Dr.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

CIRCULAR NO.SU/B.Sc./CBC&GS /65/2023

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies, Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the **following syllabi of Bachelor of Science with Practical Pattern of Question Paper under the scheme of Choice Based Credit & Grading System** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

Sr.No.	Courses	Semester
1.	**B.Sc. Home Science (Degree)**	**IIIrd & IVth semester**
2.	**B.Sc. Information Technology (Degree)**	**IIIrd & IVth semester**
3.	**Bachelor of Computer Application (Degree)**	**IIIrd & IVth semester**
4.	**B.Sc.Botany (Optional)**	**IIIrd & IVth semester**
5.	**B.Sc.Dairy Science & Technology(Optional)**	**IIIrd & IVth semester**
6.	**B.Sc.Fisheries Science (Optional)**	**IIIrd & IVth semester**
7.	**B.Sc.Computer Science (Optional)**	**IIIrd & IVth semester**
8.	**B.Sc.Zoology (Optional)**	**IIIrd & IVth semester**

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

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

University Campus,
Aurangabad-431 004.
REF.NO.SU/2023/30210-26
Date:- 26.05.2023.

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Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principal of all concerned 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.

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Dr. Babasaheb Ambedkar Marathwada University
Aurangabad – 431 517 (MS) India

Undergraduate Bachelor Degree Program in Science

(B. Sc. Second Year)

Semester- III and IV

Dairy Science and Technology

(Optional Subject)

Course Structure and Curriculum

(Outcome based Curriculum)

Choice Based Credit System

(Effective from Academic Year 2023-24)

(Prof. V.V. Nikas)

11/5/23.
Dean
Faculty of Science & Technology
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad

Dr. Babasaheb Ambedkar Marathwada University,Aurangabad

Choice based credit system (CBCS) semester pattern

B. Sc. Second Year

Dairy Science and Technology (Optional Subject)

Course Structure and Curriculum

Semester- III

	Course code	Course Title	Total periods (Teaching periods/ week)	Credits	Scheme of examination			
					Max. marks	CIA	UA	Min .marks
Optional 1 Dairy Science & Technology (DST-1C)	DST-311	Animal Reproduction & Artificial Insemination (Theory Paper-V)	45(3/week)	2	50	10	40	20
	DST-312	Traditional Indian Dairy Products (Theory Paper-VI)	45(3/week)	2	50	10	40	20
	DST-321	Lab Course 3 (Based on 311)	45(3/week)	1.5	50	10	40	20
	DST-322	Lab Course 4 (Based on 312)	45(3/week)	1.5	50	10	40	20
Skill Enhancement Course (SEC-1)	DST-313	SEC-1 Any one skill to be chosen out of two SEC-1(A)-Artificial Insemination Technology. SEC-1(B)-Paneer Technology	45(3/week)	2	50	10	40	20
Ability Enhancement Compulsory Courses (AECC-3)	XXX-331	Communication skills of English-III	45(3/week)	3	50	10	40	20
	XXX-332	Marathi/Hindi/Urdu/Sanskrit (SL-III)	45(3/week)	3	50	10	40	20
			315	15	350	70	280	140

Prof V.V Nikas

Dr. Babasaheb Ambedkar Marathwada University,Aurangabad

Choice based credit system (CBCS) semester pattern

B. Sc. Second Year

Dairy Science and Technology (Optional Subject)

