



CIRCULAR NO.SU/Sci./B.Sc.Agro.Chem. /70/2023

It is hereby inform to all concerned that, the syllabus prepared by the Ad-hoc Board in Agrochemical & Fertilizer and recommended by the Dean, Faculty of Science & Technology the **Academic Council at its meeting held on 13 June 2023 has accepted the Revised Syllabus of B.Sc. Agrochemical and Fertilizer IIIrd & IVth semester under Choice Based Credit Grading System** as appended herewith.

This shall be effective from the Academic Year 2023-24 and onwards.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO. SU/SCI/2023/ 1402-09
Date:- 14.06.2023.

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Deputy Registrar,
Academic Section.

Copy forwarded with compliments to :-

- 1] **The Principal of all concerned affiliated Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,
- 2] **The Director, University Network & Information Centre, UNIC,**
with a request to upload this Circular on University Website.

Copy to :-

- 1] The Director, Board of Examinations & Evaluation, Dr.BAMU, A'bad.
- 2] The Section Officer, [B.Sc.Unit] Examination Branch, Dr.BAMU, A'bad.
- 3] The Programmer [Computer Unit-1] Examinations, Dr.BAMU, A'bad.
- 4] The Programmer [Computer Unit-2] Examinations, Dr.BAMU, A'bad.
- 5] The In-charge, [E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.BAMU, A'bad.
- 6] The Public Relation Officer, Dr.BAMU, A'bad.
- 7] The Record Keeper, Dr.BAMU, A'bad.



**Dr. Babasaheb Ambedkar
Marathwada University
Aurangabad - 431004 (MS) India**

**Undergraduate Bachelor
Degree Program in Science
(B.Sc.)**

Agrochemicals & Fertilizers

Course Structure and Curriculum

Choice Based Credit System

(Effective from Academic Year 2023-24)

**Dr. Babasaheb Ambedkar
Marathwada University Aurangabad
431004 (MS) India**

**Head
Dept. of Agro Chemicals &
Fertilizers
Balbhim College, Beed.**

**Head
Department of Chemistry
Balbhim College, Beed**

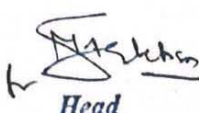
1. Preamble:

Our University has successfully tried to meet the regional demands of Agro-economic development by introducing need based course. The course is ideally accomplished by having chemical analysis, analytical techniques, use and formulations of agrochemicals, pest management, fertilizer management, disease management, modern techniques of agriculture productivity and its preservation. Today there is a great demand for this course, as student have realized that it has better chance of getting jobs in agro industries, chemical industries, food industries and self-business like nursery, sericulture, floriculture, apiculture, dairy business, fishery, agriculture shop etc. while conventional courses only trend human resources for teaching.

With the advancement in agricultural practices and application of Modern techniques in order to increase agricultural productivity in the country, it is inevitable to use modern techniques for crop cultivation i.e. shed net, poly house and green house technology. In future is also needs to increase such type of agricultural technologies to produce more cultivation of crops in minimum quantity of water and Land. Ratio of rainfall is low due to which such techniques are increasing very fast and changing the atmosphere of Marathwada region. To provide skilled man power to this field the present course will be highly effective and this will help to fulfill the employment needs in above mentioned techniques.

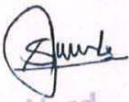
The systematic and planed curriculum from first to final semester shall motivate the student for pursuing higher studies in agrochemicals and fertilizers and inculcate enough skill for becoming an entrepreneur.

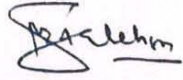

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Objectives:

1. To develop skill of modern agriculture techniques.
2. To provide knowledge regarding to soil science, soil fertility management, Fertilizer management, Weed and pest management.
3. To provide knowledge related to nursery, sericulture, floriculture, apiculture, dairy science, fishery etc.
4. To gives information about modern irrigation techniques i.e. micro irrigation, sprinklers irrigation, water conservation etc.
5. It aims at providing knowledge about advanced techniques of soil less culture i.e. hydroponics technology.
6. To improve knowledge about post-harvest technology aims at storing and preserving the fruits and vegetables for avoiding losses and improves profitability of farming.


