

**Learning Outcomes based Curriculum Framework
(LOCF)**

For

B.Sc. Food Science & Technology

(Four Year Degree Programme)

w.e.f. Session 2022-26



University School for Graduate Studies

Chaudhary Devi Lal University

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2021

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Table 1: Courses and Credit Scheme

Semester	Core Courses (CC)		Discipline Specific Elective Courses (DSC)		Skill Enhancement Courses (SEC)		Ability Enhancement Compulsory Courses (AECC)		Generic Elective Courses (GEC)		Grand Total Credits
	1	2	3	4	5	6	7	8	9	10	
	No. of Courses	Total Credits	No. of Courses	Total Credits	No. of Courses	Total Credits	No. of Courses	Total Credits	No. of Courses	Total Credits	(2+4+6+8+10)
I	4	12	-	-	1	2	2	8	1	6	28
II	5	13	-	-	2	4	1	4	1	6	27
III	4	12	2	6	-	-	-	-	2	6	24
IV	5	13	2	6	-	-	-	-	2	6	25
V	6	17	2	6	1	2	-	-	-	-	25
VI	6	17	2	6	1	2	-	-	-	-	25
Total	Core Credits	84	Discipline Specific Elective Credits	24	Skill Enhancement Credits	10	Ability Enhancement Credits	12	Generic Elective Credits	24	154
Percentage (%)	Core Credits	54.54	Discipline Specific Elective Credits	15.58	Skill Enhancement Credits	6.49	Ability Enhancement Credits	7.79	Generic Elective Credits	15.58	100
VII	2	6	5	16	-	-	-	-	-	-	22
VIII	1	24	-	-	-	-	-	-	-	-	24
Total	Core Credits	114	Discipline Specific Elective Credits	40	Skill Enhancement Credits	10	Ability Enhancement Credits	12	Generic Elective Credits	24	200
Percentage (%)	Core Credits	60	Discipline Specific Elective Credits	20	Skill Enhancement Credits	5	Ability Enhancement Credits	6	Generic Elective Credits	12	100

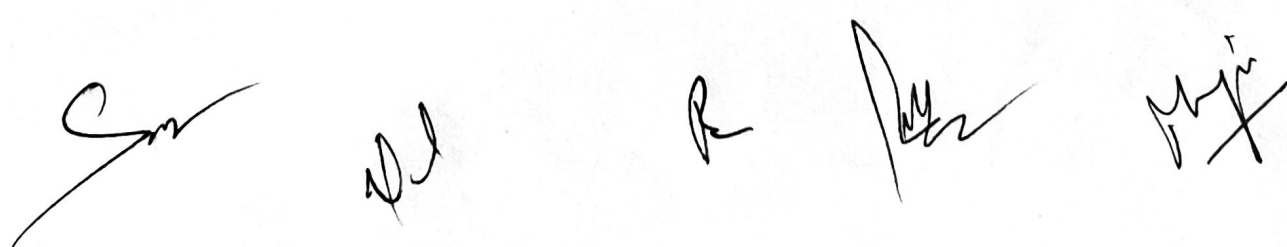


Table 2: Detailed break-up of Credit Courses

Semester	Core Courses (CC)	Discipline Specific Elective Courses (DSC)	Skill Enhancement Courses (SEC)	Ability Enhancement Compulsory Courses (AECC)	Generic Elective Courses (GEC)	Total Courses (CC+DSC+SEC+AECC+GEC)
I	CC1 CC2 CC3 CC4	-	SEC1	AECC1 AECC2	GEC1	08
II	CC5 CC6 CC7 CC8 CC9	-	SEC2 SEC3	AECC3	GEC2	09
III	CC10 CC11 CC12 CC13	DSC1 DSC2	-	-	GEC3 GEC4	08
IV	CC14 CC15 CC16 CC17 CC18	DSC3 DSC4	-	-	GEC5 GEC6	09
V	CC19 CC20 CC21 CC22 CC23 CC24	DSC5 DSC6	SEC4	-	-	09
VI	CC25 CC26 CC27 CC28 CC29 CC30	DSC7 DSC8	SEC5	-	-	09
VII	CC31 CC32	DSC9 DSC10 DSC11 DSC12 DSC13	-	-	-	07
VIII	CC33 Research (Dissertation/ Project/Product development/ etc.)	-	-	-	-	01

