B.A. (Prog) with Food Technology (FT) as Major
Category-II

DISCIPLINESPECIFICCORECOURSE–DSC-14
APPLIED FOOD CHEMISTRY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

CourseTitle & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Applied Food Chemistry	4	3	0	1	Class XII	Nil

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LEARNING OBJECTIVES:

- To impart students' basic knowledge related to the principles of food chemistry and their applications on food systems.
- Highlight the importance of knowledge in food chemistry for the production of nutritious and wholesome foods in benefit of consumers and the food industry.
- Introduce students to food additives and their applications in food preservation, flavor enhancement, and texture improvement.
- Encourage the practical application of theoretical knowledge to address real-world food industry challenges.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:

- Describe the chemical composition of food and the functional roles of major and minor food components.
- Understand key food reactions such as Maillard browning, caramelization, lipid oxidation, and enzymatic processes, and their practical applications.
- Assess the roles of food additives like emulsifiers, sweeteners, stabilizers, and preservatives in enhancing food quality, safety, and shelf life.
- Apply theoretical knowledge to address practical challenges in food processing and product development.

SYLLABUS OF DSC-14-FT

THEORY
(Credits 3; Hours 45)

UNIT I: Introduction to Applied Food Chemistry **(4 Hours)**

Unit Description: This unit introduces the chemical composition of foods and the functional roles in quality, safety, nutrition and new food product development.

Subtopics:

- Definition and scope of food chemistry
- Difference between basic and applied food chemistry

UNIT II: Major Food Components and their Functional Applications (14 Hours)

Unit Description: This unit explores the properties, functional roles, and applications of major food components—water, carbohydrates, proteins, and lipids in maintaining food quality, stability, and texture.

Subtopics:

- Water: Properties of water, Water activity and its role in food stability.
- Carbohydrates: Properties, functions, and food applications. Role of starches, gums, and fibers in food thickening and stabilization. Modified starches in processed foods.
- Proteins: Functional properties and applications, role in texture development of gels, foams, and emulsions.
- Lipids: Functional properties, and role in food systems: Shortening, emulsification, and flavor carriers. Applications in margarine, chocolate, and frying oils. Modification of lipids.

UNIT III: Minor Food Components and their Functional Applications (6 Hours)

Unit Description: This unit focuses on the functional roles of minor food components like vitamins, minerals, and phytochemicals in enhancing nutritional value and promoting health. It emphasizes their applications in fortified and functional foods.

Subtopics:

- Vitamins: Application as nutritional additives in food.
- Minerals: Essential minerals and their application as nutritional additives in food.
- Phytochemicals: Antioxidants, polyphenols, flavonoids; applications in functional foods.

UNIT IV: Food Reactions and their Practical Implications (10 Hours)

Unit Description: This unit examines key food reactions like Maillard browning, caramelization, lipid oxidation, and enzymatic processes, focusing on their impact on food quality, flavor, and texture.

Subtopics:

- Maillard Browning and Caramelization: Applications in baked goods, coffee, and confectionery.
- Lipid Oxidation and hydrogenation.
- Enzymatic Reactions: Use of enzymes in clarification of fruit juices, baking, and dairy products.

UNIT V: Food Additives and their Applications (11 Hours)

Unit Description: This unit explores the role of food additives such as emulsifiers, stabilizers, sweeteners, and preservatives in enhancing food quality, texture, and shelf life. It also covers the use of natural and synthetic flavor and color enhancers.

Subtopics:

- Emulsifiers and stabilizers in processed foods.
- Flavor and Color Enhancers: Natural vs. synthetic.
- Sweeteners: Use of artificial and natural sweeteners in low-calorie products.
- Chemical preservatives in shelf-life extension.
- Leavening agents.

PRACTICAL
(Credit: 1; Hours: 30)

No. of Students per Practical Class Group: 10-15

1. Measurement of the moisture content of a given food sample.
2. Estimation of reducing and non-reducing sugars using potassium ferricyanide method.
3. Determination of smoke point and percent fat absorption for different fat and oils.
4. Determination of percent free fatty acids.
5. Estimation of saponification value.
6. Estimation of total ash content.
7. Preparation and testing stability of fruit juice with added stabilizers
8. Preparation and testing stability of oil-in-water emulsions using different emulsifiers (e.g., lecithin, gum arabic)
9. Effect of enzymes (e.g., pectinase, pectic enzymes) in juice clarification.

ESSENTIAL/ RECOMMENDED READINGS (Theory and Practical):

- O. R. Fennema. (2003) Food Chemistry, 3rd Ed, Tata McGraw-Hill, New York.
- DeMan. (2007). Principles of Food Chemistry. Springer, 3rdedition.
- Suri, S., & Malhotra, A. (2013). *Food science, nutrition and safety*. Pearson Education India
- Whitehurst and Law. (2002). Enzymes in Food Technology. Canada: CRC Press.
- Brannen and et al., Food Additives, Marcel Dekker, New York,1990

SUGGESTED READINGS:

- Potter, N.N. and Hotchkiss, J.H. (1999). Food Science, 5th Ed., Chapman & Hall.
- Wong, Dominic WS. (2018). Food Enzymes. New York: Chapman and Hall.
- Meyer, L.H. (2004). Food Chemistry. CBS Publishers & Distributors Pvt Ltd, India.
- Desrosier, Norman W. and Desrosier, James.N. (2018). The technology of food preservation, 4th Ed.Westport, Conn.: AVI Pub. Co.
- Hui, Y. H., & Evranuz, E. Ö. (Eds.). (2015). Handbook of vegetable preservation and processing. CRC press.

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