

SHIVAJI UNIVERSITY, KOLHAPUR



Estd. in 1962

'A⁺⁺' Accredited by NAAC (2022) with CGPA 3.52

CHOICE BASED CREDIT SYSTEM

Syllabus For

B.Sc. Part-I

Food Science (Entire)

SEMESTER I AND II

(Syllabus to be implemented from June-2022)

B.Sc. Part-I
Food Science (Entire)

SEMESTER I AND II

(Syllabus to be implemented from June, 2022 onwards)

- ❖ Guidelines shall be as per B.Sc. Regular Program
- ❖ Rules and Regulations shall be as per B.Sc. Regular Program except CBCSR. B. Sc. 3 Structure of Program and List of Courses.

❖ Preamble:

This syllabus is framed to give sound knowledge with understanding of Food Science subject to undergraduate students of B.Sc. Food Science (Entire) Program. Students will learn Food Science as a separate course (Subject) from B.Sc. Part-I.

The goal of the syllabus is to make the study of Food Science more popular, generate an interest amongst the students about the field and encourage them for higher studies including research.

- ❖ Structure of Program and List of Courses are as follows.

Structure of B.Sc. Food Science (Entire) Program [Semester I & II] Structure– I

SEMESTER–I(Duration–6Months)														
Sr. No.	Course (Subject) Title	TEACHINGScheme						EXAMINATIONScheme						
		THEORY			PRACTICAL			THEORY				PRACTICAL		
		Credits	No. of lectures	Hours	Credits	No. of lectures	Hours	Hours	Max	Total Marks	Min	Hours	Max	Min
1	DSC-FS-A1	2	5	4	2	4	3.2	2	50	100	35	Practical Examination is ANNUAL	50	18
2	DSC-FS-A2	2						2	50					
3	DSC-FS-A3	2	5	4	2	4	3.2	2	50	100	35			
4	DSC-FS-A4	2						2	50					
5	DSC-FS-A5	2	5	4	2	4	3.2	2	50	100	35			
6	DSC-FS-A6	2						2	50					
7	DSC-FS-A7	2	5	4	2	4	3.2	2	50	100	35			
8	DSC-FS-A8	2						2	50					
9	AECC-A	2	4	3.2	-----	-----	-----	2	50	50	18	---	---	
	Total	18	24	19.2	8	16	12.8			450		200		
10	SEC-1	-	-	-	2	4	4							
11	VBC-1	-	-	-	1	2	2							
SEMESTER–II (Duration–6Months)														
1	DSC-FS-B1	2	5	4	2	4	3.2	2	50	100	35	As per BOS Guidelines	50	18
2	DSC-FS-B2	2						2	50					
3	DSC-FS-B3	2	5	4	2	4	3.2	2	50	100	35			
4	DSC-FS-B4	2						2	50					
5	DSC-FS-B5	2	5	4	2	4	3.2	2	50	100	35			
6	DSC-FS-B6	2						2	50					
7	DSC-FS-B7	2	5	4	2	4	3.2	2	50	100	35			
8	DSC-FS-B8	2						2	50					
9	AECC-B	2	4	3.2	-----	-----	-----	2	50	50	18	---	---	
	Total	18	24	19.2	8	16	12.8			450		200		
	Grand Total		48	38.4		32	25.6			900				
10	SEC-2	-	-	-	2	4	4							
11	VBC-2	-	-	-	1	2	2							
<ul style="list-style-type: none"> • Student contact hours per week:32Hours(Min.) • Theory and Practical Lectures:48 Minutes Each • DSC–Discipline Specific Core course: All papers are compulsory. • Practical Examination will be conducted annually for 50 Marks per course (subject). • AECC – Ability Enhancement Compulsory Course (A & B)- English • SEC: Skill Enhancement Course (Vocational Studies): Field Projects/ Internship/ Apprenticeship/ Community Engagement and service. Any one from pool of courses. For SEC courses there shall be only practical examination of 50 marks. • VBC: Value Based Course (NSS/NCC/ Sports/ Cultural, etc.) • There shall be separate passing for theory and practical courses. 							<ul style="list-style-type: none"> • Total Marks for B.Sc.-I (Including English):1100 • Total Credits for B.Sc.-I (Semester I & II): 52 							
<ul style="list-style-type: none"> • Except English there shall be combined passing for two theory courses of 50 marks each that is minimum 35 marks are required for passing out of 100. 														