Table 3: Course code and Title along with credits details

Sr. No.	Course Code	Course Title	Credits		
			Lecture+ Tutorial	Practical	Total
Semester I					
1.	ENG/1/AECC1	Functional English	4	-	4
2.	EVS/1/AECC2	Environmental Studies	4	-	4
3.	BSc/FST/1/CC1	Basics of Food Microbiology	4	-	4
4.	BSc /FST/1/CC2	Introduction to Food Technology-I	4	-	4
5.	BSc /FST/1/CC3	Lab-I Basics of Food Microbiology	-	2	2
6.	BSc /FST/1/CC4	Lab-II Introduction to Food Technology-I	-	2	2
7.	BSc /FST/1/SEC1	Food Safety and sanitation	2	-	2
8.	BSc/FST/1/GEC1	To be opted by student from Pool of Generic Elective Courses	-	-	6
Total					28
Semester II					
1.	HIN/2/AECC3	Prayojanmoolak Hindi	4	-	4
2.	BSc/FST/2/CC5	Food Analysis	4	-	4
3.	BSc/FST/2/CC6	Introduction to Food Technology-II	4	-	4
4.	BSc/FST/2/CC7	Lab-III Food Analysis	-	2	2
5.	BSc/FST/2/CC8	Lab-IV Introduction to Food Technology-II	-	2	2
6.	BSc/FST2/CC9	Seminar	-	-	1
7.	BSc/FST2/SEC2	Food Quality Assurance	2	-	2
8.	COMP/2/SEC3	Computer Skills	-	2	2
9.	BSc/FST/2/GEC2	To be opted by student from Pool of Generic Elective Courses	-	-	6
Total					27
Semester III					
1.	BSc/FST/3/CC10		4	-	4
2.	BSc/ FST/3/CC11		4	-	4
3.	BSc/ FST/3/CC12		-	2	2
4.	BSc/ FST/3/CC13		-	2	2
5.	BSc/ FST/3/DSC1		4	-	4
6.	BSc/ FST/3/DSC2		-	2	2
7.	...../3/GEC3		4	-	4
8.	...../3/GEC4		-	2	2
Total					24
Semester IV					
1.	BSc/ FST/4/CC14		4	-	4
2.	BSc/ FST/4/CC15		4	-	4
3.	BSc/ FST/4/CC16		-	2	2
4.	BSc/ FST/4/CC17		-	2	2
5.	BSc/ FST/4/CC18		-	-	1
6.	BSc/FST/4/DSC3		4	-	4

7.	BSc/FST/4/DSC4		-	2	2
8.	...../4/GEC5		4	-	4
9.	...../4/GEC6		-	2	2
				Total	25
Semester V					
1.	BSc/FST/5/CC19		4	-	4
2.	BSc/FST/5/CC20		4	-	4
3.	BSc/FST/5/CC21		4	-	4
4.	BSc/FST/5/CC22		-	2	2
5.	BSc/FST/5/CC23		-	2	2
6.	BSc/FST/5/CC24		-	-	1
7.	BSc/FST/5/DSC5		4	-	4
8.	BSc/FST/5/DSC6		-	2	2
9.	BSc/FST/5/SEC4		2	-	2
				Total	25
Semester VI					
1.	BSc/FST/6/CC25		4	-	4
2.	BSc/FST/6/CC26		4	-	4
3.	BSc/FST/6/CC27		4	-	4
4.	BSc/FST/6/CC28		-	2	2
5.	BSc/FST/6/CC29		-	2	2
6.	BSc/FST/6/CC30		-	-	1
7.	BSc/FST/6/DSC7		4	-	4
8.	BSc/FST/6/DSC8		-	2	2
9.	BSc/FST/6/SEC5		-	2	2
				Total	25
Semester VII					
1.	BSc/FST/7/CC31		4	-	4
2.	BSc/FST/7/CC32		-	2	2
3.	BSc/FST/7/DSC9		4	-	4
4.	BSc/FST/7/DSC10		4	-	4
5.	BSc/FST/7/DSC11		-	2	2
6.	BSc/FST/7/DSC12		-	2	2
7.	BSc/FST/7/DSC13		4	-	4
				Total	22
Semester VIII					
1.	BSc/FST/8/CC33				24
Grand Total (I+II+III+IV+V+VI+VII+VIII)					200

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Table 4: Generic Elective Courses offered by Department of Food Science & Technology for the Students of other departments

Course Code	Course Title	Credits
Semester -I		
BSc/FST/1/GEC1	Nutrition and Health	4
Semester -II		
BSc/FST/2/GEC2	Food Adulteration	4



Semester-I

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BSc/FST/1/CC1- Basics of Food Microbiology

Credits: 4
Lectures: 60
Duration of Exam.: 3 Hrs.