Course Structure and Curriculum

Semester- IV

	Course code	Course Title	Total periods (Teaching periods/ week)	Credits	Scheme of examination			
					Max. marks	CIA	UA	Min .marks
Optional 1 Dairy Science & Technology (DST-1D)	DST-411	Genetics and Animal Breeding	45(3/week)	2	50	10	40	20
	DST-412	Ice-Cream and fat rich dairy products	45(3/week)	2	50	10	40	20
	DST-421	Lab Course 5 (Based on 411)	45(3/week)	1.5	50	10	40	20
	DST-422	Lab Course 6 (Based on 412)	45(3/week)	1.5	50	10	40	20
Skill Enhancement Course (SEC-2)	DST-413	SEC-2 Any one skill to be chosen out of two SEC-2(C)-Techniques of animal breeding SEC-2(D)-Ice Cream Technology	45(3/week)	2	50	10	40	20
Ability Enhancement Compulsory Courses (AECC-4)	XXX-431	Communication skills of English-IV	45(3/week)	3	50	10	40	20
	XXX-432	Marathi/Hindi/Urdu/Sanskrit (SL-IV)	45(3/week)	3	50	10	40	20
Additional credits		**Environmental studies**	45(3/week)	2	350	70	280	140
			315	15	350	70	280	140

B.Sc. Second Year Semester III (CBCS)

Paper DST 311 Animal Reproduction and Artificial Insemination

Total Credits: 02 **Total Periods: 45**

Marks: 50

Learning objectives of the course :

1. To introduce students regarding the process of animal reproduction.
2. To understand the different stages of parturition.
3. To enable students to understand the AI techniques in farm animals.
4. To understand the knowledge of bio techniques in animal reproduction.

Learning outcomes of the course :

1. Describe the animal reproduction practices in farm animal.
2. Give the different stages of parturition.
3. Describe the AI techniques in farm animal.
4. Explain the bio techniques used in animal reproduction.

Unit I: Reproductive system of cattle **(10)**

1. Anatomy of reproductive system in cattle

2. Growth, Puberty and Gametogenesis

3. Study of estrus cycle:- Definition, Hormones in reproduction & Stages of Estrus cycle.

4. Ovulation, Fertilization & Implantation.

Unit II: Gestation and parturition **(10)**

1. Gestation :- Types of Placenta, Functions of Placenta, Length of gestation in Farm animals, Factors affecting Gestation.

2. Pregnancy Diagnosis

3. Parturition:- Definition, stages of parturition, evolution of Uterus.

Unit III: Artificial Insemination **(10)**

1. Artificial Insemination:-History and Importance.

2) Definition, advantages & Disadvantages of AI.

3) Evaluation of Semen

4) Collection of Semen.

5) Dilution of semen.

6) Preservation of semen.

7) Handling & storing of semen.

Unit IV: Biotechnology in Animal Reproduction **(10)**

1) A.I. –Time, technique

2) Super Ovulation

3) Estrus Synchronization

4) ETT

5) Cloning

Unit V: Tutorials, Seminars and Assignments **(05)**

DST 321 Lab Course 3 Based on DST 311

1. Study of reproductive organs of cattle.

2. Study of section slides of spermatogenesis and oogenesis.

3 Assembling and preparation of A.V., collection of semen by A.V.

4 Study of A.I. equipments & insemination of cow.

5 Examination of semen.

6. Preparation of semen extender/dilutor.

7. Pregnancy diagnosis in cow.

8. Detection of heat in farm animals.

9. Project work

10. Visit to cattle breeding farm.

B.Sc. Second Year Semester III (CBCS)

Paper DST 312 Traditional Indian Dairy Products

Total Credits: 02 **Total Periods: 45**

Marks: 50

Learning objectives of the course :

1. To identify and classify the traditional Indian dairy products.
2. To describe dessicated milk products.
3. To describe heat and acid coagulated milk products.
4. To understand fat rich traditional Indian dairy products.

Learning outcomes of the course :

1. Identify and classify traditional Indian dairy products.
2. Able to describe the dessicated milk products.
3. Describe the different heat and acid coagulated milk products.
4. Explain the fat rich traditional Indian dairy products.

