis
6.	Chopra & Kanvar, Analytical agriculture chemistry



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

First Year M. Sc. (AGPM)

Semester – II

Vertical : Major Mandatory

Course Name: DSC – 2 Applied and Economic Entomology

M2623-DSC-23

*Teaching Scheme

Lectures: 04 Hours/week, 04 Credits

OR

Practical: 02 Hours/week, 02 Credits

*Examination Scheme

UA: 60 Marks

CA: 40 Marks

Course Preamble: The Paper – ‘Applied and Economics Entomology’ included the knowledge of Study of Insects, Habit and Habitat of Insects. Study of Insects pests and their control measures .Insects Pests management. Advantage and Significances of Sericulture and Apiculture and their Economic importance. Correlation of Insects of Human beings.

Course Objectives:

During this course, the student is expected to:

1. Study of Insects.
2. Study of Correlation of insects with Environment and Human beings.
3. Study of Advantage and Significance of Insects.
4. Study of Insect Pests and in their Control Measures.

Course Outcomes:

At the end of this course, students will be able to:

1. Knowledge of Insect Pests Management.
2. Treatment and Control Measures of Insects.
3. Commercial and Economic Importance of Sericulture, Apiculture.
4. Insects as a Biological indicator.
5. Study of role of Insects in Environment

Unit-1: Introduction to insects:-

No. of lectures- 15

Weightage:15-23 Marks

Unit content: Study of Insect and Insect Pests

- a. Classification of Insect b.Habit and Habitat of Insect c. Morphology of Insects d. Appendages of Insect e. Definition of Insect Pests f. General characters of Insect Pests g. Study of Domestic Pests h. Study of Vegetable Pests i. Study of Crop Pests j. Study of Sugarcane Pests k. Study of Fruit Pests l. Detailed study of various Insect Pests and their Host m. Structural Damage from Insect Pests n. Treatment and Control measures of Insects Pests O. Biological Control for Insects Pests p. Chemical control for Insects Pests q. Study of Parasites Insects r. Study of Predator Insects

s. Appliances for Control Measures Insect Pests (Theoretical Treatment)		
Unit-2: Anatomy and Physiology of the insect:	No. of lectures-15	Weightage:15-23Marks
Unit content Anatomy and Physiology of the insect: - i. Classification of pests Based on damage, feeding habits, taxonomy etc. Anatomy and Physiology of the Insect: a. Digestive System b. Respiratory System c. Circulatory System d. Excretory System e. Reproductive System f. Nervous Systems. (Theoretical Treatment)		
Section II		
Unit-3: General life cycle patterns in insect pests	No. of lectures-15	Weightage: 15-23 Marks
Unit content: General life cycle patterns in insect pests a. Grasshopper b. Aphids c. Jowar stem borer d. Mango stem borer e. White grub f. Termite h. Snail i. Nematode j. Rat k. Slug (Theoretical Treatment)		

Unit-4: Insects of Economic Importance	No. of lectures-15	Weightage: 15-23 Marks
Unit content Insects of Economic Importance:- I Sericulture. a. Definition of Sericulture b. Classification of Silk Moth c. Habit and Habitat of Silk Moth d. General Characters of Silk Moth e. Study of Mouth parts of Silk Moth f. Types of Silk Moth g. Life cycle of Silk Moth h. Rearing of Silk Moth i. Types of Silk and its Host j. Cultivation of Mulberry plant as Host plant of Silk Moth. K. General Study of pests and Disease Management of Host plant. l. Economic and Commercial Importance of Silk. II. Apiculture a. Definition of Apiculture b. Classification of Honey Bee c. Habit and Habitat of Honey Bee d. General characters of Honey Bee e. Mouth parts of Honey Bee f. Types of Honey Bee h. Life cycle of Honey Bee i. Castes of Honey Bee j. Polymorphism of Honey Bee. k. Agricultural and Non-agricultural Role of Honey Bee l. Study of Bee keeping and Its Advantages. m. Study of Equipment of Beekeeping. n. Study of Honey Comb / nest of Honey Bee o. Byproducts of Honey Bee. p. Production of Bioagents q. Economic and Commercial Importance of Honey Bee III Biocontrol: - The production of egg parasitoids of Lepidopteran pest. Production of Bioagents: Production of Trichogramma, Production of Nuclear Polyhydrosis Virus (NPV) and Muscardine fungal pathogens. Production of predator: Chrysoperla carnae		
College Level Assessment (CA) Activities: M2623-DSC-23P List of Experiments/Assignments, etc. Any six of the following:		
1.	Rearing of an egg parasite, Trichogramma sp.	
2.	Study of system of given specimen	
3.	Rearing of predator, Chrysoperla carnae	
4.	Rearing of Helicoverpa armigera / Jowar stem borer.	
5.	Rearing of Silkworm	
6.	Rearing of White grub	

