

**Maulana Abul Kalam Azad University of Technology, West Bengal**  
**(Formerly known as West Bengal University of Technology)**  
**Syllabus of B.Sc in Dietetics and Nutrition**  
**Effective from academic session 2023-2024**

**Semester I**

**FYBDN 101 BASICS OF NUTRITION**

**3 Credit, Total Hours - 30 Hours + 15 Tutorial Hours**

Course Objectives:

1. Basic knowledge about nutrition, energy, growth and development.
2. Basic knowledge regarding macro- and micro-nutrients and their role in nutrition

Sl. No.	Course Outcome (CO)
1	Remember and understand the concept of nutrition.
2	Understand the energy in human nutrition.
3	Develop the knowledge of macro- and micro-nutrients and their role in nutrition
4	Develop the knowledge and skill for determining the nutritional requirement of an individual
5	Develop knowledge regarding vitamins and minerals and its role in nutrition
6	Remember and understand the concept of Functional foods

**UNIT I: 5 Hours**

Definition of food, nutrition, health, Nutraceuticals and Nutrigenomics. Dimension of health and function of

food- Physical, social and mental health. Food guide – Basic food groups, my plate

**UNIT II 5 Hours**

**Energy requirements:**

Factors affecting energy requirements,

BMR - activity, age, climate, diet induced thermogenesis (SDA), Physiological conditions.

RDA (ICMR) - formation, uses

**UNIT III: ( 5 Hours )**

**Macronutrients:**

Protein, Carbohydrate, Fat-Classification, functions, Digestion & absorption (in brief), RDA, sources and deficiencies.

**UNIT IV: (5 Hours )**

**Micronutrients**

**Macro-minerals**

Calcium, Phosphorus and magnesium: Functions, absorption, RDA, sources and deficiencies.

**Micro Minerals:**

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Sodium, Potassium, Iron, Zinc, Fluorine and Iodine, Copper, Selenium: function, absorption, RDA, sources and deficiency.

**Vitamins**

**Fat-soluble Vitamins (A, D, E & K)**

Function, RDA, sources and deficiency and excess.

Water soluble vitamins: Thiamin, Riboflavin, Niacin, B6, B12, Folic acid, Biotin and Vitamin C: functions, RDA,

food sources, deficiencies and excess.

**UNIT V: Water and Electrolytes. (5 Hours )**

Water: Functions, requirements, sources, water balance

Electrolyte and acid base balance: Electrolyte- Sodium, Chloride, Potassium sources and RDA, function

**UNIT VI: Functional foods (5 Hours )**

Phytonutrients: Phytates, Tannins and Polyphenols, their sources and functions

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**FYBDN 191 BASICS OF NUTRITION PRACTICAL**

**2 Credits, Total hours 60 ( 40 + 20 self-paced practice)**

1. Weights and measures.
2. Standardization of recipes.
3. Introduction to Recommended Dietary Allowances/Nutritive value of foods.
4. Calculation of energy balance among college going girls.
5. Enhancing the traditional recipes with specific nutrients (protein, carbohydrate, fat, vitamin A, vitamin C, calcium and iron).
6. Visit to the analytical lab for demonstration of protein and fat estimation.

**References:**

1. Antia F.P., Philip Abraham, Clinical Dietetics and Nutrition, Oxford University Press; 4th edition.
2. Srilakshmi, B.(2019):Dietetics,8th edition, New Age International(P) Limited Publishers, New Delhi
3. Kathleen Mahan L., Sylvania Escott-Stump, Krause's food, nutrition and diet therapy (11th edition). Saunders company, London.
4. Passmore R. and Davidson S. (1986) Human nutrition and Dietetics. Liming stone publishers.
5. Robinson C.H. Careme, Chenometh W.L., Garmick A.E. (1986) 16th edition Normal Therapeutic nutrient. Publish by Mc Millan Company New York.
6. Shil's M.E., Alfon J.A., Shike M (1994), Modern nutrition in health and diseases eighth edition.
7. William S.R., Nutrition and Diet Therapy fourth edition C.V. Mos Company.

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**FYBDN 102 Microbiology of Food**

**3 credits, Total hours- 30 Hours + 15 Tutorial Hours**

**Course Objectives:**

1. Familiarize students with the general characteristics and growth characteristics of microbes.
2. Broad understanding of spoilage microorganisms and their effects on food and to get an idea about beneficial organisms.
3. Basic knowledge about the microbes present in the environment and handling of waste disposal.

#	Course Outcome (CO)
1	Remember and understand the concept regarding the different types and morphology of microorganisms and magnification capacity of different types of microscopes.
2	Remember and understand the concept regarding the factors affecting the growth in controlling the growth curve of microorganisms
3	Remember and apply the level of skill required to preserve the perishable foods from different types of microbial spoilage.
4	Remember and apply the level of skill required to preserve the non-perishable foods from microbial contamination and spoilage.
5	Explore the beneficial effects of microorganisms in the processing and development of fermented foods.
6	Know the different types and morphology of microorganisms and magnification capacity of different types of microscopes.