Unit I : Introduction to traditional Indian dairy products **(05)**

1. History , scope and status of traditional Indian dairy products

2. Classification of traditional Indian dairy products

3. Comparison of traditional Indian dairy products with western counterparts

Unit II: Desiccated Milk Products **(15)**

i) Khoa :- Definition, Classification, types, methods of manufacture, packaging, preservation, factors affecting yield of khoa, physicochemical changes during manufacture and storage of khoa, defects in khoa, khoa based sweets :- Definition composition & technology of manufacture.

i) Peda, Burfi, Gulabjamun & Milk Cake.

ii) Rabri.

iii) Basundi

iv) Kheer

v) Khurchan

Unit III: Heat and acid coagulated milk products **(10)**

i) Channa: Definition, composition, methods of manufacture, packaging, yield and defects.

Channa based Sweets: - Channa Kheer, Rasogolla, Kalakand, Pantoa, Sandesh, Rasmalai, Rasanguri, and Rajbhog & Channa Podo.

ii) Panir: - Definition Method of manufacture, Packaging & storage. Physico chemical changes during storage.

Unit IV: Fat rich Indian Dairy Products **(10)**

i) Makkhan: Definition, composition, method of manufacture, fat losses during manufacture.

ii) Ghee: History, Composition, methods of manufacture, grading, packaging and preservation of Ghee, market quality, Renovation of Ghee. Defects in Ghee.

Unit V: Tutorials, Seminars and Assignments **(05)**

DST 322 Lab Course 4 Based on DST 312

1. Preparation of Khoa
2. Preparation of Khoa sweets
3. Preparation of Rabri
4. Preparation of Basundi
5. Preparation of Kheer
6. Preparation of Chhana
7. Preparation of Chhana Sweets
8. Preparation of Paneer
9. Preparation of Makkhan
10. Preparation of Ghee

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Choice based credit system (CBCS) semester pattern

B.Sc. second year Dairy science and Technology

Skill Enhancement course SEC-1(A)

Artificial insemination (AI) Technology

Total Credits: 02 **Total Periods: 45**

Marks: 50

1. History scope and status of AI technology.
2. Definition, advantages and disadvantages of Artificial Insemination.
3. Evaluation of semen.
4. Collection methods of Semen.
5. Preservation of Semen.
6. Handling and storage of Semen.
7. Insemination techniques of Semen.
8. Bio techniques in animal reproduction
   a) super ovulation
   b) oestrus. synchronization
   c) ETT
   d) cloning

Practicals

1. Assembling and preparation of AV.
2. Methods of Collection of Semen.
3. Examination of Semen.
4. Preparation of semen dilutor / extender.
5. Study of AI equipment and insemination techniques in cow.
6. Visit to cattle breeding farm.

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Choice based credit system (CBCS) semester pattern

B.Sc. second year Dairy science and Technology

Skill Enhancement course SEC-1(B)

Paneer Technology

Total Credits: 02 **Total Periods: 45**

Marks: 50

Unit-1: fundamentals of dairy chemistry

1. Milk composition, constituents and nutritional importance.
2. Physic-chemical properties of milk.
3. Adulterants in milk.

Unit-2: chhana and Paneer

1. Classification of milk products.
2. Definition, composition, standards and factors affecting quality of chhana and paneer.
3. Method of manufacture of chhana and paneer.
4. Packaging, storage and common defects.

Unit-3: chhana based sweets

1. Chhana kheer
2. Rasogolla
3. Rasmalai
4. kalakand

Practicals :

1. Sampling of milk.
2. Platform test of milk.
3. Determination of acidity of milk.
4. Determination of fat of milk.
5. Determination of specific gravity of milk.
6. Detection of adulterants in milk.
7. Preparation of chhana.
8. Preparation of Paneer.
9. Quality evaluation of Paneer.
10. Visit to dairy plant

B.Sc. Second Year Semester IV (CBCS)

Paper DST- 411 Genetics and Animal breeding

Total Credits: 02 **Total Periods: 45**

Marks: 50

Learning objectives of the course :

1. To introduce students regarding the knowledge about genetics.
2. To enable students to understand the knowledge about genes and their functions.
3. To understand the fertility and sterility in farm animals.
4. To understand the different methods of animal breeding.