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2. Course Structure

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Choice Based Credit System (CBCS)

Curriculum For

Faculty of Science and Technology

Course Structure and Scheme of Examination

B.Sc. Three Year Undergraduate Degree Program

Semester I

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1A) Core Courses	ACF-111	Organic Chemistry (Theory Paper-I)	45(3/week)	2	50	10	40	20
	ACF-112	Physical Chemistry (Theory Paper-II)	45(3/week)	2	50	10	40	20
	ACF-121	Lab course 1	45(3/week)	1.5	50	10	40	20
Ability Enhancement compulsory courses (AECC-1)	XXX-131	Communication skills in English-I	45(5/week)	3	50	10	40	20
	XXX-132	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-I)	45(4/week)	3	50	10	40	20
			225	11.5	250	50	200	100

Total Credits for Semester I : 5.5 (Theory : 04 ; Laboratory : 1.5)

Semester II

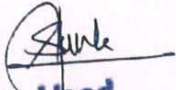
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1B) Core Courses	ACF -211	Agriculture Chemistry (Theory Paper-III)	45(3/week)	2	50	10	40	20
	ACF -212	Food & Nutrition (Theory Paper-IV)	45(3/week)	2	50	10	40	20
	ACF -221	Lab course 2	45(3/week)	1.5	50	10	40	20
Ability Enhancement	XXX-231	Communication skills in English-II	45(5/week)	3	50	10	40	20

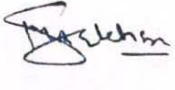

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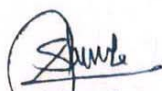
t compulsory courses (AECC-2)	XXX-232	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-II)	45(4/week)	3	50	10	40	20
Non-Credit Course	XXX-213	Constitution of India	45(3/week)	2*	50			
Non-Credit Course /additional credits	XXX-214	Compulsory Computer Course	45(3/week)	2*	50			
			225	11.5	250	50	200	100
Total Credits for Semester II : 5.5 (Theory : 04 ; Laboratory : 1.5)								

Semester III								
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1C) Core Courses	ACF -311	Soil Science (Theory Paper-V)	45(3/week)	2	50	10	40	20
	ACF -312	Biochemistry (Theory Paper-VI)	45(3/week)	2	50	10	40	20
	ACF -321	Lab course 3 (based on ACF-311)	45(3/week)	1.5	50	10	40	20
	ACF -322	Lab course 4 (based on ACF-312)	45(3/week)	1.5	50	10	40	20
Skill Enhancement Course (SEC-1)	ACF -313	SEC-1 Any one skill to be chosen out of two SEC-1(A):Pesticide Formulation SEC-1(B):Biological insecticides	45(3/week)	2	50	10	40	20
Ability Enhancement compulsory courses (AECC-3)	CLE-331	Communication skills in English-III	45(5/week)	3	50	10	40	20
	AECC-332	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-III)	45(4/week)	3	50	10	40	20
			315	15	350	70	280	140
Total Credits for Semester III : 07 (Theory : 04 ; Laboratory : 03)								


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Semester IV								
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSC-1D) Core Courses	ACF-411	Diseases of Crops & Fungicides (Theory Paper-VII)	45(3/week)	2	50	10	40	20
	ACF-412	Insecticides and Herbicides (Theory Paper-VIII)	45(3/week)	2	50	10	40	20
	ACF-421	Lab course 5 (based on ACF-411)	45(3/week)	1.5	50	10	40	20
	ACF-422	Lab course 6 (based on ACF-412)	45(3/week)	1.5	50	10	40	20
Skill Enhancement Course (SEC-2)	ACF-413	SEC-2 Any one skill to be chosen out of two SEC-2(A): Analytical Techniques for Agrochemicals Analysis SEC-2(B): Horticulture	45(3/week)	2	50	10	40	20
Ability Enhancement compulsory courses (AECC-4)	CLE-431	Communication skills in English-III	45(5/week)	3	50	10	40	20
	AECC-432	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-IV)	45(4/week)	3	50	10	40	20
Additional credits		Environment Studies	45(3/week)	2	50	10	40	20
			315	15	350	70	280	140
Total Credits for Semester IV : 07 (Theory : 04 ; Laboratory : 03)								


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3. Vision: To impart the experiential learning through promoting skills, knowledge in the field of agrochemicals, fertilizers, crop production, plant protection, reduction in toxicity, environmental safety and sustainability of agro ecosystem.

4. Mission:

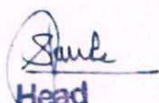
1. To provide relevant education to the students in soil science, soil fertility, agrochemicals and fertilizers.
2. To make the students well aware about the different agrochemicals and their management.
3. To encourage the young ones by imparting the knowledge in the crop, weed, pest and their management.
4. To persuade the youths on entrepreneurship in agriculture and rural development through adopting different ventures.

