

- **Joshi Y K. and Benjamin, J.** (2026). *Basics of Clinical Nutrition* (3rd ed.) Jaypee Brothers Medical Publishers.

Suggested Readings:

- **Chowdhary, S.R. and Aeri, B.T.** (2023). *Textbook of Food Science and Nutrition*. (1st Ed.). Aarahana Publishers.
- **Gibney MJ, Elia M, Ljungqvist & Dowsett J.** (2005). *Clinical Nutrition*. The Nutrition Society Textbook Series. Blackwell Publishing Company
- **Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins, R.J.** (2005). *Modern Nutrition in Health and Disease*. (10th Ed.) Lipincott, William and Wilkins.
- **Williams, S.R.** (2001). *Basic Nutrition and Diet Therapy*. (11th Ed.) Times Mirror Mosby College Publishing.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time

Bachelors in Arts with With Community Science Category-V

DISCIPLINE SPECIFIC ELECTIVE COURSE – DSE-FN 12-HSC: ADVANCED FOOD SCIENCE

CREDIT DISTRIBUTION, ELIGIBILITY, PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the course
		Lecture	Tutorial	Practical		
Advanced Food Science	4	2	0	2	-	NIL

Learning Objectives

- To understand in depth, the scope of food science in processing food.
- To understand the structure, composition, nutritional value, of various food components and the changes that occur during processing.

Learning outcomes

- Appreciate the principles of food science and technology.
- Attain knowledge of the structure, composition, nutritional quality of foods.
- Apply the principles of food science for processing variety of safe foods.

THEORY (Credits 2; Hours 30)

UNIT I: Understanding Food Science and Chemistry

8 hours

This unit will help in understanding the scope, science and functional properties of important components of food, the colloidal systems and their salient applications in the food industry.

- Scope of advanced food science in food industry including nanotechnology
- Functional properties and chemistry of carbohydrates, protein and lipids in food.

- Applications of carbohydrates, protein and lipids.
- Colloidal Chemistry-definition, classification, properties and applications of sols, gels, foams and emulsions.

UNIT II: Changes during food processing

8 hours

This unit will cover processing-induced changes in food, including cellular alterations, browning reactions, and nutrient-sensitive changes. It will also highlight the impact of thermal and non-thermal processing methods on food composition.

- Physico-chemical changes during processing (cellular changes, enzymatic browning and non- enzymatic browning, maillard reaction, caramelization, ascorbic acid oxidation)
- Nutritional changes occurring during food processing (such as thermal and non-thermal processing)

UNIT III: Food and microbes

7 hours

This unit will discuss the characteristics of predominant micro-organisms in food and the role of microorganisms in spoilage as well as in food production.

- Introduction to microbes in food - characteristics of predominant micro-organisms in food (yeast, mold and bacteria), bacterial growth curve, factors influencing growth of microorganisms.
- Role of microorganisms in spoilage - Important food spoilage micro-organisms (psychotropic, thermophilic, osmophilic microbes), spoilage in specific food groups (raw meat, fruits & vegetables), role of microorganisms in food fermentation.
- Role of microorganism in food production: curd, yoghurt, cheese, breads, vinegar and traditional Indian sweets.

UNIT IV: Enzymes, pigments and additives

7 hours

This unit will discuss the scope of enzymes, pigments and additives in food processing (characteristics, uses, effect of processing).

- Enzymes in food processing (any five)
- Natural Food Pigments
- Food Additives (any five)

PRACTICAL (CREDITS 2; HOURS 60)

1. Study the behavior of sugar at variable temperatures.
2. Study hydrolysis of protein during cookery.
3. Study hydration/solubility and denaturation of proteins.
4. Prepare one protein and one carbohydrate gel.
5. Study behavior of fats/oils – emulsions, smoke point.
6. Prepare and give presentations on fat replacers used in food industry or changes in food composition during processing or recent advancements based on market survey.
7. Develop educational aid on food spoilage or applications of nanotechnology.
8. Demonstrate various types of browning in food.
9. Study the effect of heat, acid and alkali on pigments.
10. Prepare food product(s) using beneficial microorganisms.

Essential Readings:

UNIT I

This unit explores the functional properties and chemistry of carbohydrates, proteins, and lipids, alongside the principles of colloidal systems and nanotechnology applications to enhance food texture, stability, and industrial innovation.

