

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




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

Agrochemical & Fertilizers

Course Structure and Curriculum

Choice Based Credit System

(Effective from Academic Year 2022-23)


Dr. S.S. Umekar

**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 for Agrochemical & Fertilizers
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	Core Course (Theory Paper-I)	45(3/week)	2	50	10	40	20
	ACF-112	Core Course (Theory Paper-II)	45(3/week)	2	50	10	40	20
	ACF-121	Lab course 1 (based on ACF-111 and ACF-112)	45(3/week)	1.5	50	10	40	20
Total Credits for Semester I : 5.5 (Theory : 4 ; 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	Core Course (Theory Paper-III)	45(3/week)	2	50	10	40	20
	ACF-212	Core Course (Theory Paper-IV)	45(3/week)	2	50	10	40	20
	ACF-221	Lab course 2 (based on ACF-211 and ACF-212)	45(3/week)	1.5	50	10	40	20
Total Credits for Semester II : 5.5 (Theory : 4 ; Laboratory : 1.5)								

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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	Core Course (Theory Paper-V)	45(3/week)	2	50	10	40	20
	ACF -312	Core Course (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
Total Credits for Semester III : 7(Theory : 4 ; Laboratory : 3)								
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	Core Course (Theory Paper-VII)	45(3/week)	2	50	10	40	20
	ACF -412	Core Course (Theory Paper-VIII)	45(3/week)	2	50	10	40	20
	ACF -421	Lab course 4 (based on ACF-411)	45(3/week)	1.5	50	10	40	20
	ACF -422	Lab course 5(based on ACF-412)	45(3/week)	1.5	50	10	40	20
Total Credits for Semester IV : 7 (Theory : 4 ; Laboratory : 3)								


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Semester V

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1 A) Discipline Specific Elective	ACF -511	DSE-1A(1) (Theory Paper-IX) (Select any one paper from A1/B1/C1/D1)	45(3/week)	2	50	10	40	20
	ACF -512	DSE-1A(2) (Theory Paper-X) (Select any one paper from A2/B2/C2/D2)	45(3/week)	2	50	10	40	20
	ACF -521	Lab course 6 (based on ACF-511)	45(3/week)	1.5	50	10	40	20
	ACF -522	Lab course 7 (based on ACF-512)	45(3/week)	1.5	50	10	40	20

Total Credits for Semester V : 7 (Theory : 4 ; Laboratory : 3)

Semester VI

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I (DSE-1 B) Discipline Specific Elective	ACF -611	DSE-1B(1) (Theory Paper-XI) (Select any one paper from A1/B1/C1/D1)	45(3/week)	2	50	10	40	20
	ACF -612	DSE-1B(2) (Theory Paper-XII) (Select any one paper from A2/B2/C2/D2)	45(3/week)	2	50	10	40	20
	ACF -621	Lab course 8 (based on ACF-611)	45(3/week)	1.5	50	10	40	20
	ACF -622	Lab course 9 (based on ACF-612)	45(3/week)	1.5	50	10	40	20

Total Credits for Semester V : 7 (Theory : 4 ; Laboratory : 3)

Total Credits for three years : Sem I (5.5) + Sem II (5.5) + Sem III (7) + Sem IV (7) + Sem V (7) + Sem VI (7) = 39 Credits

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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)Code description: ACF code has to be decided by BOS of the respective subject while designing their respective curriculum.

iii)Assessment: 80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)

iv)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.

v)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

Practical examination : Annual examination.

ACF-111
(Organic Chemistry)
(Theory: 02; Periods: 45)

Unit: I Acids, Phenols & Bases: 10 Periods.

Acids: Synthesis, physical & chemical properties of Lactic acid, Oxalic acid

Phenols: Synthesis, physical & chemical properties of Resorcinol, Cresols, Naphthols.