CBCS B.Sc. Food Science (Entire): List of courses

B.Sc. Food Science Part-I (Semester I & II)

THEORY

Course code	Name of Course	Course code	Name of Course
Semester I		Semester II	
DSCFS-A1	Fundamentals of Food Science-I	DSCFS-B1	Fundamentals of Food Analysis-I
DSCFS-A2	Fundamentals of Food Science-II	DSCFS-B2	Fundamentals of Food Analysis-II
DSCFS-A3	Food Chemistry-I	DSCFS-B3	Human Nutrition-I
DSCFS-A4	Food Chemistry-II	DSCFS-B4	Human Nutrition-II
DSCFS-A5	Food Microbiology-I	DSCFS-B5	Food Biochemistry-I
DSCFS-A6	Food Microbiology-II	DSCFS-B6	Food Biochemistry-II
DSCFS-A7	Principles of Food Preservation-I	DSCFS-B7	Food Biotechnology-I
DSCFS-A8	Principles of Food Preservation-II	DSCFS-B8	Food Biotechnology-II
AECC-A	English-I	AECC-B	English-II
SEC-1	Accounting	SEC-2	Junior Marketing Associate

PRACTICAL

DSCFS-P1	Lab Course I (Based on DSCFS-A1 and A2)	DSCFS-P5	Lab Course V (Based on DSCFS-B1 and B2)
DSCFS-P2	Lab Course II (Based on DSCFS-A3 and A4)	DSCFS-P6	Lab Course VI (Based on DSCFS-B3 and B4)
DSCFS-P3	Lab Course III (Based on DSCFS-A5 and A6)	DSCFS-P7	Lab Course VII (Based on DSC FS-B5 and B6)
DSCFS-P4	Lab Course IV (Based on DSCFS-A7 and A8)	DSCFS-P8	Lab Course VIII (Based on DSCFS-B7 and B8)

*DSCFS: Discipline Specific Core Course Food Science

*AECC: Ability Enhancement Compulsory Course: Compulsory English

* SEC: Skill Enhancement Course: Sem 1: Accounting

Sem 2: Junior Marketing Associate.

B.Sc. Part I, Semester I
DSCFS-A8 Fundamentals of Food Science-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48

Unit I:

15 Hours

Introduction to Food and Food Science
Functions of food
Objectives of Food Science
Industrial Aspects of Food Science

Unit II:

15Hours

Classification of food
Basic food groups
Classification of food according food science
Introduction to Food Processing

Suggested Reading:

1. Food Science by B. Srilakshmi
2. Food Science by Potter
3. Food Processing Technology by P. J. Fellows
4. Food Facts and Principles by Shakuntala Manay

B.Sc. Part I, Semester I
DSCFS-A9 Fundamentals of Food Science-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48

Unit I:

15Hours

Food preparation and storage
Basic terms used in food preparation
Pre-preparation of cooking
Cleaning, Sorting, Grading, Peeling, Storage of food

Unit II:

15Hours

Methods of cooking
Traditional cooking techniques
Modern cooking techniques
Objectives and importance of cooking

Suggested Reading:

1. Food Science by B. Srilakshmi
2. Food Science by Potter
3. Food Processing Technology by P. J. Fellows
4. Food Facts and Principles by Shakuntala Manay

B.Sc. Part I, Semester I
DSCFS-A10 Food Chemistry-I
Credits 2 (Marks50) Hours30, 37.5 Lectures of 48 minutes