Max. Marks: 100
Final Term Exam.: 70
Internal Assessment: 30

Objective: To introduce students with the world of microbiology, familiarize them with different types of micro-organisms, factors affecting the growth of micro-organisms also teach them about cultivation and control of micro-organisms.

Course Outcomes: After successfully completing the course, student will be able to:

CO1: Students acquire knowledge about microbiology.

CO2: They become familiar with different types of micro-organisms.

CO3: Students learn about the techniques of cultivation and control of micro-organisms.

CO4: Students become aware about the factors affecting the growth of micro-organisms.

Note for the Paper Setter: The question paper will consist of nine questions in all. The first question will be compulsory and will consist of eight short questions of 2 marks each covering the whole syllabus. In addition, eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

Unit-I

Introduction: Discovery of microbial world, theory of spontaneous generation, Germ theory of disease, Koch's postulates, Pure culture concept, Nature and properties of prokaryotic and eukaryotic micro-organisms.

Unit-II

Microbial Growth: Definition of growth, growth cycle, growth rate, generation time, measurement of growth, effect of environmental factors such as temperature, oxygen, moisture, salt, pH, oxidation-reduction potential and radiations on growth.

Unit-III

Cultivation of micro-organisms: Pour plate method, spread plate method and streak plate

Control of Micro-organisms: Control of micro-organisms by physical, chemical and biological methods.

Unit-IV

Food microbiology and public health-Introduction, food hazards, control methods, significance of food borne illness, Types of food poisoning, important features, and control

Bacterial and non-bacterial agents of food borne illness

Text/Reference Books:

1. Pelczar M. J., Chan E.C.S. and Krieg N.R., 'Microbiology', 5th Edition., McGraw Hill Co, Singapore, 1987.
2. Frazier W. C., Weshoff. D.C., 'Food Microbiology', McGraw Hill Education India, ISBN: 9781259062513
3. Stanier R.Y., Graham J.L., Wheelies M.L. and Painter P.R., 'General Microbiology', 5th Edition., The Macmillan Press Ltd., London, 1993.
4. Cappuccino J.G. and Sherman N., 'Microbiology: A Laboratory Manual', Benjamin-Cummings Publishing Co., USA, 2004.
5. Gunase K. P., 'Laboratory Manual in Microbiology', New Age International (P) Ltd. New Delhi, 1996.

BSc/FST/1/CC2- Introduction to Food Technology-I

Credits: 4

Lectures: 60

Duration of Exam: 3 Hrs.

Max. Marks: 100

Final Term Exam: 70

Internal Assessment: 30

Objective: To make students familiar with food science and technology, provide them detailed knowledge about structure of different cereal grains and aware them about processing of pulses. To give them an overview of fats and oils.

Course Outcomes: After successfully completing the course, student will be able to:

CO1: Students become familiar with food science and technology.

CO2: Students acquire knowledge about the different methods of preservation.

CO3: Students become aware about thermal processing of various foods.

CO4: Students get knowledge about different components responsible for shelf life of food products.

Note for the Paper Setter: The question paper will consist of nine questions in all. The first question will be compulsory and will consist of eight short questions of 2 marks each covering the whole syllabus. In addition, eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

UNIT-I

Introduction to Food Science and Technology, its scope and importance

Introduction to food processing; basic principles; importance of food processing and preservation, Different types of spoilages: Physical spoilage, Chemical and enzymatic spoilage, Biological spoilage, Changes in foods and types of toxins produced by microorganisms

UNIT-II

High temperature processing's: Principles of thermal processing's, pasteurization, sterilization, canning, bottling, spoilage of canned foods and methods of quality evaluations, heat resistance of microorganisms, factors affecting heat resistance in micro organism

Applications effects and mechanism of irradiation, microwave and ohmic heating in food preservation,

UNIT-III

Low temperature processing's: Low temperature requirement of different foods, refrigeration, chilling, and freezing of foods, freezing principles, methods of freezing's, determinations of freezing load, freezing rate, types of freezers, thawing of frozen foods, advantages and disadvantages of cold preservation

