

**KURUKSHETRA UNIVERSITY, KURUSHKhetRA**  
**(‘A+’ Grade NAAC Accredited)**  
**Department of Home Science**



**Programme: M.Sc. Home Science (Food, Nutrition and Dietetics)**  
**under CBCS-LOCF Pattern**  
**W.e.f. 2020-21**



**KURUKSHETRA UNIVERSITY, KURUKSHETRA**  
(‘A+’ Grade NAAC Accredited)  
**Department of Home Science**  
**M.Sc. Home Science (Food, Nutrition and Dietetics)**

## **INTRODUCTION**

The Department of Home Science, Kurukshetra University, Kurukshetra, offers M.Sc. in Food, Nutrition and Dietetics. The aim of the programme is to foster a team of experts who can generate nutrition awareness to promote healthy lifestyle among the masses. The courses in the programme are planned so as to augment the fundamental aptitude of learners in the fields of human nutrition, food service management, public health nutrition and clinical dietetics etc. The curriculum offers a robust theoretic background and experimental learning is also promoted through field trainings and practicals. This programme targets to reinforce the research expertise of learners to allow them to grow into academicians and researchers in the field of food science, nutrition and dietetics.

### **Program Outcomes (POs) for PG courses of Faculty of Life Sciences**

- PO1. To acquaint students with recent knowledge and techniques in basic and applied biological sciences.
- PO2. To develop understanding of organismal, cellular, biochemical and environmental basis of life.
- PO3. To provide insight into ethical implications of biological research for environmental protection and good laboratory practices and bio safety.
- PO4. To develop problem solving innovative thinking with robust communication and writing skills in youth with reference to biological, environmental and nutritional sciences.
- PO5. To understand application of biotic material in health, medicine, food security for human wellbeing and sustainable development.
- PO6. To impart practical and project based vocational training for preparing youth for a career in research and entrepreneurship in fields of life sciences for self-reliance.

### **Programme Specific Objectives:**

The objectives of M.Sc. Food, Nutrition and Dietetics programme are:

- To make the students comprehend the theories of nutritional biochemistry, food science, clinical dietetics and public health nutrition.
- To assist the learners in acquiring the methods of assessment of human nutrition requirements and diet planning.
- To relate the application of concepts of the above-mentioned areas to laboratory settings.
- To comprehend the implementation of clinical nutrition, to communicate the health promotion, food science and food service management.

- To advance knowledge and improve abilities for monitoring, planning and management of public health nutrition programmes executed by the government.
- To gain expertise to carry out methodical investigation in the areas of public health nutrition, food science and clinical nutrition.

### **Programme Specific Outcomes:**

The programme equips students to grow into experts who can work as nutritionists, dieticians and researchers. After completing this programme the learner will be able to:

PSO1. Evaluate nutrition status and design suitable diets.

PSO2. Use the information about nutrition in clinical conditions and health promotion communications.

PSO3. Work in the arena of public health nutrition as program organizers and supervisors.

PSO4. Work as nutrition experts and quality assurance specialists.

PSO5. Run a food service institution.

PSO6. Apply theoretic knowledge and practical exercises for investigation in the arena of public health nutrition, food science and clinical nutrition.

### **Home Science M.Sc. (Food, Nutrition and Dietetics)**

*Eligibility (Passed one of the following examinations from this University or any other recognized University)*

Candidate who has passed one of the following examinations with any field of specialization, obtaining at least 50% marks in aggregate: B.Sc. (Home Science)/B.Sc. (Home Science) with Honours /B.Sc. Clinical Nutrition and Dietetics/B.Sc. Human Nutrition & Dietetics/B.Sc. Nursing.

**OR**

Bachelor of Science with Home Science/ Botany/ Zoology/ Genetics/ Biochemistry/ Microbiology/ Biotechnology/ Food Technology/ Food Microbiology/ Food Sc./ Food Processing as one of the main subjects.

**Note:** A candidate who has passed B.Sc. (Agriculture) or B.A. with Home Science as one of the main subjects or B.A. with any subject combination is not eligible for admission to M.Sc. (HomeScience) course for any field of specialization

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**  
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**Scheme of Examinations for M.Sc. Home Science (Food, Nutrition and Dietetics) under CBCS-LOCF  
 w.e.f. 2020-21 in Phased Manner for UTD only**

**Semester-1**

<b>Paper Code</b>	<b>Title of Paper</b>	<b>Type of Paper</b>	<b>Hours/Week</b>	<b>Credits</b>	<b>Marks(Ext+Int)</b>	<b>Total</b>	<b>Duration of exam</b>
FND-101	Advanced Human Nutrition-I	Core	4	4	80+20	100	3
FND-102	Advanced Nutritional Biochemistry-I	Core	4	4	80+20	100	3
FND-103	Food Science-I	Core	4	4	80+20	100	3
FND-104	Food Service Management-I	Core	4	4	80+20	100	3
FND-105	Practical:Advanced Human Nutrition and Advanced Nutritional Biochemistry -I	Core	8	4	80+20	100	3
FND-106	Practical: Food Science and Food Service Management-I	Core	8	4	80+20	100	3
<b>Total</b>				<b>24</b>		<b>600</b>	

## Semester-2

<b>Paper Code</b>	<b>Title of Paper</b>	<b>Type of Paper</b>	<b>Hours/Week</b>	<b>Credits</b>	<b>Marks (Ext+Int)</b>	<b>Total</b>	<b>Duration of exam</b>
FND-201	Advanced Human Nutrition-II	Core	4	4	80+20	100	3
FND-202	Advanced Nutritional Biochemistry-II	Core	4	4	80+20	100	3
FND-203	Food Science-II	Core	4	4	80+20	100	3
FND-204	Food Service Management-II	Core	4	4	80+20	100	3
FND-205	Seminar	Core	1	1	25	25	1
FND-206	Nutrition for Holistic Health/Any other MOOC Course available on SWAYAM Portal	Open* elective	2	2	40+10	50	3
FND-207	Practical: Advanced Human Nutrition and Advanced Nutritional Biochemistry-II	Core	8	4	80+20	100	3
FND-208	Practical: Food Science and Food Service Management-II	Core	8	4	60+20+20**	100	3
<b>Total</b>				<b>27</b>		<b>675</b>	

\*will be offered to the students within faculty.

\*\*Viva-voice of the training of one month in Food Processing unit & its report.

### Semester-3

Paper Code	Title of Paper	Type of Paper	Hours/Week	Credits	Marks (Ext+Int)	Total	Duration of exam
FND-301	Clinical Dietetics-I	Core	4	4	80+20	100	3
FND-302	Public Health Nutrition-I	Core	4	4	80+20	100	3
FND-303	Research Methods, Statistics and Computer Applications	Core	4	4	80+20	100	3
FND-304	Food Microbiology	Elective	4	4	80+20	100	3
FND-305	Food Safety & Quality Control						
FND-306	Human Physiology						
FND-307	Nutrition During Life Cycle/Any other MOOC Course available on SWAYAM Portal	Open* elective	2	2	40+10	50	3
FND-308	Seminar	Core	1	1	25	25	1
FND-309	Clinical Dietetics-I	Core	8	4	80+20	100	3
FND-310	Public Health Nutrition-I	Core	8	4	80+20	100	3
<b>Total</b>				<b>27</b>		<b>675</b>	

\*will be offered to the students within faculty.