Learning outcomes of the course :

1. Describe the Mendel's law of inheritance.
2. Describe the functions of genes.
3. Describe fertility and sterility in farm animals.
4. Describe the different methods of animal breeding.

Genetics and Animal breeding DST 411

Unit I: Genetic Recourses **(10)**

i) Terminology used in genetics

ii) Cell-division – mitosis & meiosis

iii) Mendel's law of inheritance

a) Monohybrid & di-hybrid crosses

b) Modified di-hybrid crosses

iv) Multiple alleles

Unit II: Gene and their functions **(10)**

1. Mutation

2. Variation

3. Sex chromosome

4. Sex linkage,

5. Sex determination

6. Genotype environment interaction

Unit III: Fertility and Sterility **(10)**

1. Fertility
2. Breeding efficiency
3. Factors affecting breeding efficiency
4. Sterility, causes of sterility.

Unit IV: System of animal breeding **(10)**

1. Principles & progress of animal breeding.
2. Inbreeding- definition, methods
3. Out breeding- definition, methods
4. Effect of inbreeding on growth, production & reproduction
5. Adaptability of cross breeds in tropics

Unit V: Tutorials, Seminars and Assignments **(05)**

DST 421 Lab Course 5 Based on DST 411

1. Judging of dairy cattle.
2. Estimation of gene frequency.
3. Estimation of genotype frequency.
4. Estimation of most probable producing ability in cow.
5. Estimation of breeding efficiency of cow.
6. Project work.
7. Visit to cattle breeding farm.

B.Sc. Second Year Semester IV (CBCS)

Paper DST 412 Ice cream and fat rich dairy products

Total Credits: 02 **Total Periods: 45**
Marks: 50

Learning objectives of the course :

1. To understand the process of ice cream manufacture.
2. To understand the role of different ingredients in Ice cream making.
3. To describe cream.
4. To describe butter and butter oil.

Learning outcomes of the course

1. Describe the process of Ice cream manufacture.
2. Able to understand role of different ingredient in Ice cream making.
3. Describe the manufacture cream.
4. Able to understand the manufacture of butter and butter oil.

Ice cream and fat rich dairy products DST 412

Unit I: Ice cream **(15)**

1. History, scope , development and status of ice-cream industry in India.

2. Definition, composition and nutritive value of ice-cream.

3. Classification and standards of ice-cream.

4. Study of role of dairy and non dairy ingredients in ice-cream.

5. Study of stabilizers and emulsifiers, their classification, properties and role in quality of ice-cream.

6. Manufacturing of ice-cream.

7. Physico-chemical properties of ice-cream mix

8. Over run in ice-cream and their control.

9. Defect in ice-cream, their causes and prevention.

Unit II: Manufacturing of indigenous frozen dessert. **(05)**

a) Kulfi b) Malai ka burf c) Milk ices and lollies d) Milk shake

Unit III: Fat rich dairy products **(10)**

Cream: Definition, composition and classification. Methods of cream separation, Factors affecting creaming and skimming efficiency, Defects of cream their causes and prevention

Unit IV: Butter and butter oil **(10)**

Butter: History, Definition, composition & types of butter ,butter churn. Method of manufacturing , factors affecting fat losses in butter milk, theories of churning, Defects, their causes & prevention. Continuous butter making machine (CBMM). Manufacture of desi and table butter.

Butter oil: Defination, Composition, method of manufacturing, distribution & uses.

Unit V: Tutorials, Seminars and Assignments **(05)**

DST 422 Lab Course 6 Based on DST 412

1. Study of ice-cream freezer.
2. Calculation of ice-cream mix.
3. Manufacturing of soft serve plain & fruit flavored ice-cream
4. Preparation of kulfi.
5. Preparation of milk shake.
6. Study of cream separator.
7. Separation of cream.
8. Study of butter churn & butter making equipment.
9. Manufacturing of white/table butter.
10. Manufacturing of butter oil.
11. Project work.