Unit I: **15Hours**

Definition and Introduction to food chemistry

Water

Water and forms of water

Role of water in food

Water activity and storage of food

Carbohydrates

Definition and Classification

Structure and Sources

Physical and chemical properties

Unit II: **15Hours**

Proteins

Definition and Classification

Structure and Sources

Physical and chemical properties

Lipids

Definition and Classification

Structure and Sources

Physical and chemical properties

Suggested Reading:

1. Birch, G. G., Cameron, A. G. and Spencer, M. Food Science, 3rd Ed. Pergamon Press, New York.
2. Fennema, O. R. Ed. Principles of Food Science: Part-I
3. Marcel Dekker, Food Chemistry. New York.
4. Meyer, L. H. Food Chemistry. East-West Press Pvt. Ltd., New Delhi..
5. Potter, N. N. Food Science. 3rd Ed. AVI, Westport.

B.Sc. Part I, Semester I
DSCFS-A 11 Food Chemistry - II

Unit I: **15Hours**

Minerals

Definition and Types of minerals

Sources

R D A and Deficiency

Food Pigments

Introduction

Classification

Characteristics

Industrial applications of colors/ pigments in food processing

Unit II: **15Hours**

Vitamins

Definition and Types of vitamins

Sources

RDA and deficiency

Food flavors

Introduction

Classification

Characteristics

Industrial applications of flavors in food processing

Suggested Reading:

1. Birch, G. G., Cameron, A. G. and Spencer, M. Food Science, 3rd Ed. Pergamon Press, New York.
2. Fennema, O. R. Ed. Principles of Food Science: Part-I
3. Marcel Dekker, Food Chemistry. New York.
4. Meyer, L. H. Food Chemistry. East- West Press Pvt. Ltd., New Delhi..
5. Potter, N. N. Food Science. 3rd Ed. AVI, Westport.

B. Sc. Part I, Semester I
DSCFS -A12 Food Microbiology-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of

Unit I:

15Hours

Introduction to Microbiology
Concept of General Microbiology
Morphological characteristics of Bacteria, Yeasts and Molds
Physical and chemical factors affecting growth of microorganisms

Unit II:

15Hours

Microbial Contamination of Food
Introduction of sources of contamination
Food Spoilage
Food born intoxication
Control of microorganisms in food

Suggested Reading:

1. FoodMicrobiology.3rd Edn.VNR, New York. Robinson, R. K. Ed.1983.
2. Dairy Microbiology. Applied Science, London.
3. Branen A. L. and Davidson, P. M. Antimicrobials in Foods. Marcel Dekker, New York.

B. Sc. Part I, Semester I
DSCFS -A13 Food Microbiology-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:

15Hours

Microbial Food Fermentation

Definition, Microorganisms used in food fermentation

Fermented foods

Food born disease

Food born infection

Unit II:

15Hours

Cultivation of microorganisms

Pure culture techniques

Methods of isolation and cultivation

Enumeration of microorganisms - Qualitative and Quantitative

Stains and Staining Techniques

Suggested Reading:

1. Food Microbiology. 3rd Edn. VNR, New York. Robinson, R. K. Ed. 1983.
2. Dairy Microbiology. Applied Science, London.
3. Branen A. L. and Davidson, P. M. Antimicrobials in Foods. Marcel Dekker, New York.

B.Sc. Part I, Semester I
DSCFS-A14 Principles of Food Preservation- I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:

15Hours

Food Preservation

Introduction to food preservation

Concept and importance

Common terms used in food preservation

Principles of food preservation

Prevention or delay microbial decomposition

Prevention or delay of self decomposition

Methods of preservation

Unit II:

15Hours

Preservation by High temperature

Introduction and Classification

Pasteurization, Sterilization, UHT, Blanching and Canning

Preservation by use of preservatives

Classification of Food preservatives

Characteristics of preservatives

Suggested Reading:

1. Arsdel W. B., Copley, M. J. and Morgen, A. I. Food Dehydration, 2nd Edn. (2vol. Set). AVI, Westport.
2. Bender, A. E. Food Processing and Nutrition. Academic Press, London.
3. Fellows, P. and Ellis H. Food Processing Technology: Principles and Practice, New York.