- **Damodaran, S., Parkin, K. L., & Fennema, O. R. (Eds.).** (2007). *Fennema's food chemistry*. CRC Press.
- **Suri, S., & Malhotra, A.** (2014). *Food science, nutrition and safety*. Pearson.
- **Hotchkiss, J. H., & Potter, N. N.** (2007). *Food science* (5th Ed.). CBS Publishers & Distributors.
- **Srilakshmi, B.** (2018). *Food science* (7th Ed.). New Age Publishers.
- **Jafari, S. M. (Ed.).** (2020). *Handbook of food nanotechnology: Applications and approaches*. Academic Press.
- **Gopi, S., & Balakrishnan, P. (Eds.).** (2022). *Advances in nutraceuticals and functional foods: Concepts and applications*. CRC Press.

UNIT II

This unit analyzes how processing triggers cellular alterations, browning reactions—including Maillard and caramelization—and nutrient degradation, comparing the impact of thermal and non-thermal methods on the physico-chemical and nutritional profile of foods.

- **Fellows, P.** (2000). *Food processing technology* (2nd ed.). Woodhead Publishing Limited & CRC Press LLC.
- **Damodaran, S., Parkin, K. L., & Fennema, O. R. (Eds.).** (2007). *Fennema's food chemistry*. CRC Press.
- **Bawa, A. S., Chauhan, O. P., & Raju, P. S. (Eds.).** (2013). *Food science*. New India Publishing Agency.
- **Rao, E. S.** (2019). *Fundamentals of food technology and preservation*. Variety Books.

UNIT III

This unit examines the characteristics of bacteria, yeasts, and molds, focusing on microbial growth kinetics, spoilage mechanisms across food groups, and the beneficial role of microorganisms in fermenting global and traditional Indian foods.

- **Frazier, W. C., & Westhoff, D. C.** (2004). *Food microbiology*. TMH Publication.
- **Bawa, A. S., Chauhan, O. P., & Raju, P. S. (Eds.).** (2013). *Food science*. New India Publishing Agency.
- **Srilakshmi, B.** (2018). *Food science* (7th ed.). New Age Publishers.
- **Hotchkiss, J. H., & Potter, N. N.** (2007). *Food science* (5th Ed.). CBS Publishers & Distributors.

UNIT IV

This unit examines the characteristics and industrial applications of food enzymes, natural pigments, and additives, focusing on their functional roles and how processing conditions influence their stability and performance in food.

- **Brannen, D., & Salminen, T.** (2002). *Food additives* (2nd ed.). Marcel Dekker.
- **Damodaran, S., Parkin, K. L., & Fennema, O. R. (Eds.).** (2007). *Fennema's food chemistry*. CRC Press.
- **Bawa, A. S., Chauhan, O. P., & Raju, P. S. (Eds.).** (2013). *Food science*. New India Publishing Agency.

- Suri, S., & Malhotra, A. (2014). *Food science, nutrition and safety*. Pearson.

Suggested Readings:

- DeMan, J. M., Finley, J. W., Hurst, W. J., & Lee, C. Y. (2018). *Principles of food chemistry* (4th ed.). Springer.
- Frazier, W. C., & Westhoff, D. C. (2004). *Food microbiology*. TMH Publication.
- Johnson, A. H., & Peterson, M. S. (1974). *Encyclopedia of food technology* (Vol. 2).
- Meyer, L. H. (2006). *Food chemistry*. CBS Publishers & Distributors.
- Rao, E. S. (2019). *Fundamentals of food technology and preservation*. Variety Books.

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Bachelors in Arts with Community Science Category-V

DISCIPLINE SPECIFIC ELECTIVE COURSE – DSE-FN 14-HSC: SUSTAINABILITY AND SOCIAL RESPONSIBILITY

CREDIT DISTRIBUTION, ELIGIBILITY, PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the course
		Lecture	Tutorial	Practical		
Sustainability and Social Responsibility	4	3	1	0	Class XII	NIL

Learning Objectives

- Introduce students to the fundamental concepts, principles, and evolution of sustainability and sustainable development.
- Familiarize students with the framework of the United Nations Sustainable Development Goals (SDGs) and their global and national relevance.
- Develop an understanding of major environmental, social, and economic challenges affecting sustainable development.
- Examine the role of governments, industries, institutions, and individuals in promoting sustainability and social responsibility.
- Encourage critical thinking about sustainable solutions, responsible consumption, and ethical practices.
- Promote awareness of sustainable technologies, policies, and community-based initiatives that support long-term environmental and social well-being.

Learning Outcomes

The students would be able to:

- Explain key concepts, principles, and historical developments related to sustainability and sustainable development.
- Describe the structure and objectives of the United Nations Sustainable Development Goals and their significance for global development.