7.	Rearing of a Hairy caterpillar.
8.	Release techniques in parasites, predators and NPV in field
9.	Visit to Apiculture/ Sericulture centre.
10.	Collection of various crop pests and their submission

Reference Books	
1.	A.S.Atwal, Agriculture pests of India and South East Asia
2.	K.P.Srivastava, A textbook of applied entomology.
3.	Larry P.Pdigo, Entomology and pest management
4.	Sathe and Jadhav Sericulture and pest management –DPH-Delhi.
5.	S.Pradhan Agricultural Entomology
6.	Govt.Maharashtra.Crop pest and how to fight them B.D.Ratnaik,Text Book Of Entomology.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

First Year M Sc (AGPM)

Semester – II

Vertical : Major Mandatory

**Course Name: DSC – 4 Analytical Techniques for
Agrochemicals**

M2623-DSC-24

***Teaching Scheme**

Lectures: 04 Hours/week, 04 Credits

OR

Practical: 02 Hours/week, 02 Credits

***Examination Scheme**

UA: 60 Marks

CA: 40 Marks

Course Separation techniques: Instrumentation and application of TLC, paper chromatography, column Chromatography, Ion exchange and Ion chromatography. Non-Instrumental Techniques: Acid base titrations acid- base indicators & Redox titrations. Knowledge of Ultraviolet Spectroscopy & Infrared Spectroscopy. Optical Methods like Flame emission and atomic absorption spectrometry & Polarimetry

Course Objectives:

During this course, the student is expected to:

- 1 Use Instrumentation and application of TLC
- 2 Study Non-Instrumental Techniques: Acid base titrations acid- base indicators & Redox titrations.
- 3 Optical Methods like Flame emission and atomic absorption spectrometry & Polarimetry

Course Outcomes:

At the end of this course, students will be able to:

- 5 Application of TLC, paper chromatography, column Chromatography, Ion exchange and Ion chromatography.
- 6 Knowledge of Ultraviolet Spectroscopy & Infrared Spectroscopy.
- 7 Instrumentation and application
- 8 Optical Methods like Flame emission and atomic absorption spectrometry & Polarimetry

Section I

Unit-1: Separation techniques	No. of lectures-15	Weightage:15-23 Marks
Unit content - Sampling of solids, liquids and gases; solvent Extraction, Principle, Instrumentation and applications of TLC, Paper chromatography, Column chromatography, Ion exchange and Ion chromatography (Theoretical Treatment)		
Unit-2: Non Instrumental Techniques	No. of lectures-15	Weightage:15-23 Marks
Unit content Acid base titrations, acid base indicators; Redox titrations, determination of halide ions by complexometric titration, precipitation titrations, methods of determination of Mg, Zn, Ca, Al, Cu, Metallochromic indicators, Gravimetric estimation of SO_4^{2-} and Fe^{++} . (Theoretical Treatment)		
Section II		
Unit-3: Ultraviolet Spectroscopy	No. of lectures-15	Weightage: 15-23 Marks
Unit content Principle, Theory, instrumentation and applications. Infrared Spectroscopy (IR): Principles, Fundamental modes of vibrations, fundamental group regions of IR spectrum, functional group region, finger print region, Types of vibrations, Instrumentation of IR, IR Spectrum, Applications of IR spectroscopy in structure determination. (Theoretical Treatment)		
Unit-4: Optical Methods	No. of lectures-15	Weightage: 15-23 Marks
Unit content Flame emission and atomic absorption spectrometry: Atomization, flame Photometry and its applications in the estimation of Na, K, Ca; Atomic absorption, instrumentation and applications in the analysis of Soil, water, food and environmental samples. Polarimetry: Principle and application in the analysis of optically active pesticides. Electrical conductivity: Electrical conductivity of electrolyte, conductivity meter, specific and equivalent conductivities, application of measurement in the analysis of salinity, halide and soil moisture. (Theoretical Treatment)		
College Level Assessment (CA) Activities: M2623-DSC-24P		
List of Experiments/Assignments, etc.		
Any six of the following:		
1.	Determination of Alkalinity of water.	