Bases: Synthesis, physical & chemical properties of primary and secondary amines

Unit: II Analysis of Organic Compounds: 10 Periods

- i) Detection of elements: Carbon, Hydrogen, Nitrogen, Halogen & Sulphur.
- ii) Estimation of elements:
 - a) Carbon & hydrogen by Liebig's method.
 - b) Nitrogen by Kjeldahl method
 - c) Halogen & Sulphur by Cane's methods
- iii) Determination of Empirical and molecular formulae

Unit: III Alkaloids & Amino acids: 10 Periods

Alkaloids: Introduction, Classification of Alkaloids, natural sources of nicotine.

Amino acids: Definition, structure, classification and properties of amino acids.

Unit: IV Heterocyclic Compounds: 10 Periods

Introduction, classification of heterocyclic compounds containing one hetero atom.

- a) Five membered heterocyclic compounds: Synthesis and chemical properties of Pyrrole, Furan & Thiophene
- b) Six membered heterocyclic compounds: Synthesis and chemical properties of Pyridine, Quinoline.

Reference Book:

- 1) Biochemistry 4 th Edition by U. Satyanarayan & U. Chakrapani.
- 2) Principles of Biochemistry by Albert L. Lehninger, David L. Nelson, Michael M. Cox
- 3) Heterocyclic Chemistry 3 rd Edition by Thomas Gichrist
- 4) Heretocyclic Chemistry 4 th Edition by Raj K. Bansal
- 5) Heterocyclic Chemistry 5 th Edition by J.A. Joule, K.Mills
- 6) Chemistry of natural products 2nd Edition by N.R. Krishnaswamy
- 7) Chemistry of natural products by S. V. Bhat, B.A. Nagasampagi, M. Sivkumar
- 8) Organic chemistry by Jonathon clyden, Nick Greeves, Stuart Warren
- 9) Advanced Practical Organic Chemistry by N.K. Vishnoi

10) Comprehensive Practical Organic chemistry: Qualitative Analysis by V. K. Ahluwalia, Sunita Dhingra

ACF-112
(Physical Chemistry)
(Theory: 02; Periods: 45)

Unit: I Catalysis

10 Periods

Defination of catalyst, catalysis, Inhibitors, Biocatalyst. Positive and negative catalysis. Homogeneous & Heterogeneous catalyst. Characteristics of catalyst.

Theory of catalysis:

- i) Intermediate compound formation theory
- ii) Adsorption theory
- iii) Modern theory

Unit II: Separation Techniques

10 Periods

Principal and techniques of chromatography, Adsorption and partition chromatography. Paper chromatography, Gas & thin layer chromatography. Separation of plant pigments by chromatography.

Unit III: Photochemistry

10 Periods

Introduction of photochemistry. Importance of photochemistry in agriculture. Interaction between light and matter. Laws of photochemistry. Photochemical reaction in agriculture with example.

Unit IV: pH, pOH & Buffer Solution

10 Periods

Defination pH, pOH & buffer solution, soil pH, factors affecting on soil pH, buffer capacity of soil.

Reference Books:

- 1) Enzymes: Biochemistry, Biotechnology, Clinical Chemistry by Trevor palmer, Philip L. R. Bonner
- 2) Biochemistry 4 th Edition by U. Satyanarayan & U. Chakrapani.
- 3) Principles of Biochemistry by Albert L. Lehninger, David L. Nelson, Michael M. Cox
- 4) Introduction to Modern Liquid Chromatography by Lloyd R. Snyder, joseph J. Kirkland, John W. Dolan.
- 5) Analytical Chemistry by Gary D. Christian, Purnendu K. dasgupta, Kevin A. Schug
- 6) Instrumental Methods of Chemical Analysis by Gurdeep R. Chatwal
- 7) Fundamental of photochemistry by K.K. Rohatgi-Mukharjee
- 8) Photochemistry by Gurdeep Raj GOEL Publication House, Meerut

ACF-221
Laboratory Course –I
(Credits 1.5; 3 Hours per week)