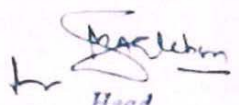
5. Programme Educational objectives:

1. Analytical techniques for agrochemicals.
2. Study of various bio-pesticides.
3. Chemistry of pesticide and their formulations.
4. To familiarize with recent modern agriculture technology development.
5. To help student to build up progressive and successful career in agriculture.
6. To train the student in skills related to agro industries.

6. Programme outcomes and Programme specific outcomes:

- Student develops a strong foundation in the fundamental concepts of agriculture.
- Students can work skillfully in agriculture industry.
- Students can employ the differential methods in crop cultivation.
- Students can have enough knowledge to pursue further study.
- Students will be able to get exposed to strong theoretical and practical background in fundamental concepts of agro chemistry.
- To make them able to express ideas persuasively in written and oral form to develop their business abilities.
- Gained the theoretical as well as practical knowledge of handling agro chemicals


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7. Eligibility:

1. He/ She must have passed the higher secondary (multipurpose) examination conducted by H.S.C. board Government of Maharashtra with science / Otechnical subjects Or an Examination of any statutory University and Board recognized as equivalent thereto.
2. OR He / She must have passed examination prescribed at the end of second year of the junior college conducted by the H.S.C. board, Government of Maharashtra with English, Second language, Physics, Chemistry, Mathematics and or Biology or one of the technical subjects prescribed at the said examination as the optional or elective subjects or an examination recognized as equivalent thereto.
3. He/ She must have passed at qualifying examination. A candidate who has passed the B.Sc. examination of this university may be allowed to present himself subsequently at the degree examination in a subject or subjects other than those he has taken earlier provided that he puts in three years of attendance as a regular candidate for First, Second and Third year in the subject or subjects concerned excluding compulsory English, Second Language and remaining optional subject(s). A candidate shall not be allowed to appear for such examination if he has passed the higher examination.

8. Duration:

The undergraduate program in agrochemicals and fertilizers is offered through the courses, Designed for granting the following B.Sc. degree. The course is of 3 years duration divided in 6 semesters.

9. Medium of instructions:

The medium of instruction for this course is in English.

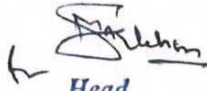
10. Choice based credit system (CBCS) and credit to contact hour mapping:

Each theory paper and practical paper allotted 45 periods. Each theory paper having 2 credits and practical paper having 1.5 credits.

11. Attendance:

The student should need minimum 60 % attendance to appear the examination.


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**12. Evaluation Methods/ Scheme of Examination, Earning Credits,
Grading system**

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Question Paper Pattern

Nature of Question Paper (Theory) for choice- based credit system (CBCS) semester
Pattern

Subject: Agrochemicals & Fertilizers

Time: 2 Hours

Max.Marks:40

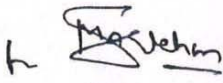
Instructions:

- 1) All questions are compulsory.
- 2) All question carry equal marks
- 3) Fig to the right indicate full marks

- Q.1. Long answer questions (Solve any one) 10
A. Question from Unit-I
B. Question from Unit-III
- Q.2. Long answer questions (Solve any one) 10
A. Question from Unit-II
B. Question from Unit-IV
- Q.3. Short answer questions (5 marks for each) 10
A. Short answer question from Unit-I
B. Short answer question from Unit-III
Or
A. Short answer question from Unit-II
B. Short answer question from Unit-IV
- Q.4. Multiple choice questions (MCQ) 10
Note: Ten MCQ's having four alternatives based on theory.
(Minimum two MCQ's from each unit)

Note: Continuous Internal Assessment (CIA): Theory = 10 marks


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Scheme of practical examination and marks (Practical) for choice based credit system
(CBCS) semester pattern

B.Sc. II Year Semester-III (ACF-321, ACF-322) and Semester-IV (ACF-421, ACF-422)

Subject: Agrochemicals & Fertilizers

i. **Continuous Internal Assessment (CIA): Practical** (10 marks): 05 marks for internal practical examination and 05 marks for record book.