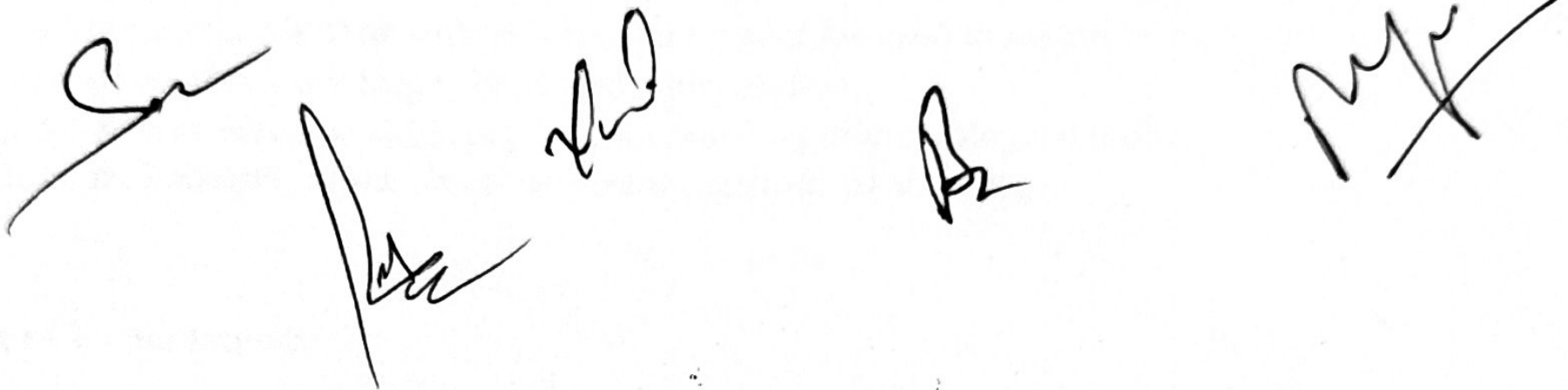
UNIT-IV

Processing's by moisture control-Evaporation, concentration, dehydration, drying, types, equipment's, advantages and disadvantages

Water activity in foods: Role of water activity in food preservation, control of water activity by addition of solutes, and moisture removal, measurements of water activity, inter-mediate moisture foods

Text/Reference Books:

1. Manay, S. and Shadaksharaswami, M., 'Foods: Facts and Principles', New Age Publishers, 2014.
2. Srilakshmi B., 'Food science', New Age Publishers, 2012.
3. Meyer L. H., 'Food Chemistry', New Age, 2015
4. Potter, N.N., and Hotchkiss, J.H. Food Science, CBS, Publishers and distributors, New Dehli, 2017



BSc/FST/1/CC3–Lab-I Basics of Food Microbiology

Credits: 2 (Practical)

Teaching per week: 4 Hrs.

Max. Marks: 50

Duration of Exam: 3 Hrs.

Objective: To know basics of about pathogenic spoilage background of foods and their microbial detection procedures.

Course outcomes: After successfully completing the course, student will be able to:

CO1: Students become familiar with different equipment are used in microbiology.

CO2: Students acquire knowledge about media preparation.

CO3: Students learn practical skills required for handling microbiological tools.

CO4: Students become aware about different methods of staining.

List of Experiments:

1. To study different parts of a microscope.
2. Study of instruments (Autoclave, Hot air oven, Incubator, Laminar flow, pH meter, and spectrophotometer) of microbiology laboratory.
3. Preparation of nutrient agar and MacConkey's Agar plates, slants and broth.
4. To study the serial dilution method.
5. To perform pour plate, spread plate and streak plate methods for isolation and enumeration of micro-organisms from different food samples.
6. To perform simple staining.
7. To stain the given bacteria by Gram's staining method.
8. To perform negative staining.
9. To determine the number of micro-organisms with a Haemocytometer.
10. To determine the motility of bacteria by hanging drop method.



BSc/FST/1/CC4-Lab-II Introduction to Food Technology-I

Credits: 2 (Practical)

Teaching per week: 4 Hrs.

Max. Marks: 50

Duration of Exam: 3 Hrs.

Objective: To know major constituents and significantly important qualities of food commodities and procedures for their determination.

Course outcomes: After successfully completing the course, student will be able to:

CO1: Students become familiar with different instruments used in food technology.