Unit I:**15Hours****Preservation by low temperature**

History and Concept

Methods of low temperature Preservation

Advantages and disadvantages

Preservation by drying

History and Concept

Methods of Drying and Dehydration

Advantages and disadvantages

Unit II:**15Hours****Preservation by irradiation**

Concept of irradiation

Food irradiation

Methods of irradiation

Advantages and disadvantages

Modern Techniques in Food Preservation

Hurdle technology

Pulse electric field

High Pressure Processing

Advantages and disadvantages

Suggested Reading:

1. Arsdel W. B., Copley, M. J. and Morgen, A. I. Food Dehydration, 2nd Edn. (2 vol. Set). AVI, Westport.
2. Bender, A. E. Food Processing and Nutrition. Academic Press, London.
3. Fellows, P. and Ellis H. Food Processing Technology: Principles and Practice, New York.

B. Sc. Part I, Semester IAECC-A English-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes
Common Compulsory Paper

B. Sc. Part I, Semester I SEC –1 Accounting
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

B.Sc. Part I, Semester II
DSCFS-B18 Fundamentals of Food Analysis- I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:

15Hours

Introduction and Objectives of Food Analysis
Need of quality control and quality assurance
Principles and functions of quality control
Quality attributes of food

Unit II:

15Hours

Sampling of Food
Types of samples
Methods of food sampling
Proximate analysis of Food

Suggested Reading:

1. Aurand, L. W. and Woods, A. E. Food Chemistry. AVI, Westport.
2. Birch, G. G., Cameron, A.G. and Spencer, M. Food Science, 3rd Ed. Pergamon Press, New York.
3. Fennema, O. R. Ed. Principles of Food Science: Part-I Food Chemistry.
4. S. Suzanne Nielsen. Food Analysis– Google Book edited.

B.Sc. Part I, Semester II
DSCFS-B19 Fundamentals of Food Analysis- II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:

15Hours

Sensory analysis of Food

Human Senses

Methods of Sensory Analysis

Shelf life of food

Unit II:

15Hours

Food Adulteration

Types of adulterants

Methods of detecting adulterants in food

Suggested Reading:

1. Aurand, L. W. and Woods, A. E. Food Chemistry. AVI, Westport.
2. Birch, G. G., Cameron, A. G. and Spencer, M. Food Science, 3rd Ed. Pergamon Press, New York.
3. Fennema, O. R. Ed. Principles of Food Science: Part-I Food Chemistry.
4. S. Suzanne Nielsen. Food Analysis– Google Book edited

**B. Sc. Part I,
Semester II DSCFS-B 20
Human Nutrition - I**

Unit I:

15Hours

Introduction to Nutrition
Menu Planning and Balance Diet
Food Pyramid and Food Groups
Nutritional and Food Requirements of Adults

Unit II:

15Hours

Nutritional and Food Requirements for Infants
Food Requirements for Low Birth Weight and Preterm Baby
Weaning foods
Nutritional and Food Requirements for Preschool and School going Children
Feeding Programmes and School Lunch Programmes

Suggested Reading:

1. B. Srilakshmi. Dietetics, Revised Fifth Edition, New Age International Publishers
2. B. Srilakshmi. Nutrition Science, Third Edition, New Age International Publishers
3. Dr. M. Swaminathan. Advanced Textbook on Food and Nutrition, Second Edition, BAPPCO Publication.