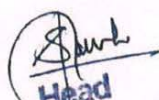
ii. **Practical Examination:** Annual examination

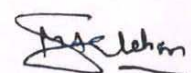
Continuous Internal Assessment (CIA): for 40 marks distribution

Course Title	Internal Practical Examination Marks	Record Book Marks	Total Marks
ACF-321	05	05	10
ACF-322	05	05	10
ACF-421	05	05	10
ACF-422	05	05	10
Total	20	20	40

Practical Examination (UA)

1. Experimental performance ACF-321 + ACF-421 -70 + Viva voce-10 = 80 Marks
2. Experimental performance ACF-322 + ACF-422 -70 + Viva voce-10 = 80 Marks


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Important Notes:

- i) **Nomenclature:** DSC- Discipline Specific Core course, SEC – Skill Enhancement Course, AECC- Ability Enhancement compulsory course, DSE- Discipline Specific Elective, UA- University Assessment (Semester End), CIA-Continuous Internal Assessment
- ii) **There shall be one skill enhancement course (SEC) IIIrd to VIth Semester (any one SEC course to be chosen (any one from three optional subjects) from the basket of SEC courses for the respective semester.**
- iii) **Code description:** XXX code has to be decided by BOS of the respective subject while designing their respective curriculum (e.g. for Physics it will be PHY; for Electronics it will be ELE)
- The codes for first semester courses will start from XXX-111, Second-semester courses will start from XXX-211 and so on
 - XXX-111 : The first digit indicate the Semester Number, the second two digits indicate paper numbers for the first-semester courses and the same analogy is for the remaining semesters
 - The codes for theory courses will start from XXX-111 (for the first semester and the same analogy is for the remaining semesters)
 - The codes for practical courses will start from XXX-121 (for the first semester and the same analogy is for the remaining semesters)
 - The codes for Ability Enhancement compulsory courses will start from XXX-131 (for the first semester and the same analogy is for the remaining semesters)
- iv) **Assessment:** 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)
- v) **Continuous Internal Assessment (CIA): Theory (10 Marks):** Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two test will be considered) and 05 Marks for Assignment/tutorials.
- vi) **Continuous Internal Assessment (CIA): Practical (10 Marks):** 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report
- vii) **Practical examination :** Annual examination


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**B.Sc. III Semester
Core Course (Theory paper-V)**

**Course Code: ACF-311
Title of course: Soil Science**

Credit: 02

Marks: 50

Periods: 45

Learning Outcomes: On successful completion of this course student will be able to

- * Understand the soil science, soil fertility management.
- * Get the knowledge of soil and its importance.
- * Aware about Management of soil productivity.

Unit: I Introduction of Soil

10 Periods

Definition of soil, classification of soil, Properties and composition of soil.

Rock, Minerals & weathering:

Definition of rocks & minerals, Classification and properties of rocks & minerals.

Definition of weathering, types of weathering, factors responsible for weathering.

Unit: II Study of Soil profile

10 Periods

Definition, Soil Horizon and typical diagram of soil profile, types of soil horizon,
Soil Components.

Unit: III Soil physical properties and their importance in soil fertility

10 Periods

1. Soil texture and mechanical analysis of soil.
2. Soil color.
3. Soil density and porosity.
4. Soil structure.
5. Soil temperature
6. Soil aeration.
7. Soil Consistency.

Unit: IV Soil fertility and productivity:

10 Periods

Definition, Comparison between fertility and productivity and factors affecting them

Management of soil productivity.

Unit V: Tutorials, Seminars and Assignments

05 Periods

Reference Book:

1. Fundamental of Soil Science: Forth and Turk.
2. Principles of Soil Science: M. M. Rai.


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3. Nature and properties of Soil: Bookmann and Brady
4. A text book of soil science: Dr. J. A. Daji.
5. Soil fertility and fertilizer: Tisdle and Nelson
6. Soil Science: P. S. Varma and V. K. Agarwal.
7. Soil fertility: Theory and Practice by J. S. Kanwar
8. Dictionary of Soil and water management by J. R. Kadam, B. P. Ghildyal



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B.Sc. III Semester
Core Course (Theory paper-VI)
Course code: ACF-312
Title of course: Biochemistry

Credit: 02

Marks:50

Periods: 45

Learning Outcomes: On successful completion of this course student will be able to

- * Understand the basic concepts of biochemistry and its importance.
- * Identify the importance of biomolecules in life.
- * Understand the chemical nature of biomolecules.

Unit: I Biochemistry

10 Periods

Definition, Scope and Importance of Biochemistry in Agriculture. Definition of Enzyme, Classification, Properties, Role of Enzyme as a Biological Catalysis.

Unit: II Carbohydrate

10 Periods

Definition, Classification, Structure and Properties of Carbohydrate Biological Significance of Carbohydrate.

