B SC HOME SCIENCE - NUTRITION AND DIETETICS
(Three Year Regular Programme)
(For those who joined since 2020-2021)

Programme Specific Outcomes:

PSO 1: Develop research skills in the area of Foods, Nutrition and Dietetics aimed at improving the quality of life of individuals and communities.

PSO 2: Prepare students with professional competencies necessary for employment in institutions, industries and organizations related to their field of training or for self-employment and establish entrepreneurial activities in the areas of Foods, Nutrition and Dietetics.

PSO 3: Demonstrate knowledge, application and integration of principles of health promotion and disease prevention with Normal Nutrition, Medical Nutrition Therapy and Public Health Nutrition for varied populations

PROGRAMME STRUCTURE

Sem	Subject Code	Part	Course	Subject Title	Hours/ Week	Credit	CIA	ESE	Total Marks
I	HBLT11/ HBLA11/ HBLIA11/ HBLH11	I	Language-I	Tamil I / Basic Arabic I / Intermediate Arabic / Hindi I	6	6	40	60	100
	HBLG12/ HBLF12	II	Language-II	English I -General / English I - Functional	6	6	40	60	100
	HBNDC11	III	Core - I	Food Science	6	5	40	60	100
	HBNDC12P		Core II	Food Science Practicals	4	3	40	60	100
	HBNDA13		FIRST ALLIED I	Basic Chemistry	6	5	40	60	100
	HBNDE14P	IV	Skill Based Elective	Bakery and Confectionary Practicals	2	2		50	50
				TOTAL	**30**	**27**	**200**	**350**	**550**
II	HBLT21/ HBLA21/ HBL1A21/ HBLH21	I	Language-I	Tamil II / Basic Arabic II / Intermediate Arabic II / Hindi II	6	6	40	60	100
	HBLG22/ HBLF22	II	Language –II	English II - General / English II -Functional	6	6	40	60	100
	HBNDC21	III	Core – III	Human Nutrition	5	4	40	60	100
	HBNDC22P		Core IV	Human Physiology Practicals	3	2	40	60	100
	HBNDA23		FIRST	Human Physiology	6	5	40	60	100

			ALLIED II						
	HBES2	IV	General Interest course I	Environmental studies	2	2		50	50
	HBNDE24P		Skill Based Elective	Home furnishing Practicals	2	2		50	50
	HBNDX2/ HBNDX20		Extra Credit	Food Hygiene and Sanitation / Online Certificate Course		2		100	100
				TOTAL	**30**	**27+2**	**200**	**400+ 100**	**600+ 100**
III	HBNDC31	III	Core - V	Nutritional Biochemistry	6	4	40	60	100
	HBNDC32P		Core VI	Nutritional Biochemistry Practicals	6	4	40	60	100
	HBNDA33		SECOND ALLIED I	Food Microbiology	6	5	40	60	100
		IV	Non –major elective	--	4	2		50	50
	HBNDE34P		Skill Based Elective	Kitchen Garden practicals	3	2		50	50
	HBHR3		General Interest Course II	Human Rights	3	2		50	50
	HBXTN3	V	Extension Activities	NSS/CSS	2	2	100		100
	HBNDX3/ HBNDX30		Extra credit	Marine FoodProcessing / Online CertificateCourse		2		100	100
IV				**TOTAL**	**30**	**21+2**	**220**	**330+ 100**	**550 + 100**
	HBNDC41	III	Core – VII	Nutrition for Life Span	5	4	40	60	100
	HBNDC42P		Core VIII	Nutrition for Life Span Practicals	5	4	40	60	100
	HBNDC43		Core IX	Food Toxicology	5	4	40	60	100
	HBNDA44		SECOND ALLIED II	Human development and family relationships	6	5	40	60	100
		IV	Non-major elective	---	4	2		50	50
	HBNDE45P		Skill Based Elective	Food product development practical's	3	2		50	50

	HBVE4		General Interest Course III	Values and Ethics	2	2		50	50
	HBNDX4/ HBNDX40		Extra Credit	Waste Management in food industries / Online Certificate Course		2		100	100
				TOTAL	**30**	**23+2**	**160**	**390+ 100**	**550+ 100**
V	HBNDC51	III	Core - X	Diet Therapy I	5	4	40	60	100
	HBNDC52P		Core - XI	Diet Therapy I Practicals	3	2	40	60	100
	HBNDC53		Core - XII	Community Nutrition	5	4	40	60	100
	HBNDE5A/ HBNDE5B		Elective I	a. Family Resource Management/ b. Personnel Management	5	5	40	60	100
	HBNDE5C/ HBNDE5D		Elective II	a.Food Service Management / b.Women Entrepreneurship Development	5	5	40	60	100
	HBNDE54P	IV	Skill Based Elective	Food Preservation Practicals	3	2		50	50
	HBWS5	IV	General Interest course IV	Women Studies	3	2		50	50
	HBNDX5/ HBNDX50		Extra credit	Information, Education and communication Materials for Development/Online Course		2		100	100
				Library	1				
				TOTAL	**30**	**24+2**	**200**	**400+ 100**	**600+ 100**
VI	HBNDC61	III	Core – XIII	Diet therapy II	6	4	40	60	100
	HBNDC62P		Core – XIV	Diet therapy IIPracticals	4	3	40	60	100
	HBNDC63		Core – XV	Food Standard and Quality Control	6	4	40	60	100
	HBNDC64P		Core – XVI	Dietetic Internship	4	5	40	60	100
	HBNDE6A/ HBNDE6B		Elective III	a. Food Adulteration / b. Sports Nutrition	5	5	40	60	100
	HBNDE65P	IV	Skill Based Elective	Food Adulteration Practicals	3	2		50	50
	HBSED6		Extra credit	Skills for Employability development		2	100		100
				Library	2				