### Semester4

Paper Code	Title of Paper	Type of Paper	Hours/Week	Credits	Marks (Ext+Int)	Total	Duration of exam
FND-401	Clinical Dietetics-II	Core	4	4	80+20	100	3
FND-402	Public Health Nutrition-II	Core	4	4	80+20	100	3
FND-403	Physical Fitness & Sports Nutrition	Core	4	4	80+20	100	3
FND-404	*Dissertation	Elective	4	4	80+20	100	3
FND-405	Food Toxicology						
FND-406	Food Processing and Technology						
FND-407	Clinical Dietetics -II	Core	8	4	60+20+20**	100	3
FND-408	Public Health Nutrition-II	Core	8	4	80+20	100	3
<b>Total</b>				<b>24</b>		<b>600</b>	

\*Dissertation subject to the condition that the student has obtained 70% or more marks after II<sup>nd</sup> Semester (M.Sc1st year).

\*\* Viva-voice of the training of 45 days in hospitals & its report.

**Total Credits =102**

**Total Marks =2550**

**M. Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester -I**  
**Core**  
**Paper -FND-101**  
**Advanced Human Nutrition –I**

Total Marks: 100  
External: 80  
Internal: 20  
Duration of Exam: 3 hrs  
Credit- 4

**Note:**

- Examiner will set nine questions in all.
- All the questions will carry equal marks.
- Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
- Eight questions, two questions from each unit (I, II, III & IV) will be set.
- The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

**Objectives:**

- To familiarize the student about physiological and metabolic role of various nutrients,
- To learn the requirement & interaction of various nutrients.

**Course Outcomes:**

After successful completion of this course students will be able to know about:

- FND101 1. Physiological and metabolic role of various nutrients and their interactions in human nutrition.
- FND101 2. Understand the basis of human nutritional requirement and recommendations through the life cycle.
- FND101 3. Learn the actions of nutrients and their implications.
- FND101 4. Familiarize with the recent advances in nutrition.

**Unit-I**

1. **Carbohydrates:** Types, classification, digestion, absorption and transport- review. Chemical composition and physiological effect of dietary fiber, fructo-oligosaccharides and resistance starch. Glycemic index of foods. Sweeteners- nutritive and non-nutritive. Role of carbohydrates in health and disease, health significance of carbohydrates.
2. **Lipids:** Classification, digestion, absorption, transport – review. Functions of EFA. Role of n-3, n-6 fatty acids in health and disease. Requirements of total fat and fatty acids. Trans fatty acids. Prostaglandins, health significance of lipids.

**UNIT- II**

3. **Proteins:** Classification, digestion, absorption and transport - review. Protein quality, methods of evaluating protein quality. Protein and amino acid requirements. Protein as an energy source. Therapeutic applications of specific amino acids: Branched chain, glutamine, arginine, homocysteine, cysteine, taurine, health significance of proteins.

- 4. Interaction of Nutrition, Immunity & Infection:** Host defense mechanism and nutrients essential in the development of immune system. Effect of infection on the nutritional status of an individual, impact of malnutrition on immunity and occurrence of infection, effect of infection on nutritional status.

### UNIT III

- 5. Vitamins:** Historical background, food sources, absorption and transport, biochemical function, RDA, physiological, pharmacological and therapeutic effects, toxicity and deficiency with respect to the following:
- Fat soluble vitamins: A, D, E & K.
  - Water soluble vitamin: Thiamine, riboflavin, niacin, biotin, pyridoxine, folic acid, pantothenic acid, ascorbic acid, cyanocobalamin, choline, inositol.

### UNIT- IV

- 6. Minerals:** (Note: For each nutrient sources bioavailability, function, requirements, RDI/ESADDI, deficiency and toxicity, interactions with other nutrients are to be discussed).
- Macro minerals: calcium, phosphorus, magnesium, sodium, potassium and chloride.
  - Micro minerals: Iron, copper, zinc, manganese, iodine, fluoride.
  - Trace minerals: Selenium, cobalt, chromium, vanadium, silicon, boron, nickel.

#### Books Recommended:

- Modern Nutrition in; Health and Disease – Goodheart, R. S.
- Recommended dietary allowance for Indian – I.C.M.R., 1980
- Nutrition and Development- Winick 1973, Univ. of Columbia.
- Biology of Nutrition – Eclames 1972, Palaniuma Press
- Foods & Nutrition – Krause 1972, Saunders.
- Proteins and Human Foods 1970, Lowrie, Avi. Pub. Co.
- Nut. & Physical; fitness-BoGert L.J.
- Principles of Nut. – Wilson, L.D. and Fisher. K.H.
- Standardised diets for Hospital – National Nut. Advisory Committee
- Nutrition in Health & Disease – Cooper, L. Barher, L. Mitchell, Hand Rynheraen.
- Nutrition A comprehensive: Beaton and McHanery, Treatise Vol-1, II, & III.
- Human Nut. & Dietetics- Davidson S., Passmore, R., Brook, J.E. and Truswell.
- Foods and Nut. - Rankin, W. Munn. Hildath E.N.
- Iron deficiency – Holiberth, H.C. Harvorth, vannotti, N.Y.
- Trace Elements in Human and Animal Nut. – Underwood, N.Y.
- Essays in Biochemistry – Samul Graff, Tandon Book Dept. Sec. –16
- Diabetes Mellitus- The Williams and Wilkinas Co., U.S.A.



**Attainment of Course Outcomes (COs):**

Sr. No.	Course Outcomes	Methods for attainment of COs
1.	Physiological and metabolic role of various nutrients and their interactions in human nutrition.	Power Point Presentations and discussions
2.	Understand the basis of human nutritional requirement and recommendations through the life cycle.	Power Point Presentations and discussions
3.	Learn the actions of nutrients and their implications.	Power Point Presentations and discussions
4.	Familiarize with the recent advances in nutrition.	Power Point Presentations and discussions

**CO-PO matrix for the course FND101 (Advanced Human Nutrition-I)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND101.1	3	3	3	3	3	3
FND101.2	3	3	2	3	3	3
FND101.3	2	3	3	3	3	3
FND101.4	3	3	3	3	3	3
Average	2.75	3	2.75	3	3	3

**CO-PSO matrix for the course FND101 (Advanced Human Nutrition-I)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND101.1	3	3	3	3	3	3
FND101.2	3	3	3	2	3	3
FND101.3	3	2	3	3	3	3
FND101.4	3	3	3	3	3	3
Average	3	2.75	3	2.75	3	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester –I**  
**Core**  
**Paper - FND-102**  
**Advanced Nutritional Biochemistry –I**

Max. Marks: 100  
Theory Exam: 80  
Int. Assessment: 20  
Duration of Exam: 3 hrs  
Credit- 4

**Note:**

- Examiner will set nine questions in all.
- All the questions will carry equal marks.
- Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus
- Eight questions, two questions from each unit (I, II, III & IV) will be set.
- The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

**Objectives: -**

- To facilitate the learners about fundamentals of nutritional biochemistry and its other aspects arming them with knowledge for better understanding of food, nutrition and dietetics.