Unit: III Protein and Amino Acid

10 Periods

Protein: Introduction, Definition, Classification, Properties and Structure of Protein, Qualitative Test for Identification of Protein.

Amino acid: Definition, Structure, Classification and Properties of Amino Acid.

Unit: IV Lipids

10 Periods

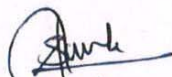
Introduction, Definition, structure, Component of Fatty Acid, Classification of Lipids, Properties of Fats and Oil, Biological Significance of Lipids.

Unit V: Tutorials, Seminars and Assignments

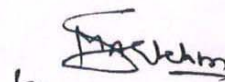
05 Periods

Reference book:

1. Elements of biochemistry by Srivastava
2. Fundamentals of biochemistry by B.P. Pandey
3. Textbook of biochemistry by West and Todd.
4. Essentials of biochemistry by U. Satyanarayan and U. Chakrapani
5. Concise textbook of biochemistry by T.N. Pattabhiraman
6. Fundamentals of biochemistry by H.P. Gajera, S.V. Patel, B.A. Golakiya
7. Textbook of biochemistry by Harbans Lal, Ashuma Sachdeva


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B.Sc. III Semester
Core Course (Lab. Course 3)
Course Code: ACF-321

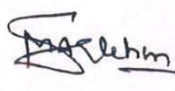
Credit: 1.5

Marks:50

Periods: 45

1. Collection of Rock and Mineral sample from the area.
2. Method of collection of soil sample.
3. Preparation and preservation of soil sample in laboratory.
4. Study of soil Augers and collection of soil sample with the help of the Augers.
5. To determine of water holding capacity of soil.
6. To determine moisture percentage from soil.
7. To determine the apparent specific gravity of soil.
8. To determine the absolute specific gravity of soil.
9. Determination of practical density of soil.
10. To determine percentage expansion of soil collides.
11. To determine the Moisture and pH of soil by using soil pH and moisture tester.


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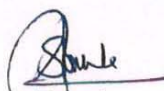
B.Sc. III Semester
Core Course (Lab. Course 4)
Course Code: ACF-322

Credit: 1.5

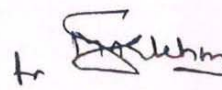
Marks: 50

Periods: 45

1. Determination moisture from the soil sample.
2. Determination of soil colouring using a soil testing kit.
3. Estimation of reducing sugar from cane sugar juice.
4. Estimation of non-reducing sugar from Jaggary.
5. Determination of saponification value from oil sample.
6. Color test of carbohydrates and protein.
7. Estimation of Vitamin C from fruit juice.
8. Visit to sericulture industry.
9. Visit to sugarcane industry.
10. Visit to soil testing laboratory.


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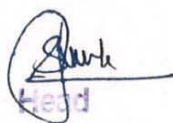

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Balbhim College, Beed**

**B. Sc. Second Year
(Semester-III)
Skill Enhancement Course**

Note:

***Any one skill Enhancement Course to be chosen out of two either
SEC-1(A): Pesticide Formulation or SEC-1(B): Biological insecticides.***


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**B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-III)**

Course Code: SEC- 313

Title of the Course: SEC-1(A) Pesticide Formulation

Credit: 02

Marks: 50

Periods: 45

Learning Objective:

At the completion of this course, the student should be-

- * To learn the Pesticide formulations.
- * To study highly toxic of pure pesticides in nature.
- * To explain the small amount of pesticides are required for the large cultivated areas, so for the pesticide

Unit I:

10 Periods

Introduction, Definition, purpose of formulations, different types of formulations.

Unit II:

10 Periods

Characteristics and specifications of formulation, Physio-chemical characteristics of formulations, important BSI specification.

Unit III:

10 Periods

Formulation of common pesticides:

Wettable powders
solutions
emulsifiable concentrates
aerosols
dusts and granules

Unit IV:

10 Periods

Controlled Release Pesticide Formulations: Polymeric pesticides.

Unit V: Tutorials, Seminars and Assignments

05 Periods

Reference books:

1. Pesticide Formulations and Application Systems by Hall F.R., Berger, P.D., Collins, H.M., (vol.14), 1995.
2. Pesticide Formulation and Adjuvant Technology by Foy C.L., Pritchard, D.W., CRC Press, 1996.
3. Chemistry and technology of agrochemical formulations by D. Alan Knowles, D.A., Springer, 1998.