1. Identification of Organic compounds (any five) that includes,
 - i. Preliminary tests.
 - ii. Nature of organic compounds
 - iii. Element Detection
 - iv. Functional groups
 - v. Physical constant
 - vi. Preparation of one derivatives
2. Estimation of available chlorine in the given sample of bleaching powder.
3. Determination of molecular weight of organic acid.
4. Estimation of copper by iodometry.
5. Determination of acid value of oil sample
6. Determination of pH of given soil sample.
7. Determination of PH of given water sample.
8. Determination of cell constant of conductivity cell.
9. Determination of equivalent conductivity of acetic acid.
10. Determination of viscosity of liquid.
11. Determination of surface tension of Given liquid.

ACF-211
Agricultural Chemistry
(Credits 2; Periods 45)

Unit I: Alcohol Manufacturing

10 Periods

Introduction and uses of rectified spirit, absolute alcohol, methylated spirit.
Manufacture of ethanol from a) Molasses b) Starch

Unit II: Study and use of Agrochemicals in Agriculture and Agro industries

10 Periods

- a) Insecticide - Organophosphorous insecticide
- b) Fungicides - Sulphur, Copper fungicides.
- c) Weedicides - Classifications, chemical nature mode of action.
- d) Preparations and uses of following.
 - a) B.H.C. b) D.D.T.

Unit III: Plant Diseases

10 Periods

Introduction, Diseases of major field crops

- i) Soyabean ii) Jowar iii) Sugarcane iv) Wheat vi) Onion

Unit IV: Pest control and Green Chemistry in Pesticides

10 Periods

Insect attractant and repellents from plant resources, Introduction, Chemical constituents and bioefficacy of Neem Extract, Application of Neem in plant protection.

Reference Books:

1. Plant diseases : R.S. Singh
2. Plant pathology :George N.Agrios
3. The Complete Technology Book On Pesticides, Insecticides, Fungicides and Herbicides with Formulae & Processes: H.Panda
4. Organic Chemistry: Bahl and Bahl

ACF-212
Food and Nutrition
(Credits 2; Periods 45)

Unit I: Nutrition

10 Periods

Food Definition functions of food - Physiological, social and psychological Balanced Nutrition and malnutrition Definition, nutritional components of food, energy importance. Following food constituents. And its requirements Nutritional importance of

- 1) Carbohydrates.
- 2) Proteins.
- 3) Fats and fatty acids.
- 4) Minerals and water.
- 5) Fibers

Unit II: Vitamins

10 Periods

Introduction, classification, properties, functions deficiency symptoms of and vitamins. A, D, E, K, Vitamin B complex (B1 & B12) vitamin C (Ascorbic acid).

Unit III: Plant Hormones

10 Periods

Introduction, occurrence, Structure, Physiological role of following plant hormones.

- a) Auxins
- b) Gibberellins
- c) Cytokinins.
- d) Abscisic acid.

Applications of plant hormones in agriculture.

Unit IV: Plant Biochemistry

10 Periods

- a) Biochemical changes during seed germination
- b) Biochemical changes during fruit ripening.
- c) Commercial use of hormones in fruit ripening.

Reference Books:


1. Plant biochemistry by Bonner
2. Plant physiology by Sundaram
3. Handbook of agriculture: ICAR Publications
4. Foods facts and Principles: N.Shakuntala Many

ACF-221

Laboratory Course -II

(Credits 1.5; 3 Hours per week)

1. Identification of diseases of major field crops
 - a) Jowar
 - b) Soyabean
 - c) Cotton
 - d) Onion
 - e) Sugarcane
2. To estimate the amount of acetic acid in vinegar solution.
3. Determination of ascorbic acid by titration method
4. Visit to sugarcane industry
5. Calculation of nutritive value of milk
6. Calculation of nutritive value of Panache
7. Estimation of Chlorophyll from plant sample
8. Determination of Ash contents from Green leafy vegetables.
9. Preparation of plant sample for analysis


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