BSC. (HONS.) FOOD TECHNOLOGY

Category-I

DISCIPLINE SPECIFIC CORE COURSE – 1 (DSC-FT01) Fundamentals of Food Technology

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Fundamentals of Food Technology	**4**	**3**	**0**	**1**	**Class XII with PCM/PCB**	**-**

Learning Objectives

1. To understand the basic principles of food science and technology.
2. To understand the structure, composition, nutritional value, changes during processing and storage of various plant and animal foods.

Learning outcomes

1. Appreciate the principles of food science and technology.
2. Attain knowledge of the structure, composition, nutritional quality and post-harvest changes in various plant foods
3. Comprehend the structure and composition of various animal foods. 4. Understand the fundamentals of various plant and animal food processing

SYLLABUS OF DSC-1

Unit I: Introduction to Food Science and Technology (4 Hours)

The unit presents the student with an overview of the food science and technology.

Unit II: Structure, Nutritional Composition and Technological aspects of Plant foods (12 Hours)

Unit Description: Cereals, Millets and Pulses

Subtopics: Introduction to cereals, nutri-cereals (millets), pseudo cereals. ● Wheat- Structure and composition, types of wheat, Diagrammatic representation of longitudinal structure of wheat grain. ● Malting, dextrinization, gelatinization, types of browning Maillard & caramelization. ● Rice- types of rice, parboiling of rice- advantages and disadvantages. ● Pulses- Introduction to pulses and legumes. ● Naturally occurring toxic constituents in pulses, types of processing- soaking, germination, decortication, cooking and fermentation.

Unit III: Structure, Nutritional Composition and Technological aspects of Plant foods (13 Hours)

Unit Description: Edible Oils, Fruits and Vegetables

Subtopics: Fats & Oils- Classification of lipids, saturated fatty acids, unsaturated fatty acids, essential fatty acids, trans fatty acids. ● Refining of oils-different methods, hydrogenation ● Rancidity –Types- hydrolytic and oxidative rancidity and its prevention. Fruits & Vegetables- Classification of fruits and vegetables, composition, pigments, types of fibre. ● Enzymatic browning and its prevention, ● Post-harvest

changes in fruits and vegetables – Climacteric and non-climacteric, ripening, physicochemical changes-physiological and horticultural maturity, pathological changes, during the storage of fruits and vegetables.

Unit IV: Nutritional Compositional and Technological aspects of Animal foods

(16 Hours)

Unit Description: Flesh Foods - Meat, Fish, Poultry and Milk and Milk products

Subtopics: ● Meat – Definition of carcass, composition of meat, post-mortem changes in meat- rigor mortis, tenderization of meat, curing and ageing of meat. ● Fish - Classification and composition of fish, aquaculture, characteristics of fresh fish, Types of spoilage in fish- microbiological, physiological, biochemical. ● Poultry - Structure and composition of egg, egg proteins, characteristics of fresh egg, deterioration of egg quality. difference between broiler and layers. ● Milk & Milk Products- Definition of milk, composition of milk and types of market of milk, milk processing- homogenization, pasteurization.

Practical component – 30 Hours

1. To study enzymatic browning in fruits & vegetables.
2. To study different types of non-enzymatic browning.
3. To study gelatinization behavior of various starches.
4. To study the concept of gluten formation of various flours.
5. To study germination.
6. To study dextrinization in foods.
7. To perform quality inspection of egg.

Essential readings

1. Bawa. A.S., Chauhan, O.P, Raju. P.S. (2013) ed. Food Science. New India Publishing Agency
2. Potter, N. N., & Hotchkiss, J. H. (2012). Food science. Springer Science & Business Media.
3. Srilakshmi, B. (2018). Food science. New Age Publishers. 7th edition.

Suggestive reading

1. De, Sukumar. (2007). Outlines of Dairy Technology. Oxford University Press
2. Kent, N.L.(2018). Kent's Technology of Cereals: An introduction for students of food science and agriculture. Elsevier. 5th edition.
3. Meyer. (2006). Food Chemistry. CBS publishers and distributors.
4. Stewart, G.F., &Amerine, M.A.(2012). Introduction to Food Science and Technology. Elsevier, 2nd Edition.
5. Rao, E.S. (2019) Fundamentals of Food Technology and Preservation, Variety Books, New Delhi.

DISCIPLINE SPECIFIC CORE COURSE – 2 (DSC-FT02) Principles of Food Science

Credit distribution, Eligibility and Prerequisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Principles of Food Science	**4**	**3**	**0**	**1**	Class XII with **PCM/PCB**	**-**

Learning Objectives

1. To impart basic concepts of food science, food chemistry and food sanitation.
2. To introduce the concept of food microbiology, sensory science and food packaging.