**UNIT I: (6 Hours )**

**Introduction to Microbiology-**A. Scope of Microbiology, Food Microbiology its origins - historical Roots-(brief), Germ theory of Disease,

B. Naming, Classification and identification, morphological characteristics of Bacteria (Salmonella typhi and Salmonella paratyphi,

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Clostridium perfringens and Clostridium botulinum, Escherichia coli, Campylobacter, Listeria monocytogenes, Staphylococcus aureus)

Fungi (Alternaria, Aspergillus, Candida, Fusarium, and Saccharomyces, mucoromycetes) and viruses (Norovirus, Rotavirus, hepatitis A,E,

Adenovirus, Astrovirus) Yeast (baker's yeast)

#### **UNIT II: (6 Hours )**

**Growth and Culturing of Bacteria-Growth** and cell Division, Factors affecting Bacterial Growth- (Physical factors and

nutritional factors), Culturing bacteria- (Methods of obtaining pure cultures, culture media, maintaining cultures).

#### **UNIT III (6 Hours )**

**Factors affecting the growth of microorganisms**-temperature, water activity, pH, oxygen and redox, interaction of factors and between organisms. Death of microorganisms and microbial populations- A . Heat, preservation of foods (appertization, pasteurization).

B. Chemical agents-factors influencing activity of sanitizers, preservatives, hurdle effect,

C. Radiation-preservation, D. High pressure (brief) Definition of FSSAI, HACCP-A Food Safety Assurance system (importance of quality control of food from microbial aspect)

#### **UNIT IV: (6 Hours )**

**Food Spoilage**- Nature, Causes, Contamination, Composition of spoilage, Changes in foods caused by spoilage organisms,

Influence of processing, Spoilage of important food commodities and food products -Meat, Fish, Egg and Milk, Fruits and Vegetables, Cereals

#### **UNIT V: (6 Hours )**

**Food –borne disease and food poisoning:** cause of disease, investigations and origins of food poisoning outbreaks, importance of food poisoning to individual and economy, control, Food poisoning bacteria causing:

1. Infections- Salmonella, Shigella, E.coli, Vibrio cholerae, Campylobacter Jejuni, Clostridium Perfringens,

2. Intoxications- Staphylococcus aureus, Streptococcus aureus, Clostridium Botulinum, Bacillus Cereus,

3. Viruses- Hepatitis A, B, C

#### **References**

1. Joshua. A.K. Microbiology - India printing works, Madras -1971.
2. Carpenter, Microbiology - W.B. Saunders Co., London.

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3. Salie. A.J. Fundamental principles of Bacteriology - McGraw Hill Book Co.,
4. R.C.Rubey & D.K. Maheshwari; A Textbook of Microbiology
5. Pelczar J. Michael; Microbiology concepts and Application
6. Ananthanarayan. R. & Paniker C.K.J; Textbook of Microbiology.
7. Frazier.W.C; Food Microbiology-McGraw Hill Book and Co; New York.
8. Smith and Water; Introductory food services-McGraw Hill Book and Co., New york,1971.
9. West Wood and Harger; Food Service in Institutions, 1966. John Wiley and Sons. Incorporation, New York, London.
10. ADAMS M.R. and MOSS M.O; Food microbiology, the Royal society and chemistry. Cambridge 1991.
11. Banwart. G.J; Basic food microbiology, Chapman and Hall, NewYork. HOBBS BC and Roberts. D;
12. Food poisoning and food Hygiene. Edward Arnold (A division of Hodder and Stoughton),London.
13. Sarda Mornmore; HACCP, A practical Approach,Edn.1997.
14. Frezier and Westhoff,5th Edition Food Microbiology, McGraw Hill Education, 2017

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**FYBDN 192 Microbiology of Food Practical**

**2 credits, Total hours- 30 Hours + 20 self-paced practice hours**

1. Use of equipment- microscope, autoclave, hot air oven, incubator, laminar .
2. Preparation of slides- bacterial smears, simple staining, differential staining, staining of yeast and molds.
3. Morphological identification of important yeast and mold in foods (slides and culture)- rhizopus, mucor, aspergillus, penicillium, fusarium, cladosporium, alternaria.
4. Preparation of common laboratory media for cultivation of bacteria, yeast and molds. Use of readily available media for cultivation.
5. Isolation of microorganisms by pour plate method (dilution) spread plate and streak plate method.
6. Demonstration of microbiological analysis of water for enumeration of standard plate count and coliform count.