2.	Determination of nitrate from water.
3.	Analysis of lime material.
4.	Determination of Malathion content.
5.	Determination of Metasystox content.
6.	Determination of hardness of bore well water sample by using EDTA method.
7.	Determination of acidity or alkalinity of given pesticide sample.
8.	Ion exchange chromatographic separation and determination of Zn(II) and Mg(II).
9.	Determination of Fe^{+++} ion from given solution by using colorimetric method.
10.	Estimation of Dicofol content.

Reference Books	
1.	A. I. Vogel. A text of inorganic quantitative analysis
2.	Shree Ramulu., Methods of pesticide analysis
3.	A. I. Vogel, A textbook practical organic chemistry including qualitative and quantitative analysis
4.	Willard, Meritt & Dean, Instrumental methods of chemicals analysis
5.	Chopra & Kanwar, Analytical agricultural chemistry.
6.	H. A. Moye Analysis of pesticide residues



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

First Year M.Sc. (AGPM)

Semester – II

Vertical : Major Elective

**Course Name: DSE – 2.1 Agronomy and Biotechnology
M2623-DSE-2A**

***Teaching Scheme**

Lectures: 04 Hours/week, 04 Credits

OR

Practical: 02 Hours/week, 02 Credits

***Examination Scheme**

UA: 60 Marks

CA: 40 Marks

Course The students will have complete knowledge of cultivation of important crops. Information about soil, climate seed rate and sowing method. Overall information on fertilizer requirements and plant protection. Knowledge of Seed technology and Production of standard seed. Information on plant breeding methods. Knowledge of tissue culture tech. and recombinant DNA tech.

Course Objectives:

During this course, the student is expected to:

- 1 Get complete knowledge of cultivation of important crops.
- 2 Acquire information about soil, climate seed rate and sowing method.
- 3 Get knowledge of Seed technology and Production of standard seed.
- 4 To complete knowledge about tissue culture.

Course Outcomes:

At the end of this course, students will be able to:

- 1 Get overall information of fertilizer requirements and plant protection.
- 2 Get information on plant breeding methods and knowledge of tissue culture tech.
- 3 Students are able to understand crop cultivation
- 4 Students are able to understand seed tech, and biotechnology knowledge.

Section I

Unit-1: Cultivation of important cash and cereal crops

**No. of lectures-
15**

Weightage: 15-23 Marks

Unit content Sugarcane, Cotton and Tobacco. Bajra, Sorghum, Maize, Wheat, Gram in respect to : Soil & climate, seed rate & sowing, varieties/ cvs. Fertilizer, requirement and protection.
(Theoretical Treatment)

Unit-2: Cultivation of important Fruit and Vegetable crops	No. of lectures-15	Weightage: 15-23 Marks
Unit content Guava, Pomegranate, Banana, Papaya. Tomato, Brinjal, Cabbage and cauliflower, Okra. in respect to : Soil & climate, seed rate & sowing, varieties/ cvs. Fertilizer, requirement and protection. (Theoretical Treatment)		
Section II		
Unit-3: Tissue culture	No. of lectures-15	Weightage: 15-23 Marks
Unit content. Introduction, Definition, Terminologies in tissue culture, Sterilization methods & Techniques of tissue culture. Types of tissue culture. Hardening techniques. (Theoretical Treatment)		
Unit-4: Biotechnology	No. of lectures-15	Weightage: 15-23 Marks
Unit content. Genetic resistance: Types of disease resistance (horizontal and vertical resistance), Back cross method and Escape method. Genetic engineering: Introduction, Methodology – Physical, Chemical and Biological methods (Agrobacterium mediated gene transfer) Seed Technology: Introduction, Definition, Classes of seeds and techniques of producing hybrid seeds for disease resistance and other relevant characters. (Theoretical Treatment)		
College Level Assessment (CA) Activities: M2623-DSE-2A-P List of Experiments/Assignments, etc. Any six of the following:		
1.	Rearing of two to three pests in the laboratory. (As per syllabus)	
2.	Field collection of pests stages and its submission	
3.	Field visits (Minimum four) & field diary.	
4.	Large scale production of <i>Bacillus thuriengnis</i> , <i>Beauveria bassiana</i> , <i>Apanteles sp.</i> , <i>Bracon sp.</i> , Nematodes.	
5.	Study of life cycles of important pests of crop plants as per syllabus. At least two of each category and laboratory and field diary.	
6.	Determination of LC50 and LC90 in given insects.	
7.	Study of the detection of damage caused by pests	

8.	Identification of different casts of termites Locally available.
9.	Collection and submission of pests.
10.	Study of crop plants as per syllabus