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Choice based credit system (CBCS) semester pattern

B.Sc. second year Dairy science and Technology

Skill Enhancement course SEC-2 (C)

Techniques of Animal breeding

Total Credits: 02 **Total Periods: 45**

Marks: 50

1. Judging of dairy cattle
2. Fertility:- definition, breeding efficiency and factors affecting on breeding efficiency
3. Sterility :- definition , causes of sterility
4. Selection
    a. Choosing trait for selection
    b. Methods of selection
    c. effect of selection
5. Systems of animal breeding
    a. Definition, methods of animal
    b. Principle progress of animal breeding
    c. Inbreeding :- definition, types
    d. Outbreeding :- definition, types
    e. Effect of inbreeding on growth production and reproduction
    f. Adaptability of cross breeds in tropics.

Practicals :

1. Judging of dairy cattle by score card method.
2. Estimation of gene frequency.
3. Estimation of genotype frequency.
4. Estimation of breeding efficiency of cow.
5. Estimation of most probable producing ability in cow.
6. Visit to cattle breeding farm.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Choice based credit system (CBCS) semester pattern

B.Sc. second year Dairy science and Technology

Skill Enhancement course SEC-2(D)

Ice cream Technology

Total Credits: 02 **Total Periods: 45**

Marks: 50

1.History scope and status of Ice cream industry.

2.Definition classification composition of Ice cream.

3.Study of dairy and non dairy ingredients in Ice cream.

4.Manufacturing of Ice cream.

5.Over run in Ice cream and their control.

6.Packaging, storage and transportation of Ice cream.

7.Defects in Ice cream, their causes and prevention.

Practicals

1.Study of Ice cream freezer.

2.Calculation of ingredients in Ice cream mix.

3.Manufacturing of softy Ice cream.

4.Determination of overall in Ice cream.

5.Sensory evolution of Ice cream.

Reference Books

1. A Text book of Animal Husbandry by - G.C. Banarjee
2. Traditional Dairy Products - M.Ranganadhm , Satishmumar M.H. Devraja H.C.and F.C.Garg.
3. Recent Trends in Dairy & Food Processing Edt. A.S. Khojare, Paithani Prakashan Aurangabad
4. Dairy India Year Book – 2007 by - P.R. Gupta
5. Moisture Sorption Properties Indian Dairy Products, A. S. Khojare, Newman Publications, Mumbai
6. Dairy Plant Engineering and Management by Tufail Ahmed.
7. Handbook of Dairy science----by K. C. Mahanta
8. Outlines of Dairy Technology by Sukumar De.
9. Milk products in India-----M.R. Shrinivasan & C.P.Anantkrishnan.
10. Dairy Technology and Engineering by H.G. Kessler
11. Ice-Cream----------by W. S. Arbuckle
12. Dairy Processing by Earl.
13. Technology of Indian milk products—by R.P.Aneja, B.N.Mathur, R.C. Chandan & A.K. Banerjee.
14. Introduction to food safety-------IGNOU, New Delhi.
15. Food Safety & Quality Assurance—IGNOU, New Delhi.
16. Hazards to food Safety----------IGNOU, New Delhi.
17. Reproduction in farm animals----C. N. Sane & others.
18. Hand Book of Indian Dairy Farmers---Patrick John.
19. A Textbook of Genetics--------Dalela R. C. & S. R. Verma.
20. Genetics and Breeding in farm animals---Banerjee & Mukharjee.
21. Reproduction in farm animals-----Hafeez.
22. Hand book & Physiology of farm animals----R. D. Frandson.
23. Anatomy & Physiology of farm animals---R. D. Frandson.
24. Principles of Dairy Science----G. H.Schmidt, L. D. Vivek & N. N. Pathak.
25. Genes and Evolution-------JHA
26. Cattle embryo transfer procedure------Curtis.
27. Genetics of Livestock improvement--------John F. Lesley
28. An Introduction to Genetics--------B. K. Jain.
29. Population Genetics in animal breeding----Franz Pitcher.