***Reference Books:***

1. Frazier, W.C. and Westhoff D.C (1988) fifth edition Food microbiology, Mc Graw Hill Inc.
2. Jay James.M. (1986) third edition, Modern food microbiology, Van Nostrand Reinhold Company Inc.
3. Pelczar, Chan, Krieg, Microbiology, fifth edition Tata Mc. Graw Hill (1993). Jay JM,LoessnerMJ,and Golden DA(2005)
4. Jacquelyn G Black Microbiology principles and Explorations John Wiley and Sons, Inc (2008)
5. Microbiology Prescott Harle Klen 4th ed, Mc.Graw Hill Essentials of Food microbiology JohnGarbutt
6. Microbiology Schaums Outlines I E ALCAMO Tata Mc Graw –Hill Publishing Company Ltd New Delhi

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**Semester II**

**FYBDN 201 Basic Chemistry**

**3 credits, Total hours- 30 Hours + 15 Tutorial hours**

**Course Objectives:**

1. Understanding of the fundamental theories and basic concepts of Thermodynamics.
2. Understanding of the fundamental theories and applications of the concepts of dilute solutions, Colligative properties, Electrochemistry, Ionic Equilibrium.
3. Insight into the instrumental methods of spectral analysis and learning about the basic laws of photochemistry and various photochemical processes.
4. Learning about the chemistry of colloids and emulsions.
5. Learning about the chemistry of nanomaterials, the basics of nanotechnology and its related applications in food industries.

SL No.	Course Outcome
1	Outline and illustrate the skills and application of mathematical tools to calculate thermodynamic and kinetic properties
2	Able to understand the relationship between microscopic properties of molecules with macroscopic thermodynamic observables
3	Able to understand the use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics
4	Remember and understand the limitations and uses of models for the solution of applied problems involving chemical thermodynamic and kinetics
5	Remember and understand the concept of acid/base equilibria, including pH calculations, buffer behaviour, acid/base titrations, and their relationship to electrophiles and nucleophiles



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6	Remember and apply the level of skill required to understand and implement the historical evolution and current revolution that is nanoscience, the fundamental uniqueness of the chemical and physical properties of nanomaterials and their potential impact in science, engineering, medicine, and the environment, the interdisciplinary nature of nanoscience, top down and bottom up methods of nanomaterials preparation, examples of different nanomaterials, applications of nanomaterials with emphasis in food sector
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**Unit I: Thermodynamics (5 Hours )**

Systems: Open, Close, Isolated. Definition with examples of Diathermic and Adiabatic walls. Extensive and

Intensive property. Process: Isothermal, Adiabatic, Isobaric, Isochoric.

First Law of Thermodynamics: Statement and mathematical form.

Internal energy: Definition, Example, Change in internal energy for ideal gas.

Enthalpy: Definition, Example, Change in internal energy for ideal gas.

Heat Capacity: Definition, Classification of heat capacity ( $C_p$  and  $C_v$ ), Expression of  $C_p$  and  $C_v$  for ideal gas. Reversible and Irreversible Processes: Definition. Work done in both processes for ideal gasses. Adiabatic

**Unit II: Dilute solutions (5 Hours ) :**

Colligative properties Lowering of vapor pressure of solution, elevation of boiling point, freezing point depression, definition, principles, and laws of osmotic pressure.

**Unit III: Electrochemistry: ( 5 Hours )**

Electrochemistry I: Conductance of Electrolytic solution. Specific conductance, Equivalent conductance, molar conductance, Ion conductance. Kohlrausch's law of independent migration of ions.

Electrochemistry II: Cell and EMF. Nernst's equation.

Ionic equilibrium: Solubility and solubility product, common ion effect, determination of solubility product by EMF method, ionic product of water, pH, pOH, hydrolysis of salt solutions: Strong acid and weak base, weak acid and strong base, weak acid and weak base, concepts of buffer. Concepts of molarity, normality, molality, equivalent

**Unit IV: Reaction Mechanisms: (5 Hours )**

Reaction Dynamics: Reaction Laws: Rate and Order. Molecularity. Zero, First, and Second order Kinetics.

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Pseudo-molecular and Arrhenius reaction. Transition and Collision state theory.

**Unit V: Colloid Chemistry: (5 Hours )**

Definition of colloid, principle of colloid formation, types of colloid, colloid preparation, stability of colloid, association of colloid and emulsion.

**Unit VI: Photochemistry (5 Hours )**

Instrumental methods of spectral analyses, Photochemistry: Lambert's law and Beer's Law, Laws of photochemistry, Photochemical processes.