Reference Books	
1.	Reddy S.M., 1997. Microbial Biotechnology.
2.	M.K.Razdan, Introduction to Plant Tissue Culture
3.	K.K.De, Plant Tissue Culture book
4.	T.B.Jha and B.Ghosh, Plant Tissue Culture Basic and Applied
5.	P.S.Verma and V.K. Agarwal, Genetics
6.	Atwal. Agricultural pests of India and southeast Asia



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

First Year M.Sc. (AGPM)

Semester – II

Vertical : Major Elective

**Course Name: DSE – 2.2 Integrated Pest Management
M2623-DSE-2B**

***Teaching Scheme**

Lectures: 04 Hours/week, 04 Credits

OR

Practical: 02 Hours/week, 02 Credits

***Examination Scheme**

UA: 60 Marks

CA: 40 Marks

Course Anatomy and Physiology of the insect. General life cycle patterns in insect pests. Causes for insects assuming pest status: type of damage to plants by insects and their estimation. Tactics and strategies of pest management (IPM). Concept and tools of pest management. Role and impact of predators, parasitoids, biological characteristics. Microbial insect control and their mode of action.

Course Objectives:

During this course, the student is expected to:

- 1.To understand the principles, concept and components of integrated Pest Management
2. To gain knowledge of cultural, mechanical, biological and chemical methods of pest management
3. To learn anatomy and physiology of the insect.
4. To describe tactics and strategies of pest management (IPM).
5. To explain general life cycle patterns in insect pests.
6. To develop skills in selecting and integrating eco friendly and sustainable pest management strategies
7. To identify major insect pests, diseases in agricultural crops

Course Outcomes:

At the end of this course, students will be able to:

- 1 Students are able to explain the principles concept and importance of Integrated Pest management

2. Students are able to apply knowledge Tactics and strategies of pest management (IPM).
2 Students are able to explain the role and impact of predators, parasitoids' biological characteristics. Microbial insect control and their mode of action.
3 Students are able to apply knowledge of Pests i.e., household, crop plant pest & polyhouse pest. Economic damage of crop plants done by various pests.
4 Students are able to learn Microbial insect control and their mode of action.

Section I

Unit-1: Causes for insect assuming pest status:	No. of lectures-15	Weightage: 15-23 Marks
Unit content : Type of damage to plants by insects and their estimation. Methods and principles of pest control, natural and applied .Prophylactic & Curative methods, cultural, mechanical. Physical, legal and biological (Theoretical Treatment)		
Unit-2: Pest Management	No. of lectures-15	Weightage: 15-23 Marks
Unit content: Tactics and strategies of pest management (IPM) Concept and tools of pest management, Ecosystem concept, Ecological Niche concept, Colonization of island, Crop Island in ecosystem, Quantitative basis of pest management, sampling and measuring system, Analysis and Modelling in pest management, Monitoring, Forecasting and Field loss assessment, Design making systems, Constraints and Strategies in implementation of IPM, validation of IPM. Host plant resistance. (Theoretical Treatment)		
Section II		
Unit-3: Biocontrol in Agroecosystem through management & Entamophagous insects:	No. of lectures-15	Weightage: 15-23 Marks
Unit content Introduction, Definition, Role and impact of predators, parasitoids Biological characteristics, Role and impact strategies of biological control, conservation and habitat management. Microbial control of insects: Introduction, Definition, History principle groups of pathogen, <i>Bacillus thuringensis</i> , fungi, viruses, protozoa, their mode of action and methods of applications. (Theoretical Treatment)		

Unit-4: Major: Pests of crops:		No. of lectures- 06	Weightage:9-16 Marks
Unit content (Classification, Biology, nature of damage and control measures). Pests of cereals : Rice: Major- Brown plant hopper, yellow stem borer, Swarming Caterpillar. I Minor – Rice ear head bug, Armyworm, Blue beetle, Gall midge, Rice hispa. Sorghum : Major – Midge fly, Aphids , Shoofly, Stem borer Minor- White grub Maize: Major- Bug (Deliphaeids), Ear head bug, stem borer, pink borer. Minor- Pyrausta, Aphids. Pearl millet: Major- Blister beetle. Minor- Surface grasshopper, Armyworm. Wheat: Major- Jassids, Termites, Stem borers. Minor- Aphids, Nematodes. (Theoretical Treatment)			
College Level Assessment (CA) Activities: M2623-DSE-2B-P List of Experiments/Assignments, etc. Any six of the following:			
1.	Large scale production of <i>Bacillus thuringiensis</i> , <i>Beauveria bassiana</i> , <i>Apanteles sp.</i> , <i>Bracon sp.</i> , Nematodes.		
2.	Study of life cycles of important pests of crop plants as per syllabus. At least two of each category and laboratory and field diary.		
3.	Determination of LC50 and LC90 in given insects.		
4.	Study of the detection of damage caused by pests		
5.	Identification of different casts of termites locally available.		
6.	Collection and submission of pests.		
7.	Study of crop plants as per syllabus		
8.	Large scale production of <i>Bacillus thuringiensis</i> , <i>Beauveria bassiana</i> , <i>Apanteles sp.</i> , <i>Bracon sp.</i> , Nematodes.		
9.	Study of life cycles of important pests of crop plants as per syllabus. At least two of each category and laboratory and field diary.		
10.	Study of pest crop plants as per syllabus		