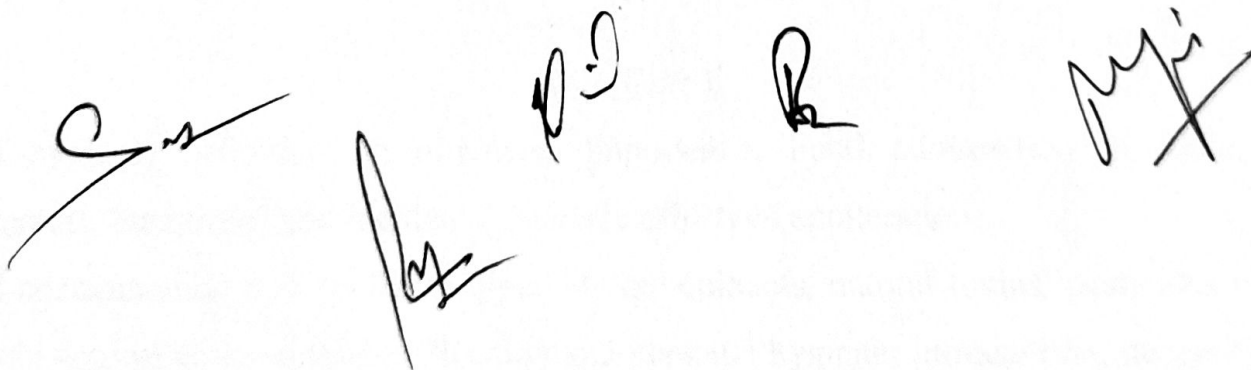
CO2: Students learn about the proximate analysis of different food products.

CO3: Students determine the effect of pH and blanching on fruits and vegetables.

CO4: Students learn to analyze the food qualitatively.

List of Experiments:

1. Demonstration of the instruments used in food technology.
2. Determination of saponification value and acid value.
3. Qualitative test for starch and protein.
4. Effect of thermal processing's on shelf life of different foods.
5. Pasteurization of various food products.
6. Canning of fruit and vegetable products.
7. Effect of refrigerated storage on shelf life of different foods.
8. Effect of frozen storage on shelf life of different foods.
9. To study the different packaging materials used in food packaging.
10. Visit to food processing industries.



BSc/FST/1/SEC1 Food Safety and Standards

Credits: 02 (Theory)
Lectures: 30
Duration of Exam.: 2 Hrs.

Max.Marks: 50
Final Term Exam: 30
Internal Assessment: 20

Objectives: To improve the knowledge of students about food adulteration, food laws, hygiene and sanitation process used in food industries.

Course outcomes: At the end of the course, the students will be able to describe:

CO1: The knowledge of food safety and food adulteration issues would empower the students to detect for the various adulterations and safety threats in food.

CO2: The students would be enabled to develop food quality and safety management systems in food industries.

CO3: The students would be able to understand various food standards.

CO4: The students would become familiar with various food laws and regulations.

Note for the paper setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition, four more questions will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt two more questions selecting at least one question from each unit.

Unit 1

Food hygiene: definition, requirement, importance. Food adulteration in India, Types of adulterants: Intentional and incidental, adverse effects of adulteration.

Food contamination and spoilage: types of contaminants, natural toxins, pesticides residues and microbiological contamination. Cleaning and personal hygiene: introduction, necessity. Health of staff, sanitary practices and importance.

Unit II

Food Safety: Definition and importance, HACCP-Definition and principles. Good Manufacturing Practices (GMP)/ Good Hygienic Practices (GHP)/Good Laboratory Practices (GLP).

Food Laws and Regulation: introduction, regulatory agencies, control of food quality, Food Safety and Standards Authority of India (FSSAI).







Recommended Books:

1. SunetraRoday (2017). Food hygiene and sanitation with case studies, McGraw Hill Education (India) Private Limited.
2. Gould, W.A and Gould, R.W. (1998). Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
3. Siva Kiran, R.R. (2012). Manual for Detection of Common Food Adulterants, First Edition, IAPEN.
6. Battershal, J.P. (2013). Food Adulteration & its detection, General Books LLC.
7. Prevention of Food Adulteration Act, 4th Edition, Ashoka Law House, 2002



Semester-II

BSc/FST/2/CC5– Food Analysis

Credits: 4
Lectures: 60
Duration of Exam.: 3 Hrs.

Max. Marks: 100
Final Term Exam.: 70
Internal Assessment: 30

Objectives: The course aims to provide detailed information and knowledge about various methods and instruments used in the analysis of food components.

Course outcomes: At the end of the course, the students will be able to describe:

CO1: The knowledge regarding sampling methods would make the students skillful for analytical work in research and food industry.

CO2: Study of different analytical methods would make the students capable of analyzing various nutritive components of foods.

CO3: The knowledge regarding the principles and applications of different instruments would prepare the students for analytical purpose and quality control labs in food research and industries.

CO4: The knowledge regarding texture and rheology will improve which help in further development of new products.

Note for the paper setter: The question paper will consist of nine questions in all. The first question will be compulsory and will consist of eight short questions of 2 marks each covering the whole syllabus. In addition, eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

UNIT I

Introduction to food analysis, types of samples and sampling techniques, storage and preservation of samples

Analysis of principal food constituents such as carbohydrates, and proteins by various methods.