**Reference Books:**

1. Engineering Chemistry: Bandyopadhyay and Hazra
2. Physical Chemistry: P.C. Rakshit
3. Organic Chemistry: Finar, vol-1
4. Engineering Chemistry: B.Sivasankar, Tata Mc Graw Hill, 2008
5. A Text book of Engineering Chemistry: S.S.Dara, 10th Edition, S.Chand & Company Ltd., New Delhi, 2003.
6. Engineering Chemistry Simplified: S. Nandi and R. Bhattacharyya, Chayya Prakashani Pvt. Ltd.
7. Advanced practical chemistry, 3rd edition by Subhas C Das.
8. An advanced course in practical chemistry by Ghoshal, Mahapatra and Nad

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**FYBDN 291 Basic Chemistry**

**2 credits, Total hours- 30 Hours + 20 hours of self-paced practice**

1. Determination of surface tension and viscosity.
2. Determination of hardness of water.
3. Determination of chloride content of water.
4. pH metric titrations.
5. Thin layer chromatography.
6. Preparation and standardization of Mohr's solution by  $\text{KMnO}_4$  solution.
7. Preparation of standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution and standardization of Mohr's Salt solution.
8. Estimation of Iodine in common salt by standard sodium thiosulfate solution

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**FYBDN 202 Food Science**

**3 credits, Total hours : 30 Hours + 15 Tutorial hours**

**Course Objective:**

Make use of the chemistry that underlies in the Classification, Structure & properties of various calorie giving food components.

Sl No.	Course Outcome (CO)
1	Understand and remember the concept of food groups and their functions
2	Know about pulses and grams
3	Familiarize with milk and beverages.
4	Understand and remember the concept of meat.

**UNIT-I (5 Hours )**

Food groups: Basic 4, 5&7 food groups. Functional food groups-energy yielding, body building and protective foods (only sources and not properties and functions). Food Pyramid, My Plate. Study of various cooking methods - Boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure. Cereals - composition of rice, wheat, effects of cooking on parboiled and raw rice, types of starch, principles of starch cookery, gelatinization. Food group- Grouping of foods, discussion on nutritive value.

**UNIT-II (5 Hours )**

Pulses and grams – Varieties of pulses & grams, composition, nutritive value, cooking quality of pulses, germination, and its effect. Vegetables - Classification, composition, nutritive value, selection and preparation for cooking, methods and principles involved in cooking. Fruits - Composition, nutritive value, changes during ripening, methods and effects of cooking, enzymatic browning.

**UNIT -III (5 Hours )**

Beverages - Classification, nutritive value, Milk based beverages- methods of preparing tea and coffee, fruit-based beverages and preparation of carbonated non – alcoholic beverages. Spices and Condiments - Uses and abuses. Fats and Oils - Types of oils, function of fats and oils, shortening effects of oil, smoking point of oil, factors affecting absorption of oil. Sugar cookery- Stages of sugar cookery, crystallization and factors affecting crystallization.

**UNIT-IV (5 Hours )**

Milk - Composition, nutritive value, kinds of milk, pasteurization and homogenization of milk, changes in milk during heat processing, preparation of cheese and milk powder

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Egg - Structure, composition, classification, nutritive value, uses of egg in cookery, methods of cooking, foam formation and factors affecting foam formation.

**UNIT–V ( 5 Hours )**

Meat -Structure, composition, nutritive value, selection of meat, post mortem changes in meat, aging, tenderness, methods of cooking meat and their effects. Poultry – types, composition, nutritive value, selection, methods of cooking.

Fish - Structure, composition, nutritive value, selection of fish, methods of cooking and effects.

**Unit-VI (5 Hours )**

Food evaluation (Subjective and objective)

**Reference Books:**

1. Food science, Chemistry and Experimental foods by M. Swaminathan.
2. Food Science by Norman.N.Potter.
3. Experimental study of Foods by Griswold R.M.
4. Food Science by Helen Charley.
5. Foundation of Food Preparation by A.G. Peckam.
6. Modern Cookery for teaching and trade, volume I&II ,Thangam Philip. Orient Longmans Ltd.
7. Food Fundamentals by Mac Williams, John Willy and son's, NewYork.
8. Food Facts & Principles by Shakuntala manay &ShadakhraSwamy.
9. Food Science by Srilakshmi , second edition,2002.

**FYBDN 292 Food Science Practical:**

**2 credits, Total hours : 30 hours + 20 hours self-paced practice**

1. Measuring ingredients : Methods of measuring different types of food stuffs .
2. Edible portion: Determination of edible portion percentage of different foods (mention name of foods).
3. Cooking methods Moist heat methods – (i) boiling, simmering , steaming, & Pressure cooking, (ii). Dry heat methods – baking. (iii), Fat as a medium for shallow cooking and deep fat frying.

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4. Methods of cooking and preparations- cereals, pulses (soaked and unsoaked), vegetables, germination & fermentation . Preparation of soups and salads. Prevention of darkening in fruits & vegetables, milk, and milk product ( curd, homemade cheese, flocculation).
5. Beverages: Preparation of hot beverages- coffee, tea. Preparation of cold Beverages-fruit drinks & milkshakes.