**Course Outcomes:**

This course will enable the students to:

- FND102 1. Expand the nutritional biochemistry knowledge acquired at the undergraduate level.
- FND102 2. Understand the fundamentals of energetics of biochemical reactions.
- FND102 3. Comprehend the different aspects of carbohydrates, lipids, proteins, enzymes and nucleic acids as biomolecules.
- FND102 4. Know the mechanism of action of hormones.
- FND102 5. Learn about basic idea about nutrigenomics and nutraceuticals.

**Unit-I**

- 1. PRINCIPALS OF BIOENERGETICS-** Concept of free energy, Oxidation and reduction, concept of cell, high energy compounds (ATP, PEP, and Phosphogens), role of ATP/ADP cycle in transfer of high energy phosphates, concept of coupled reactions, equilibrium & non- equilibrium reactions, committed steps, caloric homeostasis & futile cycles.
- 2. CARBOHYDRATES-** Definition, classification. Monosaccharides: Classification, occurrence, structure, stereoisomerism (DL and RS systems), optical isomerism and chemical reactions of the functional groups, derivatives of monosaccharides- deoxy sugars and amino sugars. Disaccharides of nutritional importance (sucrose, maltose, lactose), Polysaccharides- Homopolysaccharides- starch, glycogen, cellulose, Heteropolysaccharides- glycoprotein, proteoglycans, mucopolysaccharides, pectins.

## Unit-II

- 3. LIPIDS-** Definition, classification. Structure, properties and functions of fatty acids (including essential fatty acids) Trans fatty acids, prostaglandins,acylglycerols, phospholipids, sphingolipids, glycolipids, steroids (including role of cholesterol). Chemical composition and biological role of lipoproteins, Characterization of fats- saponification, iodine, acid, acetyl and peroxide value.
- 4. AMINO ACIDS AND PROTEINS-** Common structural features, classification based on the nature of R group, non-protein amino acids, essential amino acids and titration curves of monoamino-monocarboxylic, monoamino-dicarboxylic and diamino-monocarboxylic acids. Peptide bond, biological role of proteins, classification of proteins, levels of protein structure- primary, secondary (super secondary elements in brief), tertiary and quaternary structure, forces stabilizing protein structure, denaturation of proteins.

## Unit-III

- 5. ENZYMOLOGY-** General Characteristics, classification and nomenclature, coenzyme, cofactor, prosthetic group, concept of holoenzyme and apoenzyme, units of enzyme activity, Multienzyme systems and multifunctional enzymes with specific examples and significance,Enzyme kinetics- Michaelis-Menten and Lineweaver-Burk equation for monosubstrate reactions,  $K_m$ ,  $k_{cat}$  (turnover number), bisubstrate reactions.
- 6. MECHANISM OF ACTION OF HORMONES-**Classes of hormones, signal transduction and intracellular messengers, chemistry and functions of thyroid, parathyroid, adrenal, pancreatic, gastric and reproductive hormones; hypothalamus and pituitary, hormone replacement therapy

## Unit-IV

- 7. NUCLEIC ACIDS-** Nitrogenous bases, experimental proof of DNA and RNA as genetic material, Chargaff's rules, double helical model of DNA (A, B and Z), DNA packaging, types of RNA and their functions.
- 8. Nutrigenomics and Nutraceuticals.**

### Books Recommended

1. Harper's Biochemistry- Robert K. Murray
2. Textbook of Biochemistry- West and Todd
3. Bio chemical aspect of Nutrition – S.X.C.- Okoyo
4. Food Chemistry – O.R. Fennema
5. Biochemistry– Voet and Voet
6. Principles of Biochemistry – A.L. Lehninger
7. Outlines of Biochemistry- E. E. Conn
8. Practical Clinical Biochemistry- Harold Varley

**Attainment of Course Outcomes (COs):**

Sr. No.	Course Outcomes	Methods for attainment of COs
1.	Expand the nutritional biochemistry knowledge acquired at the undergraduate level.	Class room lectures and discussions
2.	Understand the fundamentals of energetics of biochemical reactions.	PPT presentations and discussions
3.	Comprehend the different aspects of carbohydrates, lipids, proteins, enzymes and nucleic acids as biomolecules.	Class room lectures and power point presentations
4.	Know the mechanism of action of hormones.	PPT presentations and discussions
5.	Learn about basic idea about nutrigenomics and nutraceuticals.	Class room lectures and discussions

**CO-PO matrix for the course FND102 (Advanced Nutritional Biochemistry-I)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND102.1	3	2	3	3	3	3
FND102.2	3	3	3	2	3	3
FND102.3	3	3	3	3	3	3
FND102.4	3	3	3	3	3	3
FND102.5	3	3	3	3	3	3
Average	3	2.8	3	2.8	3	3

**CO-PSO matrix for the course FND102 (Advanced Nutritional Biochemistry-I)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND102.1	3	3	3	3	3	3
FND102.2	2	3	3	2	3	3
FND102.3	3	3	3	3	3	3
FND102.4	3	3	3	3	3	3
FND102.5	3	3	3	3	3	3
Average	2.8	3	3	2.8	3	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS**

**Semester –I**

**Core**

**Paper –FND-103**

**Food Science-I**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3 hrs

Credit- 4

**NOTE:**

- Examiner will set nine questions in all.
- All the questions will carry equal marks.
- Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
- Eight questions, two questions from each unit (I, II, III & IV) will be set.
- The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

**Objectives:**

- To learn about the basic concepts and composition of food.
- To provide the knowledge about the principles of food science in various food preparations.

**Course Outcomes:**

After successful completion of this course students will be able to:

- FND103 1. Familiarize with changes occurring in various foodstuffs as a result of processing and cooking.
- FND103 2. Use the theoretical knowledge of food science in day-to-day life.

**Unit-I**

1. **Relation of cookery to colloidal chemistry:** Definition of colloidal system, altering degree of dispersion, Hydrophilic and Hydrophobic colloids, stabilization of colloidal systems, properties i.e. surface tension, adsorption, foam formation, rheology, gel, formation and emulsions.
2. **Fermentation process, merits and demerits, fortification process, merits, types and nutritional importance of fortified foods.**

**Unit-II**

**3. Starch Cookery:**

- a) Sources, types and uses of starch, gelatinization.
- b) Flours- Composition and baking qualities. Batters and dough (chapatti and poori), Leavening agents: biologically and chemically leavened products.
- c) Cooking and parboiling of rice.

4. **Sugar Cookery:** Introduction, types, uses and properties of crystallization of sugar, stages of sugar cookery, physical and chemical properties of sugar, sweetness index, types of honey and its products, fondant, fudge, caramel and brittles.

### Unit- III

5. **Fats and Oils:** Sources, structure and type of fats, physical & chemical properties and cooking uses of fats and oils. Absorption of fat. Changes during storage, fat deterioration and antioxidants.
6. **Nuts and Oilseeds:** Composition, classification, nutritional value, Oil extraction and by-products, uses and storage of oil seeds, toxins in nuts and oil seeds.

### Unit –IV

7. **Beverages:** Classification and types of beverages. Some major beverages such as coffee, tea, cocoa, malted drinks.
8. **Spices and Condiments:** Composition, functions of spices, nutritional importance of Indian spices and condiments.
9. **Sensory Evaluation:** Sensory characteristics of food: appearance, colour, flavor, odour, taste, mouth feel and texture, objective and subjective evaluation.

#### BOOKS RECOMMENDED:

1. Experimental Cookery: Low Bells.
2. Food Selection and Preparation: Sweetman, M.D.
3. Handbook of Food Preparation: A.N. Hime Ec. Asso.
4. Our Food: Swaminathan, M, and Bhagiam, R.K.
5. Experimental Foods: Swaminathan
6. Food Science and Application: L Paul, C. Pauling.
7. Food Science: Mudami, S.R. & Rao, S.M. 1994, Wiley Eastern Ltd. New Delhi
8. Food Facts & Principles: Maney N. S. & Shudarshan Swamy M. 1966. New Age International Pub. N. Delhi

#### Attainment of Course Outcomes (COs):

Sr. No.	Course Outcomes	Methods for attainment of COs
1.	Familiarize with changes occurring in various foodstuffs as a result of processing and cooking.	Power Point Presentations, discussions and demonstration
2.	Use the theoretical knowledge of food science in day to day life.	Power Point Presentations, discussions and demonstration

**CO-PO matrix for the course FND103 (Food Science-I)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND103.1	3	3	3	3	3	2
FND103.2	3	3	2	3	3	3
Average	3	3	2.5	3	3	2.5

**CO-PSO matrix for the course FND103 (Food Science-I)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND103.1	2	3	3	3	3	3
FND103.2	3	3	3	3	2	3
Average	2.5	3	3	3	2.5	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester –I**  
**Core**  
**Paper –FND-104**  
**Food Service Management –I**

Total Marks: 100  
External: 80  
Internal: 20  
Duration of Exam: 3 hrs  
Credit- 4

**NOTE:**

- Examiner will set nine questions in all.
- All the questions will carry equal marks.
- Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
- Eight questions, two questions from each unit (I, II, III & IV) will be set.
- The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

**Objectives:**

- To equip the students about basic abilities and necessary expertise in key areas of institutional food administration.
- To impart necessary expertise to function as a food service manager.

**Course Outcomes:**

After successful completion of this course students will be able to:

- FND104 1. Know about field level experience in Institutional Food Administration.
- FND104 2. Equip with basic grounding in research techniques.

**Unit-I**

**1. Introduction to Food Service Systems:**

- History and development of the food service industry
- Broad categories of catering services; Commercial and Institutional
- Characteristics of the various types of food service units – Canteens, Hostels, Hospitals and Restaurants.

**2. Principles of Institutional food Management**

- Role and functions of management in food service.
- Management tools: Tangible, Intangible tools

**UNIT- II**

**3. Personnel Management: Objectives, importance and need.**

- Principles of manpower planning
- Recruitment, selection and orientation
- Training and motivation, theories and approaches of employees



#### **4. Legal Aspects**

- National and International Labour Laws
- Welfare policies and schemes for employees
- Offences and Penalties

### **Unit –III**

#### **5. Space Organization**

- Planning and design consideration for kitchen and service area
- Space requirements for kitchen and service areas
- Types of kitchens
- Layout of service areas

#### **6. Equipment**

- Types of equipment
- Selection of equipment
- Maintenance of equipment

#### **7. Time and Energy Management**

- Importance of time and energy management
- Types of energy – Human and fuel energy
- Measures for utilization and conservation

### **UNIT- IV**

#### **8. Management of Finance**

- Sources of finance
- Budgets

#### **9. Cost Accounting /Analysis**

- Objectives of food cost control
- Food cost analysis
- Labour cost analysis
- Cost control techniques

#### **BOOKS RECOMMENDED:**

1. Food Service in Institutions – Wood
2. Food Service in Institutions – West, Bessin, Brooks.
3. Handbook of Food Preparations – A.M. Home Economics Association.
4. Food Selection and Preparations – Sweetman, M.D., 4, Mackeller.
5. School Lunch Room Service – Oliver B. Watson.
6. Food service Planning: layout Equipment – Lender H. Ketshevar and Marget E. Terrel.
7. Human Nutrition and Dietetics – Davidson and Passmore

**Attainment of Course Outcomes (COs):**

<b>Sr. No.</b>	<b>Course Outcomes</b>	<b>Methods for attainment of Cos</b>
<b>1.</b>	Know about field level experience in Institutional Food Administration.	Discussions and demonstration
<b>2.</b>	Equip with basic grounding in research techniques.	Power Point Presentations, discussions and demonstration

**CO-PO matrix for the course FND104 (Food Service Management-I)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND104.1	3	3	3	3	3	3
FND104.2	2	3	3	2	3	3
Average	2.5	3	3	2.5	3	3

**CO-PSO matrix for the course FND104 (Food Service Management-I)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND104.1	3	2	3	2	3	3
FND104.2	3	3	3	3	3	3
Average	3	2.5	3	2.5	3	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester –I**  
**Core**  
**Paper- FND-105(Practical)**  
**Advanced Human Nutrition and Advanced Nutritional Biochemistry-I**

Total Marks: 100  
External: 80  
Internal: 20  
Duration of Exam: 3 hrs  
Credit- 4

**Course Objectives: -**

- To acquaint the students about various body parameters.
- To facilitate the students about colorimetry and enzyme assays.

**Course Outcomes:**

This course will enable the students to:

FND105 1. Measure blood pressure, BMI and body fat.

FND105 2. Acquire skills to prepare standard solution.

FND105 3. Estimate biomolecules and minerals.

FND105 4. Assess the enzyme activity.

**a) Advanced Human Nutrition-I**

1. Measurement of Blood Pressure.
2. Measurement of Body fat.
3. Calculation of BMI (Body Mass Index).
4. Estimation of glucose in blood.
5. Estimation of cholesterol in blood.

**b) Advanced Nutritional Biochemistry-I**

1. Preparation of standard solutions.
2. Preparation of buffers using buffer tables and verify pH.
3. Isolation and estimation of casein from milk.
4. Estimation of ascorbic acid in foods.
5. Estimation of calcium, phosphorous and Iron in various food stuffs.
6. Extraction and quantitative estimation of total sugars and reducing sugars from food stuffs.
7. Estimation of proteins in food stuffs.
8. Estimation of activity of alkaline phosphatase in Moong bean seeds.
9. Effect of pH, concentration, time and temperature of incubation on enzyme activity.
10. Estimation of Moisture, ash in the food stuffs.

**Attainment of Course Outcomes (COs):**

Sr. No.	Course Outcomes	Methods for attainment of Cos
1.	Measure blood pressure, BMI and body fat.	Demonstration and discussions
2.	Acquire skills to prepare standard solution.	Demonstration and discussions
3.	Estimate biomolecules and minerals.	Demonstration and discussions
4.	Assess the enzyme activity.	Demonstration and discussions

**CO-PO matrix for the course FND105 (Advanced Human Nutrition and Advanced Nutritional Biochemistry-I)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND105.1	3	3	3	3	3	3
FND105.2	3	3	3	3	3	3
FND105.3	3	3	3	3	3	3
FND105.4	3	3	3	3	3	3
Average	3	3	3	3	3	3

**CO-PSO matrix for the course FND105 (Advanced Human Nutrition and Advanced Nutritional Biochemistry-I)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND105.1	3	3	3	3	3	3
FND105.2	3	3	3	3	3	3
FND105.3	3	3	3	3	3	3
FND105.4	3	3	3	3	3	3
Average	3	3	3	3	3	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS  
Semester –I  
Core**

**Paper- FND-106(Practical)**

**Food Science and Food Service Management –I**

Total Marks: 100

External: 80

Internal: 20

Duration of Exam: 3hrs

Credit:4

**Course Objectives:**

- To perform physical and nutritional analysis of commonly consumed raw and processed food.
- To familiarize students with the techniques and methods used for food processing.
- To equip the students about the work knowledge of different types of food service units such as commercial and noncommercial ones.
- To impart the knowledge about planning and cost analysis of different types of menus.

**Course Outcomes:**

This course will enable the students to:

FND106 1.Learn the chemistry of food groups.

FND106 2.Understand the physical and chemical structure of foods and their components.

FND106 3.Understand the basic principles and applications of food preservation and food processing.

FND106 4.Develop skills for quantity cooking.

FND106 5.Analyze the cost of menu in food service organization.

FND106 6.Standardize the recipes for more than 100 persons.

a) **Food Science-I**

1. Effect of solutes on boiling point of water.
2. Effect of types of water on characteristics of cooked vegetables, pulses and cereals.
3. **Leavened Products:** Fermentation-Use of microorganisms (lactic acid, yeast), steam as an agent, egg as an agent, chemical agents.
4. **Starches, Vegetable Gums and Cereals:** Dextrinization, gelatinization, thickening power. Factors affecting gels. Gluten formation and factors affecting gluten formation.
5. **Sugar and Jaggery Cookery:** solubility and sizes of sugar, stages of sugar cookery, caramelization, factors affecting crystal formation.
6. **Fats and Oils:** Flash point, melting point and smoking point.Role of fats and oils in cookery as: shortening agent, frying medium. Factors affecting fat absorption Permanent and semi-permanent emulsions.
7. **Beverages:** Development & factors affecting quality of beverages.

**b) Food Service Management-I**

1. Market survey of Food service equipment.
2. Evaluation of Food Service units-2 Commercial & non-commercial.
3. Layout analysis of Kitchens of different food service Institutions.
4. Analysis of Food safety and Hygiene.
5. Planning menus for quantity.
  - Banquet
  - Outdoor catering
  - Packed meals
  - restaurant
6. Cost analysis of menus in
  - College canteen
  - Hostel mess
  - Hospitals (private, charitable, govt.)
7. Standardising recipes for 100 servings/ persons

**Attainment of Course Outcomes (COs):**

Sr. No.	Course Outcomes	Methods for attainment of Cos
1.	Learn the chemistry of food groups.	Demonstration and discussions
2.	Understand the physical and chemical structure of foods and their components.	Demonstration and discussions
3.	Understand the basic principles and applications of food preservation and food processing.	Demonstration and discussions
4.	Develop skills for quantity cooking.	Demonstration and discussions
5.	Analyze the cost of menu in food service organization.	Demonstration and discussions
6.	Standardize the recipes for more than 100 persons.	Demonstration and discussions

**CO-PO matrix for the course FND106 (Food Science and Food Service Management –I)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND106.1	3	3	3	3	3	3
FND106.2	3	3	3	2	3	3
FND106.3	3	3	3	3	3	3
FND106.4	3	3	3	3	3	3
FND106.5	3	3	3	3	3	3
FND106.6	2	3	3	3	3	3
Average	2.83	3	3	2.83	3	3

**CO-PSO matrix for the course FND106 (Food Science and Food Service Management –I)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND106.1	3	3	3	3	3	3
FND106.2	3	3	3	3	3	3
FND106.3	3	2	3	3	3	3
FND106.4	3	3	3	3	3	3
FND106.5	3	3	3	3	3	3
FND106.6	3	3	3	3	3	3
Average	3	2.83	3	3	3	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester –II**  
**Core**  
**Paper -FND-201**  
**Advanced Human Nutrition –II**

Total Marks: 100  
External: 80  
Internal: 20  
Duration of Exam: 3 hrs  
Credit- 4

**Note:**

- Examiner will set nine questions in all.
- All the questions will carry equal marks.
- Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
- Eight questions, two questions from each unit (I, II, III & IV) will be set.
- The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

**Objectives:**

- To equip the students about action of nutrients and their implications in the body.
- To know about the recent advances in nutrition.

**Course Outcomes:**

After successful completion of this course students will be able to know about:

FND201 1. Energy content of food.

FND201 2. Determination of energy metabolism.

FND201 3. Body composition, physiology of hunger and various eating disorders.

FND201 4. Interrelationship between drugs and various nutrients.

**UNIT-I**

**1. Energy:** Energy content of food stuffs –unit and determination of gross and physiological energy value of food. Energy expenditure: factors affecting, components of energy requirement, BMR and factors affecting it. Determination of energy metabolism of humans by direct and indirect method. Thermogenesis, Specific Dynamic Action (SDA)

**UNIT-II**

**2. Water:** Water intake and loss, exchange of water in body, effect of low and excess intake of water. Electrolyte (Sodium, Potassium and Chloride): Functions, dietary sources, absorption, transport and excretion, water intake and effect of electrolytes on water balance, obligatory water loss, effects of dehydration.

**UNIT- III**

**3. Body Composition:** General body composition, determination of body water, acid-base balance, extra cellular water, cell mass and body fat. Change in body composition throughout life, Body mass index: formula to calculate BMI, WHR- waist hip ratio.



#### UNIT- IV

**4. Physiology of hunger, Causes of Eating disorders, types of eating disorders, behavioral and clinical signs, prevention and treatment of Bulimia, Anorexia Nervosa, Bing eating disorder..**

**5. Drug-nutrient interaction:** Drug use and nutritional status, effects of drugs on food intake, nutrient absorption and metabolism, effects of food on drug absorption, distribution and metabolism.

**Books Recommended:**

1. Modern Nutrition in Health and Disease – Goodhearth, R. S.
2. Recommended dietary allowance for Indian – I.C.M.R., 1980
3. Nutrition and Development- Winick 1973, Univ. of Calombia.
4. Biology of Nutrition – Eclames 1972, Palaniuma Press
5. Foods & Nutrition – Krause 1972, Saunders.
6. Proteins and Human Foods 1970, Lowrie, Avi. Pub. Co.
7. Nut. & Physical fitness-BoGert L.J.
8. Principles of Nut. – Wilson, L.D. and Fisher. K.H.
9. Standardised diets for Hospital – National Nut. Advisory Committee
10. Nutrition in Health & Disease – Cooper, L. Barher, L. Mitehell, Hand Rynheraen.
11. Nutrition A comprehensive: Beaton and McHanery, Treatise Vol-1, II, & III.

**Attainment of Course Outcomes (COs):**

Sr. No.	Course Outcomes	Methods for attainment of Cos
1.	Energy content of food.	Through class room lectures, power point presentations
2.	Determination of energy metabolism.	Through class room lectures, power point presentations
3.	Body composition, physiology of hunger and various eating disorders.	Through class room lectures, power point presentations
4.	Interrelationship between drugs and various nutrients.	Through class room lectures, power point presentations

**CO-PO matrix for the course FND201 (Advanced Human Nutrition-II)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND201.1	3	3	3	3	3	3
FND201.2	3	3	2	3	3	3
FND201.3	3	3	3	3	3	3
FND201.4	3	3	3	3	3	3
Average	3	3	2.75	3	3	3

**CO-PSO matrix for the course FND201 (Advanced Human Nutrition-II)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND201.1	3	3	3	3	2	3
FND201.2	3	3	3	3	3	3
FND201.3	3	3	3	3	3	3
FND201.4	3	3	3	3	3	3
Average	3	3	3	3	2.75	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester –II**  
**Core**  
**Paper - FND-202**  
**Advanced Nutritional Biochemistry –II**

Max. Marks: 100  
Theory Exam: 80  
Int. Assessment: 20  
Duration of Exam: 3 hrs  
Credit- 4

**Note:**

- Examiner will set nine questions in all.
- All the questions will carry equal marks.
- Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
- Eight questions, two questions from each unit (I, II, III & IV) will be set.
- The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

**Objectives:**

- To understand the interrelationship between different nutrients and their metabolism.
- To provide basic knowledge about molecular processes and biophysical techniques.
- To prepare students for research and field jobs.

**Course Outcomes:**

This course will enable the students to:

FND202 1. Acquire an insight into interrelationships among various metabolic pathways.

FND202 2. Understand the mechanisms adopted by the human body for regulation of metabolic pathways.

FND202 3. Comprehend the different aspects of molecular biology.

FND202 4. Know about the mechanism of metabolism of xenobiotics.

FND202 5. Become proficient for specialization in nutrition.

**Unit-I**

- 1. METABOLISM OF CARBOHYDRATES\***- Review of glycolysis, fate of pyruvate: alcoholic and homolactic fermentation, Pasteur effect, Cori cycle, Pyruvate dehydrogenase complex and its regulation; Reactions, regulation and amphibolic nature of TCA Cycle; Anaplerotic reactions, Hexose monophosphate shunt, Biosynthesis of lactose and sucrose, glycogenesis, glycogenolysis, gluconeogenesis, glyoxalate cycle. Regulation of blood glucose level.
- 2. AMINO ACID METABOLISM\***- Transamination, deamination and decarboxylation reactions; Role of glutamine in ammonia transport; Glucose-Alanine Cycle, urea cycle, amino acids as biosynthetic precursors- biosynthesis of heme, biologically active amines and glutathione.

## Unit-II

- 3. LIPID METABOLISM\***- Beta-oxidation of saturated and unsaturated fatty acids (including brief account of minor pathways of fatty acid oxidation, de novo synthesis of fatty acids, biosynthesis and breakdown of cholesterol, triacylglycerols, Phospholipids, ketone body formation and their utilization, Formation of prostaglandins, prostacyclins, thromboxanes and leukotrienes from arachidonic acid.
- 4. BIOLOGICAL OXIDATION\***- Electron transport chain (ETC): components, operation and inhibitors of electron transport chain, oxidative phosphorylation and its mechanism, P/O and P/H ratio, uncouplers.

## Unit-III

- 5. NUCLEOTIDE METABOLISM AND MOLECULAR BIOLOGY** - Biosynthesis and breakdown of purines and pyrimidines, DNA replication, transcription, translation (prokaryotes & eukaryotes), regulation of gene expression (Prokaryotes), mutagenesis and DNA repair, recombinant DNA technology and genetically modified foods, nutritional regulation of gene expression.
- 6. DETOXIFICATION**- Metabolism of xenobiotics.

## Unit- IV

- 7. ENZYMOLOGY**- Mechanism of enzyme action (acid base catalysis, covalent catalysis, metal ion catalysis, electrostatic catalysis, proximity and orientation effect, preferential binding of the transition state complex, strain and distortion theory) Enzyme inhibition – irreversible(non-competitive, uncompetitive), reversible(competitive), feedback and product inhibition, regulation of enzyme activity by covalent modification, allosteric modification, isoenzymes, Ribozyme and Abzyme, applications of enzymes in medicine and food industry
- 8. BIOPHYSICAL TECHNIQUES**- Chromatography- Column, Thin layer, Paper, Ion exchange, Affinity, Molecular exclusion, GLC and HPLC. Electrophoresis- cellulose acetate and gel electrophoresis, isoelectric focusing. Spectrophotometry- Beer Lambert's Law, determination and application of extinction coefficient. Centrifugation- sedimentation velocity and analytical methods, ultracentrifugation. Immunochemical Methods – RIA, ELISA. Uses of Isotopes in biochemistry.

**\*Regulation of metabolic pathways should be discussed along with.**

### Books Recommended:

1. Harper's Biochemistry- Robert K. Murray
2. Textbook of Biochemistry- West and Todd
3. Biochemistry – Voet and Voet
4. Principles of Biochemistry – A.L. Lehninger
5. Outlines of Biochemistry- E. E. Conn
6. Biochemistry- UshaSatyanarayan

**Attainment of Course Outcomes (COs):**

Sr. No.	Course Outcomes	Methods for attainment of Cos
1.	Acquire an insight into interrelationships among various metabolic pathways.	Through class room lectures, group discussions and power point presentations
2.	Understand the mechanisms adopted by the human body for regulation of metabolic pathways.	Through class room lectures, group discussions and power point presentations
3.	Comprehend the different aspects of molecular biology.	Through class room lectures, group discussions and power point presentations
4.	Know about the mechanism of metabolism of xenobiotics.	Through class room lectures, group discussions and power point presentations
5.	Become proficient for specialization in nutrition.	Through class room lectures, group discussions and power point presentations

**CO-PO matrix for the course FND202 (Advanced Nutritional Biochemistry-II)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND202.1	3	3	3	3	3	3
FND202.2	3	2	3	3	3	3
FND202.3	3	3	3	3	3	3
FND202.4	3	3	3	3	3	3
FND202.5	3	3	3	3	3	2
Average	3	2.8	3	3	3	2.8

**CO-PSO matrix for the course FND202 (Advanced Nutritional Biochemistry-II)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND202.1	3	3	3	3	3	3
FND202.2	3	2	3	3	3	3
FND202.3	3	3	3	3	3	3
FND202.4	3	3	3	3	3	3
FND202.5	3	3	3	3	3	2
Average	3	2.8	3	3	3	2.8

**M.Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester –II**  
**Core**  
**Paper - FND-203**  
**Food Science-II**

Total Marks: 100  
External: 80  
Internal: 20  
Duration of Exam: 3 hrs  
Credit- 4

**NOTE:**

- Examiner will set nine questions in all.
- All the questions will carry equal marks.
- Question No.-1 will be compulsory consisting of 5-10 short type questions(having no internal choice) and spread over the entire syllabus.
- Eight questions, two questions from each unit (I, II, III & IV) will be set.
- The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

**Objectives:**

- To know about the composition of various foods.
- To learn about the significance of Food Science in the Food industry.

**Course Outcomes:**

After successful completion of this course the student will able to:

FND203 1. Describe the composition, types, impact of various processing techniques on different food groups as well as their byproducts.

**Unit-I**

1. **Vegetables and Fruits:** Composition, classification of fruits and vegetables, pigments and acids in vegetables and fruits, browning reaction. Pectic substances: Characteristics, uses, changes during ripening, methods of artificial ripening, testing of pectin, factors affecting jelly formation, loss of nutrients while cooking vegetables and it's solutions.

**Unit-II**

2. **Grams and Dhals:** Composition, methods of processing and cooking, Effect of processing such as roasting, parching, soaking, germination and fermentation. Toxins in pulses.

**Unit –III**

3. **Milk and Milk products:** Composition and components of milk. Milk types. Coagulation of milk protein. Setting of curds, different types of cheese, non-enzymatic browning.  
**Dairy products:** Cultured milk, Yogurt, Butter, Whey, Concentrated and dried products, frozen desserts, dairy product substitutes.

#### Unit -IV

- 4. Eggs:** Structure, composition and selection. Changes during storage and spoilage. Coagulation of eggs protein: proteins in egg white and yolk, egg fat. Egg types. Eggs cooked in shells, poached eggs, and omelets, units of egg quality, egg products: types and advantages.
- 5. Meat:** Structure, constituents and types of meat, meat protein, post-mortem changes, ageing of meat, curing and smoking, meat analogues: types and characteristics, tenderness and juiciness.
- 6. Fish and sea food:** Types and composition, Storage, selection, spoilage and preservation, byproducts and newer products of fish, fish cookery.

#### BOOKS RECOMMENDED:

1. Experimental Cookery: Low Bells.
2. Food Selection and Preparation: Sweetman, M.D.
3. Handbook of Food Preparation: A.N. Hime Ec. Asso.
4. Our Food: Swaminathan, M., and Bhagiam, R.K.
5. Experimental Foods: Swaminathan
6. Food Science and Application: L Paul, C. Pauling.
7. Food Science: Mudami, S.R. & Rao, S.M. 1994, Wiley Eastern Ltd. New Delhi
8. Food Facts & Principles: Maney N. S. & Shudarshan Swamy M. 1966. New Age International Pub. N. Delhi

#### Attainment of Course Outcomes (COs):

Sr. No.	Course Outcomes	Methods for attainment of Cos
1.	Describe the composition, types, impact of various processing techniques on different food groups as well as their byproducts.	Through power point presentations, class room lectures and group discussions

#### CO-PO matrix for the course FND203 (Food Science-II)

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND203.1	3	2	3	3	3	2
Average	3	2	3	3	3	2

#### CO-PSO matrix for the course FND203 (Food Science-II)

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND203.1	3	3	2	3	3	3
Average	3	3	2	3	3	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester –II**  
**Core**  
**Paper - FND-204**  
**Food Service Management-II**

Total Marks: 100  
External: 80  
Internal: 20  
Duration of Exam: 3 hrs  
Credit- 4

**NOTE:**

- Examiner will set nine questions in all.
- All the questions will carry equal marks.
- Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
- Eight questions, two questions from each unit (I, II, III & IV) will be set.
- The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

**Objectives:**

- To impart knowledge about the concept of large-scale cooking techniques.
- To equip students about strategies for pricing, sales and marketing of food products.

**Course Outcomes:**

After doing this course the students will be able to:

FND204 1. Equip basic abilities and necessary expertise to start their own food unit leading to entrepreneurship.

**Unit-I**

**1. Menu Planning**

- Types of menus
- Objectives of menu planning
- Considerations in menu planning
- Steps in Menu planning
- Planning menus for canteens, cafeterias, boarding school, hostel mess and old age homes

**2. Food Service**

- Principles, objectives and scope of food service management.
- Styles of food service in restaurants
- Food service in hospitals
- Food service in institutions

**Unit-II**

**3. Food management**

- Purchasing: principles, purchasing process and methods
- Receiving: receiving process delivery methods and procedure
- Issuing process



#### **4. Food Storage**

- Layout of stores
- Storage procedure
- Inventory management
- Store records

### **UNIT-III**

#### **5. Food Production Management**

- Food production process
- Large quantity cooking techniques
- Holding food

#### **6. Marketing and sales management**

- Marketing strategies
- Sales analysis
- Market promotion

### **UNIT –IV**

#### **7. Safety**

- General safety rules
- Types of accidents
- Accident prevention
- Review of first aid
- Safety tips for employees
- Kitchen equipment safety.

#### **8. Hygiene, Sanitation and food standards**

- Principles of food sanitation, safety and hygiene
- Sources of food contamination
- Food handling practices
- Good manufacturing practices (GMP)
- Good hygiene practices (GHP)
- Food standards
- Waste disposal

#### **BOOKS RECOMMENDED:**

1. Food Service in Institutions – Wood
2. Food Service in Institutions – West, Bessin, Brooks.
3. Handbook of Food Preparations – A.M. Home Economics Association.
4. Food Selection and Preparations – Sweetman, M.D., 4, Mackeller.
5. School Lunch Room Service – Oliver B. Watson.
6. Food service Planning: layout Equipment – Lender H. Ketshevar and Marget E. Terrel.
7. Human Nutrition and Dietetics – Davidson and Passmore

**Attainment of Course Outcomes (COs):**

<b>Sr. No.</b>	<b>Course Outcomes</b>	<b>Methods for attainment of Cos</b>
1.	Equip basic abilities and necessary expertise to start their own food unit leading to entrepreneurship.	Through power point presentations, class room lectures and demonstration

**CO-PO matrix for the course FND204 (Food Service Management-II)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND204.1	3	3	2	3	3	3
Average	3	3	2	3	3	3

**CO-PSO matrix for the course FND204 (Food Service Management-II)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND204.1	3	3	3	2	3	3
Average	3	3	3	2	3	3

**M.Sc. (Foods, Nutrition & Dietetics) CBCS**  
**Semester –II**  
**Open Elective**  
**Paper - FND-206**  
**Nutrition for Holistic Health**

Total Marks: 50  
External: 40  
Internal: 10  
Duration of Exam: 3 hrs  
Credit- 2

**Note:**

- Examiner will set nine questions in all.
- All the questions will carry equal marks.
- Question No.-1 will be compulsory consisting of 5-10 short type questions (having no internal choice) and spread over the entire syllabus.
- Eight questions, two questions from each unit (I, II, III & IV) will be set.
- The candidates are required to attempt five questions in all. Question No -1 will be compulsory, remaining four questions will be attempted by selecting one question from each unit.

**Objectives:**

- To provide basic knowledge regarding food, nutrients & different techniques of cooking.

**Course Outcomes:**

After successful completion of this course students will be able to:

FND206 1. Familiarize with the basic food group system.

FND206 2. Importance of different nutrients in maintaining good health.

**Unit –I**

1. **Food:** Functions of food & classification.
2. **Essential food constituents:** Carbohydrates, Protein, Fats.

**Unit –II**

3. **Food source:** Functions, daily allowances, deficiency and excess intake of followings:
  - Vitamins:** A, D, E, K, B1, B2, B3, C, B12, Folic acid.
  - Minerals:** Calcium, Iron, Iodine, Sodium, Potassium.
  - Enzymes:** Definition, importance and factors affecting enzyme activity.

**Unit –III**

4. **Fiber:** Role of dietary fiber in human nutrition.
5. **Methods of enhancing nutritive value of food stuff.**
  - Importance of enhancing nutritive value of food stuffs.
  - Method of enhancing nutritive value of food stuffs, sprouting, fermentation, fortification and supplementation.