UNIT II

Analysis of principal food constituents such as fat, and crude fibre by various methods.

Instrumentation in food analysis: Principles of spectroscopy, UV, visible

UNIT III

Electrophoresis: Principle, types of electrophoresis and applications, and their applications in food industries.

Chromatography: Ion exchange chromatography, affinity chromatography, liquid chromatography, gas chromatography, and applications.

UNIT IV

Texture analysis in foods, color measurement in foods and its applications.

Methods for measuring rheological and viscoamylographic properties of foods– viscoamylograph, extensograph, alveograph instruments.

Recommended Books:

1. Nehra M, Nain V, Thory R(2021) Principles of Food Chemistry, SLM Publishers, New Delhi
2. Ronald S. Kirk, Ronald, Sawyer (1991). *Pearson's Composition & Analysis of Foods*, 9th Edition Longman scientific & Technical , U.K.
3. Pomeranz , Y. & Mrloan (1978) . *Food Analysis : Theory and Practice* , Westport, connectiant :
4. Birk, G.G., Herman, J.G. and Parker, K.J. Ed. -1977. Sensory Properties of Foods. Applied Science, London.



BSc/FST/2/CC6- Introduction to Food Technology-II

Credits: 4
Lectures: 60
Duration of Exam.: 3 Hrs.

Max. Marks: 100
Final Term Exam.: 70
Internal Assessment: 30

Objective: To provide the knowledge of students about post-harvest changes in fruits and vegetables, compositional and nutritional aspects of animal foods, enhance their knowledge about milk and milk products, type, extraction techniques of essential oil and application of spices and condiments

Course Outcomes: After successfully completing the course, student will be able to:

CO1: To enable students to learn different methods of processing of plant and animal derived foods.

CO2: Students become familiar with compositional and nutritional fruits and vegetables.

CO3: Students get an overview about Indian spices and condiments.

CO4: Students become familiar with compositional and nutritional meat, poultry and fish products.

***Note for the Paper Setter:** The question paper will consists of nine questions in all. The first question will be compulsory and will consist of eight short questions of 2 marks each covering the whole syllabus. In addition, eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.*

UNIT- I

Classification of different foods of plant origin: Cereals, Millets, Composition & constituents- Post harvest handling, Storage, methods of infestation.

Processing of cereals, and pulses, fats, oil seeds: Processing and product development with maize, sorghum and ragi. Processing of Pulses along with different pre-treatments.

Unit-II

Fruits and Vegetables:- Different processing operations – Fruit Juices, Squashes, Cordial, Jam, Jelly, Marmalade, Chutneys, Sauces, Pickle Processing along with Principles and methods of preparation and their usage in different communities.

Unit-III

Processing of fats, and oil seeds: Oil expelling method, Refining, Hydrogenation and Shortenings.

Classification and composition of Spices and Plantation crops: Study of special attributes of main spices like Pepper, Cardamom, Ginger, Garlic, and Turmeric.



Unit – IV

Classification of animal foods: Meat and Meat products selection, Meat and Meat Products, Egg Products, Milk & milk products, Fish & Fishery products, and their composition.

Recommended Books:

1. J.L. Multon, A.M. Riembert, D. Marsb & A.J. Eydt 1st edition, Preservation & Storage of Grain, Seeds and their Products, CBS Publications and Distributors, Delhi.
2. Kent, Cereal Technology, Oxford Perman Press, London.
3. Giridharlal, Sidappa and G.L. Tandon, Preservation of Fruits and Vegetables, ICAR, New Delhi.
4. Dey.S, Outlines of Dairy Technology, Oxford University Press, New Delhi, 1994.
5. Lawrie R.A, Meat Science, Paragon Press Oxford, New York.
6. Borgstorm G. Fish as Food, Vol-4, New York Academic Press.



BSc/FST/2/CC7-Lab-III Food Analysis

Credits: 2 (Practical)

Teaching per week: 4 Hrs.

Max. Marks: 50

Duration of Exam: 3 Hrs.

Objective: To provide the knowledge of students about various analytical methods for analysis of various nutritive values of food products.

Course outcomes: After successfully completing the course, student will be able to:

CO1: Student would be able to understand the preparation of primary and secondary solutions.

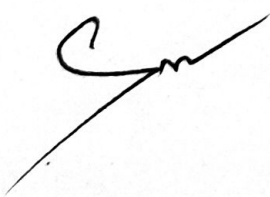
CO2: Students learn about the proximate analysis.

CO3: Students familiar with principle of determination of moisture, ash, protein and fat content.

CO4: Student would be able to understand various methods of sensory.