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for Head

Department of Chemistry
Balbhim College, Beed

**B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-III)**

Course Code: SEC- 313

Title of the Course: SEC-1(B) Biological Insecticides

Credit: 02

Marks: 50

Periods: 45

Learning Objective:

- * To give the knowledge of biological insecticides and their natural source.
- * To know about use of new tools in Biological Pest Control.
- * To know about eco-friendly pesticides.

Unit I

10 Periods

Introduction: Definition, uses and adverse effects of biological pesticides;
Types of biological pesticides (biochemical pesticides, microbial pesticides and plant-incorporated protectants).

Unit II

10 Periods

Chemistry of Microorganisms in Biological Pest Control: Mode of action, advantages and disadvantages of following microorganism in biological pest control: Bacteria (*Bacillus thuringiensis*), Fungi (*Beauveria bassiana*), Protozoa (*Nosema locustae*), Virus (Gypsy moth nuclear polyhedrosis, NPV) and Nematodes (*Steinernema feltiae*).

Unit III

10 Periods

Botanical Insecticides in Biological Pest Control: Alkaloids (Nicotine), Pyrethrum (natural & synthetic pyrethroids), Azadirachtin, Rotenone and Limonene.
Botanical insecticides and their mode of action[Nostructure elucidation or synthesis is required for the above compounds]

Unit IV

10 Periods

New Tools in Biological Pest Control: Repellants, Chemosterilants, Antifeedants, Sex attractants.

Unit V: Tutorials, Seminars and Assignments

05 Periods

Reference books:

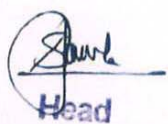
1. Microbial Control of Insects and Mites, Burges, .H.D., Hussey N.W. (Eds). Academic Press, London, 1971.


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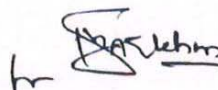
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2. Biological Control of Insect Pests and Weeds, De Bach, P., Chapman & Hall, New York, 1964.
3. Phytochemical Biopesticides, Koul, O., Dhaliwal, G.S. (eds), Harwood Academic Publishers, Amsterdam.
4. Entomology and pest management, Pedigo, L.P. Prentice Hall, N. Delhi, 1996.



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**B.Sc. IV Semester
Core Course (Theory paper-VII)**

Course Code: ACF-411

Title of the Course: Diseases of Crops & Fungicides

Credit: 02

Marks: 50

Periods: 45

Learning Outcomes: On successful completion of this course student will be able to

- * Understand the disease of crops and its types.
- * Know the various fungicides.
- * Agrochemicals and their role in various pollution.

UNIT-I Diseases of Crop:

10 Periods

Introduction: Definition, Nature, causes of Plant diseases. Reproduction and Dissemination

Types of Diseases: Seed borne diseases, Soil borne diseases, Air borne diseases.

Study of major diseases of following crops in Maharashtra state with reference to causal organism, symptoms, and control measures crops:

Sorghum, Sunflower, Cotton, Bajra, Pigeon pea, Mango, Chillies.

UNIT-II Fungicides:

10 Periods

Introduction and definition.

Classification of Fungicides: Sulphur Fungicides, Copper Fungicides, Mercury Fungicides, Systemic Fungicides, Antibiotics

Precautions taken during handling and storage of Fungicides.

Plant Protection equipment's, their proper use and maintenance.

UNIT-III Methods of application of fungicides:

10 Periods

Seed treatment, Soil treatment, Soil drenching, Broad Cast, Fumigation

Furrow application, Spraying, Dusting

UNIT-IV Agrochemicals and pollution:

10 Periods

Introduction & definition, Types of Pollution.

Pollution due to use of Agrochemicals: Pesticides/Insecticides, Herbicides

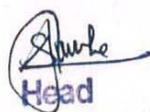
Fungicides, Pesticide residues in the water system and soil.

Unit V: Tutorials, Seminars and Assignments

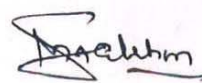
05 Periods

Reference Books:

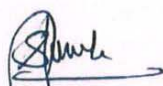
1. Diseases of crop plants in India- Rangaswami.