Learning outcomes

Understand the basic concepts of

1. Structure and composition, food science and food sanitation.
2. Food microbiology, sensory science and food packaging

SYLLABUS OF DSC- 2

Unit I: Surface Chemistry and Structural properties of foods (12 Hours)

Unit Description: Surface Chemistry and Structural properties of foods

Subtopic: Introduction to engineering properties of food and biomaterials, structure and chemical composition of foods, physical properties and surface chemistry (colloids, emulsions, foam, sols, gels, pectin gels) and application

Unit II: Sensory properties of foods (10 Hours)

● Basic description of taste, flavour, odour, colour and texture. ● Theories of gustation, olfaction, colour and texture. ● Techniques of sensory evaluation (Descriptive and Discriminative tests)

Unit III: Basic Food Microbiology (8 Hours)

Introduction to types of microorganisms, Food as a substrate for microorganism, bacterial growth curve, Factors affecting growth of microbes : Intrinsic and Extrinsic

Unit IV: Waste management and sanitation (9 Hours)

Properties of Waste water, hardness of water, break point chlorination, physical and chemical nature of impurities, BOD, COD, waste water treatment, detergents and sanitizers used in food industry, CIP and COP system with reference to food industry

Unit V: Introduction to Food Packaging (6 Hours)

Objectives of packaging, types of packaging materials (paper, glass, plastic, metal and wood, rigid and flexible packaging) and properties

Practical component – 30 Hours

1. Preparation and standardization of reagents
2. Determination of moisture content of food samples
3. Demonstration of fat/ protein estimation
4. Preparation of degree brix solution
5. Application of colloidal chemistry to food preparation
6. To perform sensitivity / threshold tests for basic taste
7. Introduction to microscopy and study of morphology of bacteria, yeast and mold using permanent slides.
8. Determination of alkalinity/ hardness of water
9. Determination of BOD/COD and total dissolved solids of water samples
10. Identification and testing (Thickness, GSM) of different types of packaging materials

Essential readings

- Coles, R., McDowell, D., & Kirwan, M. J. (Eds.). (2003). Food packaging technology (Vol. 5). CRC press.
- De, S. (1996). Outlines of dairy technology. Oxford University Press.
- DeMan, J. M., Finley, J. W., Hurst, W. J., & Lee, C. Y. (2018). Principles of food chemistry, 4th ed. Springer.
- Frazier, W.C. and Westhoff, D.C.(2004). Food Microbiology.New Delhi. TMH Publication
- Shadaksharaswamy, M., & Manay, N. S. (2011). Food, facts and principles. 4 th ed. New Age international publisher. New Age International.
- Meyer LH.(2006). Food Chemistry, CBS Publication, New Delhi.
- Potter N.N., Hotchkiss J.H. (2007). Food Science,5th ed. CBS Publication, New Delhi
- Ranganna, S. (2002). Handbook of Analysis of quality control for fruit and Vegetables products 2nd Ed. Tata Mcgraw Hill pub. Co. Ltd. New Delhi

Suggestive readings (if any)

- Jenkins, W.A. and Harrington, J.P. (1991). Packaging Foods with Plastics, Technomic Publishing Company Inc., USA.
- Norman, G. Marriott. and Robert, B. Gravani. (2018). Principles of Food Sanitation,6th ed. New York, Springer

DISCIPLINE SPECIFIC CORE COURSE– 3 (DSC-FT03) MILK & MILK PRODUCTS TECHNOLOGY

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course(if any)
		Lecture	Tutorial	Practical/ Practice		
MILK & MILK PRODUCTS TECHNOLOGY	**4**	**3**	**0**	**1**	**Class XII pass** with **PCM/PCB**	

Learning Objectives

1. Processing of milk and milk products at industry level
2. To know the compositional and technological aspects of milk
3. To study processed milk products

Learning outcomes

1. Understand the importance of Dairy industry
2. Understand the various properties and composition of milk.
3. Understand the technology of manufacturing of various products like Butter, ghee, Yoghurt, Dahi, Shrikhand, Ice-cream, Milk powder, channa, Paneer, Cheese (cheddar), Khoa
4. Understand market milk industry stages of milk processing and working of a few Dairy equipment's

SYLLABUS OF DSC-3

Unit I: Physical properties of milk (7 Hours)

• Color • Taste • pH and buffering capacity • Refractive index • Viscosity • Surface tension • Freezing & boiling point • Specific heat and electrical conductivity

Unit II: Composition of milk (16 Hours)

Unit Description: Macro nutrients and micronutrients of milk; milk sugar, fat and protein.
Subtopics: • Lactose (alpha and beta forms and their differences) • Significances of lactose in dairy industry • Composition and structure • Fat constants (Saponification value, Iodine value, RM value, Polenske value, peroxide value) • Difference between casein and serum protein • Different types of casein (acid and rennet) • Uses of casein

Unit III: Market milk industry and milk products (22 Hours)

Processing of milk and milk products
Subtopics: • Systems of collection of milk reception • Platform testing • Various stages of processing; Filtration, Clarification Homogenization, Pasteurization • Description and working of clarifier, cream separator, homogenizer and plate heat exchanger • Principle of processing of following milk products -Butter, ghee, yoghurt, dahi, shrikhand, ice-cream, milk powder, channa, paneer, cheese (cheddar), khoa

Practical components – 30 Hours

1. To determine specific gravity of milk
2. To determine acidity of milk
3. To perform COB test in milk
4. To estimate milk protein by Folin method
5. To estimate milk fat by Gerber method
6. To prepare casein and calculate its yield
7. To perform MBRT test in milk
8. Schematic diagram of pasteurization of milk in dairy industry
9. Study energy regeneration in dairy industry
10. Study and schematic diagram of CIP in dairy industry

Essential readings

● De, Sukumar. (2007). Outlines of dairy technology. Oxford University Press.
● Webb B.H.and Alford (2005). Fundamentals of dairy chemistry. CBS Publisher.

Suggestive readings

● P.F. Fox, T. Uniacke-Lowe and J.A.O' Mahony (2005). Dairy Science and Technology. Taylor & Francis.
● P. Walstra, Jan T.M. Wouters and Tom J. Geurts (2015). Dairy chemistry and Biochemistry. Springe.