List of Experiments:

1. Preparation of primary and secondary solutions.
2. Estimation of moisture content.
3. Estimation of Total Ash.
4. Estimation of Crude Protein Content
5. Estimation of Crude Fat Content
6. Determination of free fatty acids.
7. Estimation of Peroxide Value.
8. Sensory analysis of various processed food products like jam, bread, and biscuit.
9. Determination of % moisture, fat and curd content of table butter.



BSc/FST/2/CC8-Lab-IV Introduction to Food Technology-II

Credits: 2 (Practical)
Teaching per week: 4 Hrs.

Max. Marks: 50
Duration of Exam: 3 Hrs.

Objective: To know basic properties of different food commodities and their determination procedures.

Course outcomes: After successfully completing the course, student will be able to:

CO1: Students become familiar with different instruments used in food technology.

CO2: Students learn about the proximate analysis of different food products.

CO3: Students determine the effect of pH and blanching on fruits and vegetables.

CO4: Students learn to analyze the food qualitatively.

List of Experiments:

1. Demonstration of the advance instruments used in food technology.
2. Determination of moisture content in different food samples.
3. Determination of ash content of different food samples.
4. Determination of TSS of ketchup by refractometer.
5. Determination of acidity of milk and juices.
6. To study the effect of blanching on vegetables.
7. Determination of specific gravity of oil and milk.
8. Determination of pH of food samples by pH meter.

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Credits: 02 (Theory)
Lectures: 30
Duration of Exam.: 2 Hrs.

Max.Marks: 50
Final Term Exam: 30
Internal Assessment: 20

Objective: To know about various sources for contamination and standards and laws for food safety.

Course outcomes: After successfully completing the course, student will be able to:

CO1: Students would be able to understand the various sources for contamination.

CO2: Students will be able to understand concept for food safety.

CO3: Students become familiar with different component responsible for food safety and quality.

CO4: Students become familiar with different standards and laws responsible for food quality.

Note for the paper setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition, four more questions will be set unit-wise comprising of two questions from each of the two units. The candidates are required to attempt two more questions selecting at least one question from each unit.

Unit I

Food hazards of physical, chemical and biological origin: Introduction, Physical Hazards with common examples, Chemical Hazards (naturally occurring environmental and intentionally added and contaminants due to processing), Microbiological hazards (Bacterial and Fungal).

Importance of Safe Foods, Food laws and Standards, Indian Food Regulatory Regime

Unit II

Food safety management tools

Prerequisites of food hygiene- TQM - concept and need for quality, Microbiological tests for food safety related to (*Coliforms, Listeria, Staphylococci and Salmonella*), definition and principles of risk Analysis. Steps involved in implementation of food safety programme.


Food safety laws and regulations (FSSAI). New approaches to food safety.

Recommended Readings

1. Lawley, R., Curtis L. and Davis, J. The Food Safety Hazard Guidebook, RSC publishing, 2004
2. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 41
3. Forsythe, S.J. The Microbiology of Safe Food, second edition, WilleyBlackwell, U.K., 2010



Generic Elective Courses

A handwritten signature in black ink, consisting of a stylized, cursive letter 'S' followed by a long horizontal stroke extending to the right.A handwritten signature in black ink, appearing to be the name 'Dino' written in a cursive style.A handwritten signature in black ink, featuring a large, bold letter 'B' followed by a series of sharp, angular strokes.A handwritten signature in black ink, consisting of a stylized, cursive letter 'M' followed by a long horizontal stroke extending to the right.

BSc/FST/1/GEC1-Health and Nutrition

Credits: 4
Lectures: 60
Duration of Exam.: 3 Hrs.

Max. Marks: 100
Final Term Exam.: 70
Internal Assessment: 30

Objective: To understand different attributes of foods and nutrition which might be directly related to human health and to generate better understanding about consumption of different food in different situations and stages of age.

Course Outcomes: After successfully completing the course, student will be able to:

CO1: The students will be able to know about various nutrients and their requirements for various conditions and age groups.

CO2: The students will be to know relationships among food consumption, body mass and energy requirements of human body.

CO3: The students will get knowledge about various health complications which occurs due to bad eating habits and their prevention with various foods.

CO4: The students will get knowledge about diet planning and food charts for various age groups and conditions for well being of human body and it will be beneficial for their job prospective as a food and diet expert.

Note for the Paper Setter: The question paper will consists of nine questions in all. The first question will be compulsory and will consist of eight short questions of 2 marks each covering the whole syllabus. In addition, eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

UNIT-I

Basic terminologies- nutrition, health, RDA (recommended dietary allowance), diet, hunger, satiety, BMR (basal metabolic rate), BMI (body mass index).