Reference Books	
1.	Biological insect control chapter 10-14, by M.S. Quraishi.

2.	Biological insect pest suppression by H.C.Cooper (springerlag)
3.	Agriculture use of antibiotics by W.A. Moats.
4.	Pesticide chemistry by j.Miyamoto and P.C.Kearney (Pergamon)
5.	Hand book of pest management in agriculture Wi.II by D. pimentel.
6.	Biological pest control by N.W. Hussey and N. Scopes (Glandford press)

 पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ॥ विद्यया संपन्नता ॥ NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	Punyashlok Ahilyadevi Holkar Solapur University, Solapur First Year M.Sc. (AGPM) <u>Semester – II</u> Vertical : OJT/FP Course Name: On Job Training (OJT) / Field Project (FP) M2623-OJT-21	
*Teaching Scheme Lectures: 04 Hours/week, 04 Credits OR Practical: 02 Hours/week, 02 Credits		*Examination Scheme UA: 60 Marks CA: 40 Marks

Course Industrial Visit students can understand the working of industry. Field visit one can get information of pests, disease and fertilizer management in various crop plants. Industrial Training students can get complete information about industry, its production, marketing, and production cost. Knowledge of training will encourage entrepreneurship in students.

Course Objectives:

During this course, the student is expected to:

- 1 Industrial Visit students can understand the working of industry.
- 2 Field visit one can get information on tactics and strategies of pest management (IPM).
- 3 Field visit one can get information of pests, disease and fertilizer management in various crop plants.

Course Outcomes:

At the end of this course, students will be able to:	
1	Information about industry, its production, marketing, and production cost.
2	Knowledge of training will encourage entrepreneurship in students.
3	Field visit one can get information of pests, disease and fertilizer management in various crop plants

Section I

Unit-1:	No. of lectures-15	Weightage: 15-23 Marks
Unit content 1Industrial Visit (Theoretical or Practical Treatment)		
Unit-2:	No. of lectures-15	Weightage: 15-23 Marks
Unit content 2. Field Visit (Theoretical or Practical Treatment)		

Section II

Unit-3:	No. of lectures-15	Weightage: 15-23 Marks
Unit content Industrial Training (Theoretical or Practical Treatment)		
Unit-4:	No. of lectures-15	Weightage: 15-23 Marks
Unit content Any suitable topic may be added whenever necessary. (Theoretical or Practical Treatment)		
College Level Assessment (CA) Activities: List of Experiments/Assignments, etc. Any six of the following:		

Reference Books

1	As per required training
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UA
Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
Nature of Question Paper for CBCS Pattern
M. Sc. (Part- I & II) w.e.f. AY 2026

Time:

Total Marks: 60

Instructions

- 1) All Questions are compulsory
- 2) Figure to right indicate full marks.

Q.1 A) Choose correct alternative. (MCQ)

08 Marks

B) Fill in the blanks OR Write true/false

04 Marks

Q.2. Answer the following. (Any Six)

12 (2+2+2+2+2+2)

- A)
- B)
- C)
- D)
- E)
- F)
- G)
- H)

Q.3. Answer the following (Any three).

12 (4+4+4)

- A)
- B)
- C)
- D)

Q.4. Answer the following (Any two).

12 (6+6)

- A)
- B)
- C)

Q.5. Answer the following (Any two).

12 (6+6)

- A)
- B)
- C)

CA
Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
Nature of Question Paper for CBCS
Pattern M. Sc. (Part- I & II) w.e.f. AY 2026

Time:

Total Marks: 40

Internal Evaluation System for 40 Marks

Choose any two of the following

Home Assignment / Unit Test / Tutorial / Seminar/Open book test

Pattern of Examination= External Evaluation + Internal Evaluation 60 Marks
+ 40 Marks =100 Marks

Passing Criteria –

1. Written Exam – 24 out of 60
2. Continuous Assessment (CA) – 16 out of 40

NAAC Accredited-2022
'B++' Grade (CGPA-2.96)