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2. Fungicides in plant disease control- Y.L. Nene, P.N. Thapliyal
3. Chemistry of Insecticides and Fungicides-U.S. Sree Ramulu.
4. Fungi and plant disease- B.B. Mundkar
5. Chemistry of Herbicides- Homer.
6. Methods of Pesticide analysis-U.S. Sree Ramulu.
7. Analytical Agricultural chemistry- Chopra and Kanwar .
8. Hand Book of Agriculture- ICAR
9. Environmental chemistry- A.K. De
10. Crop Production and Field experimentation Vaidhya, Khuspe, Sahasra Budhe.
11. Plant pathology- R.S. Sing.
12. Modern plant pathology-S.C. Dube.
13. Text book of Applied Entomology- K.P. Shrivastava



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**B.Sc. IV Semester
Core Course (Theory paper-VIII)**

Course Code: ACF-412

Title of Course: Insecticides and Herbicides

Credit: 02

Marks: 50

Periods: 45

Learning Outcomes: On successful completion of this course student will be able to

- * Understand the insecticides and herbicides.
- * Know the method weed control.
- * Agrochemicals and their role in various pollution.

UNIT-I Insecticides:

10 Periods

Introduction and Definition, Losses Caused by insects, Classification of Insecticides

Insecticidal formulations.

Natural Insecticides: Pyrethroids and Neem based

Principals and Methods of Insect Control

Physical and mechanical control.

Cultural Control.

Biological Control.

Chemical Control.

UNIT-II Synthetic insecticides and Integrated pest management:

10 Periods

Organo chlorine Insecticides.

Organo Phosphorus Insecticides.

Carbamates & Sulphur Containing Compounds. Synthetic Pyrethroids.

Fumigants.

Control of stored grain pests.

Integrated Pest Management.

UNIT-III Weeds and their Control:

10 Periods

Introduction:- Definition and Characteristics of weeds. Damage Caused by weeds.

Classification of weeds.

Weed Control methods: Mechanical, Cultural, Chemical and Biological.

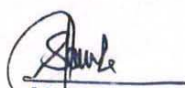
UNIT-IV Herbicides:

10 Periods

Definition and Classification of Herbicides.

Some important Herbicides: 2,4-D, 2,4-5-T, simazine, atrazine, TCA, monuron

Dalapon, Glyphoset, (Structure, Chemical Names, Common Names and uses)


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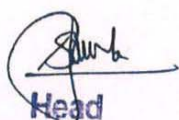
Precautions in Storage and handling of herbicides.

Unit V: Tutorials, Seminars and Assignments

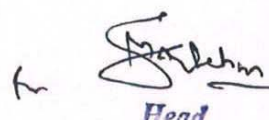
05 Periods

Reference Books:

1. Chemical for crop improvement and pest management- M. B. Green
2. Chemistry of Insecticides and Fungicides-U. S. Sree Ramula.
3. Hand book of Agrochemicals- Royal Society(UK)
4. Weed biology and control- T. J. Musik
5. Methods of Pesticide analysis-U.S. Sree Ramulu.
6. Diseases of crop plants in India- Rangaswami.
7. Chemistry of Herbicides- Homer
8. Crop Production and Field experimentation Vaidhya, Khuspe, Sahasra Budhe.
9. Weed Science- Gupta.
10. Plant pathology- R.S. Sing.



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**B.Sc. IV Semester
Core Course (Lab. Course 5)
Course Code: ACF-421**

Credit: 1.5

Marks: 50

Periods: 45

-
1. Determination of salinity of soil by conductometrically
 2. Estimation of Copper pesticides by iodometric methods.
 3. Estimation of zinc from zinc containing fungicides by EDTA method.
 4. Estimation of Sulphur from sulphur containing Fungicide.
 5. Determination of moisture content from pesticides/fungicides
 6. Determination of chemical oxygen demand (COD) from water sample.
 7. Collection and identification of plant diseases.
 8. Collection and identification of weeds.
 9. Collection and identification of insects/pests.
 10. Visit to the Agrochemicals Industry.


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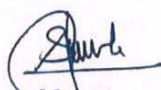
B.Sc. IV Semester
Core Course (Lab. Course 6)
Course Code: ACF-422

Credit: 1.5

Marks: 50

Periods: 45

1. Study and market survey of different agricultural chemicals.
2. Study of Plant protection appliances.
3. Preparation and use of Bordeaux mixture.
4. Determination of percentage purity of phosphomidon from commercial sample.
5. Study and application of herbicides (demonstration).
6. Extraction of pesticide/fungicide from plant material.
7. Determination of PH/acidity/alkalinity of the formulation.
8. Estimation of Fe^{2+} from FeSO_4 from micro nutrient carrier.
9. Analysis of Bordeaux mixture
10. Estimation of hardness of water.