**B.Sc. Part I,
Semester II DSCFS-B 21
Human Nutrition- II**

Unit I:

15Hours

Nutritional and Food Requirements during Adolescence

Food Habits and Nutritional Problems

Nutritional and Food Requirements for Expectant

Mothers Pre-conceptual Nutrition

Unit II:

15Hours

Nutritional and Food Requirements for Lactating Women

Nutritional and Food Requirements during Old Age

Process of Ageing and Degenerative Diseases

Nutritional and Food Requirements for Athlete

Suggested Reading:

1. B. Srilakshmi. Dietetics, Revised Fifth Edition, New Age International Publishers
2. B. Srilakshmi. Nutrition Science, Third Edition, New Age International Publishers
3. Dr. M. Swaminathan. Advanced Textbook on Food and Nutrition, Second Edition, BAPPCO Publication.

**B. Sc. Part I ,
Semester II DSCFS - B 22
Food Biochemistry - I**

Unit I: **15Hours**

Introduction to metabolism
Catabolism
Metabolism
Methods to study metabolism
Metabolism of Carbohydrates
Digestion and Absorption of Carbohydrates

Unit II: **15Hours**

Basics of Metabolic Pathways
Glycolysis
Kreb's cycle
Electron Transport Chain
Gluconeogenesis
Glycogen metabolism
Gluconeogenesis
HMP pathway
Galactose metabolism
Fructose metabolism

Suggested Reading:

1. U Satyanaraynaa and U. Chakrapani. Biochemistry
2. Dr. A. C. Deb Fundamentals of Biochemistry
3. J. L. Jain. Fundamentals of Biochemistry
4. D. L. Nelson and M. M. Cox. Lehninger's Principles of Biochemistry

B.Sc. Part I, Semester II DSCFS-B 23
Food Biochemistry - II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I: **15Hours**

Lipid metabolism

Digestion and absorption of Lipids

Oxidation of fatty acids

Ketone bodies

Lipoproteins

Adipose tissue

Unit II: **15Hours**

Protein metabolism

Digestion and absorption of proteins

Transamination

Deamination

Ureacycle

Suggested Reading:

1. U Satyanaraynaa and U. Chakrapani. Biochemistry
2. Dr. A. C. Deb Fundamentals of Biochemistry
3. J. L. Jain. Fundamentals of Biochemistry
5. D. L. Nelson and M. M. Cox. Lehninger's Principles of Biochemistry

**B.Sc. Part I, Semester II DSCFS- B 24 Food
Biotechnology - I**

Unit I:

15Hours

Introduction and Concept of Food Biotechnology

Cell Biology and Genetics

Bioprocess and Biochemical Engineering

Genetics & Molecular Biotechnology

Recombinant DNA Technology

Unit II:

15Hours

Historical perspectives and application of plant tissue culture

Method of plant tissue culture: Formulation of medium explants collection

Surface sterilization, Inoculation, Callus Induction

Sub culture and regeneration of plants

Suggested Reading:

1. H. K. Das. Text Book of Biotechnology (Wiley Publications)
2. H. J. Rehm and G. Reed. Biotechnology. VI H Publications, Germany
3. P. K. Gupta Introduction to Biotechnology
4. W. Barz, E. Reinhard, M. H. Zenk Plant Tissue Culture and its Biotechnological Applications

B.Sc. Part I, Semester II DSCFS- B 25
Food Biotechnology- II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48minutes

Unit I: **15 Hours**

Historical perspectives and application of animal tissue culture

Explants- Culture of explants

Cell culture technique:

Initiation, Preparation and sterilization of media, Isolation of explants, Disaggregation of explants

Culture and Subculture

Unit II: **15Hours**

Immunology

Introduction to immune system

Organs and cells of immune system

Types of Immunity (Innate and Acquired)

Antigens and characteristics

Suggested Reading:

1. S. Janarthanan and S. Vincent. Practical Biotechnology– Methods and Protocols (Universities Press)
2. Terence Gartoright. Animal Cells as Bioreactors. Cambridge Univ Press
3. Chinnarayappa Molecular Biotechnology (Universities Press)
4. Sudha Gangal. Principles and Practice of Animal Tissue Culture-By (Universities Press)

B. Sc. Part I, Semester I

SEC-2 Junior Marketing Associate.

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes