

GE 11: Chemistry: Chemistry of Food Nutrients

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
		Lecture	Tutorial	Practical/Practice		
Chemistry of Food Nutrients (GE-11)	4	2		2		

Learning Objectives

The Learning Objective of this course is as follows:

- To help the students develop a basic understanding of the components of food, their source, properties and interactions as well as changes that occur during processing, storage, and utilization.

Learning Outcomes

On completion of the course, the student will be able to:

- Build a strong understanding of chemistry of food: composition of food, role of each component.
- Understand some of the reactions and changes in individual food components which occur during processing, handling and storage

SYLLABUS OF GE-11

Theory:

Unit 1: Carbohydrates (6 Hours)

Introduction, sources, functions, classification: monosaccharide, oligosaccharide and polysaccharide, structure and importance of polysaccharides in food chemistry (pectin, cellulose, starch, gums), chemical reactions of sugar: mutarotation, caramelisation; non enzymic browning and its prevention, role of carbohydrates as sweeteners in food.

Unit 2: Lipids (8 Hours)

Introduction, sources, classification (fatty acids, phospholipids, fats & oils, waxes), common fatty acids present in oils and fats, Omega- 3&6 fatty acids, trans fats, chemical properties- Reichert Meissel value, Polenski value, iodine value, peroxide value, saponification value,

effect of frying on fats, changes in fats and oils- rancidity, lipolysis, flavor reversion, auto-oxidation and its prevention.

Unit 3: Proteins (8 Hours)

Introduction, sources, classification (simple, conjugated, derived), structure of protein (primary, secondary and tertiary), physico-chemical & functional properties of proteins, protein denaturation.

Unit 4: Vitamins & Minerals (8 Hours)

Vitamins: Introduction, classification: fat-soluble vitamins & water-soluble vitamins.

Minerals: Introduction, classification: macrominerals (Ca, P, Mg) & microminerals (Se, Fe, I, Co, Zn, Cu, Se, Cr).

Physiological importance of vitamins and minerals, effect of food processing on vitamins and minerals.

Practicals: (60 Hours)

(Laboratory periods: 60)

1. Determination of moisture in food products by hot air oven-drying method.
2. Colorimetric determination of Iron in vitamin / dietary tablets.
4. 2, 6-Dichlorophenol indophenol method for estimation of vitamin C in a given solution/ lemon Juice/chillies.
5. Estimation of total soluble sugar content by ferricyanide method (volumetric analysis).
6. Determination of saponification value of the given fat/oil.
7. Determination of iodine value of the given fat/oil.
8. Qualitative tests for proteins and carbohydrates.
9. Qualitative estimation of cholesterol by Liebermann Burchard method.

References:

Theory:

1. deMan, J.M., Finley, J.W., Hurst, W.J., Lee, C.Y. (2018), **Principles of Food Chemistry**, 4th Edition, Springer.
2. Msagati, T.A.M. (2013), **Chemistry of Food Additives and Preservatives**, Wiley-Blackwell.
3. Fennema, O.R. (2017), **Food Chemistry**, 5th Edition, CRC Press.
4. Attokaran, M. (2017), **Natural Food Flavors and Colorants**, 2nd Ed., Wiley-Blackwell.
5. Potter, N.N., Hotchkiss, J.H, (1995) **Food Science**, 5th Ed., Chapman & Hall.

6. Brannen, D., Davidsin, P.M., Salminen, T. Thorngate III, J.H. (2002), **Food Additives**, 2nd Edition, CRC Press.
7. Coulte, T. (2016), **Food: The Chemistry of its Components**, 6th Edn., Royal Society of Chemistry.
8. Belitz, H. D.; Grosch, W. (2009), **Food Chemistry**, Springer.
10. Course: FOOD CHEMISTRY (iasri.res.in)

Practical:

1. Ranganna, S. (2017). **Handbook of analysis and quality control for fruits and vegetable products**, 2nd Edn., McGraw Hill Education
2. Sawhney, S.K., Singh, R. (2001), **Introductory Practical Biochemistry**, Narosa Publishing House

GE 12: Chemistry: Statistical Methods and Data Analysis

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
		Lecture	Tutorial	Practical/Practice		
Chemistry: Statistical Methods and Data Analysis (GE-12)	4	2		2		

Learning Objectives

The Learning Objectives of this course are as follows:

- To give the students insight about the statistical treatment on the chemical analysis data along with illustration about the analysis of collected analytical data that will help them to take up a job of technician, scientist and laboratory manager.
- To explain the presentation of data in different form such as “Table, Graph, Bar Diagram, Pie Chart, Venn diagram” along with their reliability and validity.

Learning Outcomes

At the end of this course student will be:

- Familiar with interpretation and use of analytical data collected by different techniques, significance of different analytical techniques and their applications, reliability and presentation of data for reporting to different forum.