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B. Sc. Second Year

(Semester-IV)

Skill Enhancement Course

Note:

***Any one skill Enhancement Course to be chosen out of two either
SEC-1(A): Analytical Techniques for Agrochemicals Analysis or SEC-1(B):
Horticulture.***



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**B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-IV)**

Course Code: SEC- 413

Title of the Course: SEC-2(A) Analytical Techniques for Agrochemicals Analysis

Credit: 02

Marks: 50

Periods: 45

Learning Objective:

At the completion of this course, the student should be-

- To learn the differential Separation techniques.
- To study the spectroscopic techniques.

Unit-I Separation techniques:

10 Periods

Principles, instrumentation and application of TLC, Paper chromatography, Column chromatography, Ion exchange and Ion chromatography.

Unit-II:

10 Periods

- a) **Ultraviolet spectroscopy:** Principles, Instrumentation and Applications
- b) **Infrared spectroscopy:** Principles, Instrumentation and Application.
- c) **Fluorescence spectroscopy:** Basic principles, Methodology, Applications.

Unit-III

10 Periods

Nuclear Magnetic Resonance spectrometry: Principles, Absorption of Radiofrequency, Chemical shift, Application in pesticide residue analysis NMR Spectroscopy.

Unit-IV

10 Periods

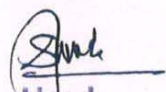
Mass spectrometry : Schematic of mass spectrometer, Ionization and Fragmentation of molecules. Interpretation and application in the pesticide Residue.

Unit V: Tutorials, Seminars and Assignments

05 Periods

Reference Books:

1. Spectroscopic methods in Organic Chemistry –D.H. Williams and I.Flemming.
2. Instrumental methods of analysis –Willard and Meritsee, Dean.
3. Application of spectroscopic techniques inorganic Chemistry-P.S. Kalsi.
4. Concept in analytical Chemistry –S.M. Khopkar.
5. Analysis of pesticide residue –H.A. Moya(JW).
6. Advance in pest control research –R.L. Metcalf.


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7. Application of absorption in Spectroscopy –J.R. Dyer.
8. Methods of pesticide analysis- Shree Ramulu.
9. Instrumental methods of chemicals analysis - Willard, Meritt & Dean.
10. Analytical agricultural chemistry- Chopra & Kanwar.



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**B. Sc. Second Year Agrochemicals & Fertilizers
(Semester-IV)**

Course Code: SEC- 413

Title of the Course: SEC-2(B) Horticulture

Credits: 02

Marks: 50

Periods: 45

Learning Objective:

At the completion of this course, the student should be-

- * To learn the horticulture.
- * To understand the floriculture, Olericulture.

Unit I

10 Periods

Introduction to Horticulture, Definition, Branches of horticulture, Importance and scope of horticulture in Maharashtra. Propagation of horticulture crops, Definition, Principles and methods of propagation of fruit crops propagation by seeds, Propagation by cutting, grafting, budding.

Unit II

Package of practices for important fruit crop of Maharashtra

10 Periods

- a) Mango
- b) Grapes
- c) Banana
- d) Guava
- e) Chiku (Sapodilla)

Unit III

10 Periods

Floriculture:

Introduction, Methods of cultivation, important flower crops of Maharashtra state, Handling, transportation and storage of floriculture products, Export potential in floriculture.

Unit IV

10 Periods

Olericulture:

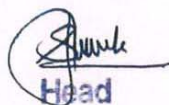
Definition, scope and Importance of vegetable growing,
Types of vegetables,
Types of vegetables gardens.

Unit V: Tutorials, Seminars and Assignments

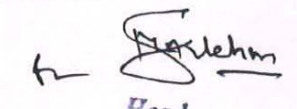
05 Periods

Reference Books:

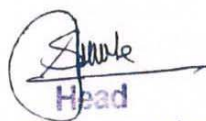
1. Fundamentals of Horticulture by Dr. G. S. K. Swamy, Dr. J. Auxilia


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2. Handbook of Horticulture by Chadha K L
3. Instant Horticulture by S N Gupta
4. Glaustas Horticulture by P Muthukumar & R Selvakumar
5. Essence of Horticulture A.R. Karale, C.D. Badgujar And J.D. Adiga M.S. Patil
6. Fruits by Ranjit Singh
7. Textbook of Vegetables Tuber crops & Spices by S & Narendra Singh Thamburaj
8. Introduction To Spices Plantation Crops Medicinal & Aromatic Plants by N Kumar
9. Floriculture At A Glance by Desh Raj



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