## Unit-IV

**6. Water:** Function of water in the body.

**7. Principles and methods of cooking:** Advantages of cooking of the food. Effect of cooking on different nutrients:

-Moist heat	-Boiling, stewing, steaming
-Dry heat	-Roasting, grilling, baking
-Frying	-Shallow and deep
-Radiation	-Solar and microwave

### Attainment of Course Outcomes (COs):

Sr. No.	Course Outcomes	Methods for attainment of Cos
1.	Familiarize with the basic food group system.	Through class room lectures and PPTs
2.	Importance of different nutrients in maintaining good health.	Through class room lectures and PPTs

### CO-PO matrix for the course FND206 (Nutrition for Holistic Health)

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND206.1	3	3	3	3	3	2
FND206.2	3	2	3	3	3	3
Average	3	2.5	3	3	3	2.5

### CO-PSO matrix for the course FND206 (Nutrition for Holistic Health)

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND206.1	3	2	3	3	3	3
FND206.2	3	3	3	3	2	3
Average	3	2.5	3	3	2.5	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester –II**  
**Core**  
**Paper- FND-207(Practical)**  
**Advanced Human Nutrition and Advanced Nutritional Biochemistry-II**

Max. Marks: 100  
Theory Exam: 80  
Int. Assessment: 20  
Duration of Exam: 3hrs  
Credit- 4

**Course objectives:**

- To understand the principles of various analytical techniques available for nutrition research.
- To familiarize with the applications of the above techniques.

**Course Outcomes:**

This course will enable the students to:

FND207 1. Analyze different parameters of blood/ serum.

FND207 2. Assess food intake of individuals.

FND207 3. Calculate the amount of sodium and potassium in various foods/ drinks.

FND207 4. Apply the biophysical techniques for estimation of amino acids and proteins.

**a) Advanced Human Nutrition-II**

1. Determination of iodine value of given fat sample.
2. Estimation of haemoglobin and RBC.
3. Identification of Blood groups.
4. Assessment of food intake.
5. Anthropometric Measurements for Children and Adults.

**b) Advanced Nutritional Biochemistry-II**

1. **Calcium:** Estimation of calcium in serum.
2. **Phosphorus:** Estimation of inorganic phosphorus in serum.
3. **Protein:** Estimation of albumin, globulin and albumin/globulin ratio in serum.
4. **Enzyme assay:** Estimation of activity of serum alkaline phosphatase and transaminase.
5. **Urea and Creatinine:** Estimation of urea and creatinine in serum.
6. **Minerals:** Determination of Sodium & Potassium of food /drinks through Flame Photometer.
7. Separation of amino acids by paper chromatography, TLC.
8. Separation of proteins by gel electrophoresis.

**Attainment of Course Outcomes (COs):**

Sr. No.	Course Outcomes	Methods for attainment of Cos
1.	Analyze different parameters of blood/ serum.	Through demonstration and presentation
2.	Assess food intake of individuals.	Through demonstration and presentation
3.	Calculate the amount of sodium and potassium in various foods/ drinks.	Through demonstration and presentation
4.	Apply the biophysical techniques for estimation of amino acids and proteins.	Through demonstration and presentation

**CO-PO matrix for the course FND207 (Advanced Human Nutrition and Advanced Nutritional Biochemistry-II)**

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND207.1	3	2	3	3	3	3
FND207.2	3	3	3	3	2	3
FND207.3	3	3	3	3	3	3
FND207.4	3	3	3	3	3	3
Average	3	2.75	3	3	2.75	3

**CO-PSO matrix for the course FND207 (Advanced Human Nutrition and Advanced Nutritional Biochemistry-II)**

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND207.1	3	3	3	3	3	3
FND207.2	3	3	2	3	2	3
FND207.3	3	3	3	3	3	3
FND207.4	3	3	3	3	3	3
Average	3	3	2.75	3	2.75	3

**M.Sc. (Food, Nutrition & Dietetics) CBCS**  
**Semester –II**  
**Core**  
**Paper- FND-208 (Practical)**  
**Food Science and Food Service Management -II**

Max. Marks: 100  
Theory Exam: 60  
Int. Assessment: 20+20  
Duration of Exam: 3hrs  
Credit- 4

**Course Objectives:**

- To develop an understanding of various food processing techniques and methods.
- To gain knowledge and experience about food processing by working in various food industries during internship.
- To equip the students about planning a menu, standardization of recipe and running a cafeteria on large scale.

**Course Outcomes:**

This course will enable the students to:

FND208 1. Learn about processing of different food products, their shelf life and processing techniques.

FND208 2. Understand the sensory evaluation of foods and its application.

FND208 3. Learn about processing, quality control and packaging of different food products through one month internship in food processing industries.

FND208 4. Develop understanding about concept of food service management.

FND208 5. Develop skills in planning different menus according to the different types of food service organizations.

FND208 6. Understand rules and regulations related to hygiene and sanitation for food service units.

**a) Food Science-II**

1. **Fruits and Vegetables:** Pigments: Effects of cooking. Effect of various cooking processes on different characteristics of vegetables. Prevention of enzymatic browning.
2. **Pulses:** Effect of various cooking and processing methods on pulses & their products.
3. **Jams and Jellies:** pectin content of fruits, role of acid, pectin and sugar in jam and jelly formation. Use of gums as emulsifiers/stabilizers.
4. **Milk and Milk Products:** Scalding, denaturation. Effect of acid, salt, alkali, sugar, heat, enzymes, polyphenols on milk. Khoa, curd, paneer, cheese (ripened and unripened).
5. **Egg:** Structure, assessing egg quality. Use of egg in cookery: - Emulsions, air incorporation, thickening, binding, gelling. Method of egg cookery and effect of heat. Egg white foams and factors affecting foams.
6. **Meat and Poultry:** Method affecting tenderness of meat, effect of various methods of cooking and ingredients on colour, volume, texture, flavor, aroma and water holding capacity.
7. **Fish and Sea Food:** Effect of different cooking methods on various fish and seafoods.
8. **Gelatin:** Gelation, gel strength and factors affecting gelation. Ability to foam.

## b) Food Service Management-II

(To be evaluated internally on the basis of regular Practical Classes)

In plant training in Cafeteria – Running cafeteria based on the recipes standardized in I<sup>st</sup> semester.

### Attainment of Course Outcomes (Cos)

Sr. No.	Course Outcomes	Methods for attainment of COs
1.	Learn about processing of different food products, their shelf life and processing techniques.	Through demonstration and hands-on training
2.	Understand the sensory evaluation of foods and its application.	Through demonstration and hands-on training
3.	Learn about processing, quality control and packaging of different food products through one month internship in food processing industries.	Through demonstration and hands-on training
4.	Develop understanding about concept of food service management.	Through demonstration and hands-on training
5.	Develop skills in planning different menus according to the different types of food service organizations.	Through demonstration and hands-on training
6.	Understand rules and regulations related to hygiene and sanitation for food service units.	Through demonstration and hands-on training

### CO-PO matrix for the course FND208 (Food Science and Food Service Management –II)

COs#	PO1	PO2	PO3	PO4	PO5	PO6
FND208.1	2	3	3	3	3	3
FND208.2	3	3	3	3	3	3
FND208.3	3	3	3	3	3	3
FND208.4	3	3	3	3	3	3
FND208.5	3	3	3	3	2	3
FND208.6	3	3	3	3	3	3
Average	2.83	3	3	3	2.83	3

### CO-PSO matrix for the course FND208 (Food Science and Food Service Management –II)

COs#	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
FND208.1	2	3	3	3	3	3
FND208.2	3	3	3	3	3	3
FND208.3	3	3	3	3	3	3
FND208.4	3	3	3	3	3	3
FND208.5	3	3	3	3	3	3
FND208.6	3	3	3	3	3	2
Average	2.83	3	3	3	3	2.83