Food and nutrients- basic definitions, function of food and nutrients, Water and its role in human health and nutrition.

UNIT-II

Obesity- it causes, body composition, weight for height measure, health implication of obesity. BMI and factor affecting BMI.

Carbohydrates- classification, dietary importance and function of carbohydrates.

UNIT-III

Fat- functions of fats, cholesterol, LDL & HDL and their health importance.

Protein - nature and function of proteins, biological value, net protein utilization, protein efficiency ratio, dietary importance and function of Proteins.

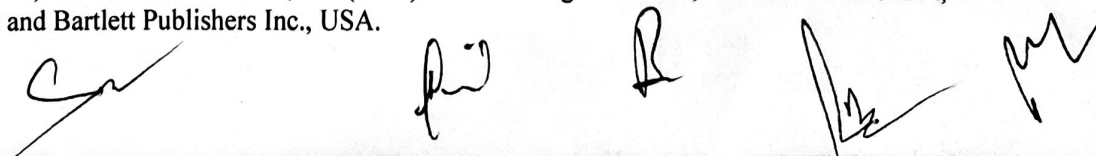
UNIT-IV

Vitamins- sources and requirements of vitamins, functions of vitamin- A, D, E, K, C and vit. B complex.

Minerals- minerals in human health, macro and micro minerals, food sources and requirements of minerals.

Text and Reference Books:

1. Insel, P., Turner R.E. & Ross, D. (2006). Discovering Nutrition, IInd Edition. ADA, Jones and Bartlett Publishers Inc., USA.



2. Williams, S.R. (1990). *Essentials of Nutrition and Diet Therapy*. Times Mirror/Mosby College Publishing.
3. Hegarty, Vincent. (1995). *Nutrition Food and the Environment*. Eagen Press.
4. Brian, A.F., Allen, G. (1995). *Food Science, Nutrition & Health*. Edward Arnold, A member of Hodder Headline Group London, Sydney, Auckland.
5. Mudambi Sumati R. & Rajagopal, M.V. (1995). *Fundamentals of Food & Nutrition*. New Age International (P) Limited, Publishers.
6. ICMR (1995). *Nutrient Requirement & RDA*, ICMR, New Delhi.
7. Gibney, M.J., Elia, M., Ljungqvist, O. & Dowsett, J. (2005). *Clinical Nutrition*. The Nutrition society textbook series, Blackwell publishing company.



BSc/FST/2/GEC2- Food Adulteration

Credits: 4

Lectures: 60

Duration of Exam.: 3 Hrs.

Max. Marks: 100

Final Term Exam.: 70

Internal Assessment: 30

Objective: To understand the role and significance of food adulteration in human life and public health.

Course Outcomes: After successfully completing the course, student will be able to:

CO1: This course will provide understanding of adulteration and their adverse health and economic effects in our life. Students come to know the importance of Food adulteration in common life.

CO2: Milk and Species are two main ingredients of almost every food preparation. Here students would be equipped with the information and general testing to detect adulteration in milk and spices.

CO3: Students would get the legal rights and remedies against the act of Food adulteration on national and international level.

CO4: Knowledge of Public health and its association with food enable students to selection of right food at right place.

Note for the Paper Setter: The question paper will consists of nine questions in all. The first question will be compulsory and will consist of eight short questions of 2 marks each covering the whole syllabus. In addition, eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

Unit I

Introduction and concept: Food Adulteration – Definition, concept, classification of adulterants, Food Contaminants, difference between adulterants and contaminants List of foods commonly adulterated, harmful effects of adulterants.

Unit II

Adulteration in milk and milk products: Common adulterants in milk and milk products. Household and laboratory scale methods to detect the adulterants in milk and milk products

Adulteration in spices and additives: Common adulterants in spices and food additive. Household and laboratory scale methods to detect the adulterants in these commodities.

Unit III

Food Laws and standards for adulteration: National and international Laws and regulations to minimize adulteration in food commodities.

Unit IV

Public health hazards and food safety: Food borne illness, food poisoning, types of food poisonings, bacterial agents of food borne illness, food poisoning by *Clostridium*, *Salmonella*, *E. coli*, *Staphylococcus*.

Recommended Books:

1. N. ShakuntalaManay and M. Shadaksharaswamy (2008) Food Facts and Principles
2. Frank Weiss Food Adulteration
3. Edwin M Bruce Detection of the Common Food Adulterants
4. Shyam Narayan Jha (2016) Rapid Detection of Food Adulterants and Contaminants