			TOTAL	**30**	**23+2**	**200+ 100**	**350**	**550+ 100**
			GRAND TOTAL	**180**	**145+ 10**	**1180+ 100**	**2220+ 400**	**3400+ 500**

NON MAJOR ELECTIVE

(All students other than Home science - Nutrition and Dietetics, Home science – FashionDesigning)

Sem	**Subject code**	**Subject Title**	**Hours/ Week**	**Credit**	**CIA**	**ESE**	**Total Marks**
III	HBNM3HS	Food Preservation	4	2		50	50
IV	HBNM4HS	Basic ofInterior Design	4	2		50	50

H/W- Hours/ Week CIA- Continuous evaluation assessment ESE- End Semester Examination.

*For online certification credit alone will be assigned on submission of certificate obtained through recognized MOOCs from National and International Portals.

Core-I Food Science

(For those who joined since 2021-22)

Semester: I **Hours per Week: 6**
Subject Code: HBNDC11/ HBFPC11 **Credits: 5**

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

CO1: Gain basic knowledge of the food groups, food compositions and theirsignificance.
CO2: Learn different methods of cooking foods and gain experience in foodpreparations.
CO3: Acquire knowledge about the changes occurring in various foodstuffs as aresult of processing and cooking.
CO4: Gain knowledge about principles of food preservation and its application infood processing industry.
CO5: Improve knowledge about the nutrients and their importance.
CO6: Understand and improve their skills in different food groups.

Unit I **(18 Hours)**

Introduction to Food: Concept of food, Nutrients, Classification of food, Food groups and uses. Methods of cooking: Objectives, Merits and demerits. Moist heat methods – Boiling, Steaming, Blanching, Poaching, Steaming, Simmering, Pressure cooking. Dry heat methods – Baking, Roasting, Grilling, Parching, Frying – Sautéing, Deep fat, Shallow fat, Microwave cooking and solar cooking**.**

Unit II **(18 Hours)**

Cereals and Millets: Classification, Structure, composition and nutritive value of cereals (Wheat and Rice) and millets (Ragi, fox tail and Jowar), role of cereals and millets.

Cereal and millet cookery: Effect of moist heat- Hydrolysis, Gelatinisation and factors affecting gelatinization, gel formation, retrogradation and syneresis, Effect of dry heat, Role of cereals in cookery

Pulses, Nuts and Oilseeds: Pulses - Classification, Structure, Nutritional Composition, Toxicants and nut allergies. Processing – Soaking, Germination and fermentation and its advantages.

Pulses Cookery - Effect of cooking, factors affecting cooking quality, Role of pulses in cookery.

Unit III **(18 Hours)**

Meat: Classification, Nutritional Composition, Post-mortem Changes, Changes during cooking.

Egg: Types of eggs, Structure, Nutritional Composition, Quality of Eggs, Role of egg in cookery.

Poultry: Classification of Poultry, Nutritional Composition, Cooking Methods.

Seafood: Classification of Fish, Nutritive value, Selection Factors and principles of fish cookery.

Unit IV **(18 Hours)**

Milk and Milk Products: Nutritional Composition, Types of milk. Processing – Pasteurization, Homogenization and Standardization of Milk.

Milk Products - Non fermented and fermented products**,** Changes during cooking and Role of milk in cookery

Fats: Fats and oils - Composition, Smoking Temperature, Rancidity, Role of fats and oils in cookery and different methods used for oil extraction from oil seeds.

Sugars and Jaggery: Classification, Sources, Sugar cookery: Crystallization and factors affecting crystallization; Stages of sugar cookery; Role of sugar and Jaggery in cookery

Unit V **(18 Hours)**

Vegetables and Fruits: Classification, Nutritional Composition, Pigments - Water soluble and fat soluble. Selection and cooking methods, Changes during Cooking - Enzymatic Browning - Causes, Prevention and conservation of nutrients.

Beverages: Types of Beverages and its health benefits. Spices and their medicinal importance.

Text books:

1. Shakuntala Manay. N, Shadaksharaswamy .M, *Food Facts and Principles*, New Age International Publishers, 4th Edition, 2018.
2. Srilakshmi. B, *Food science*, New Age International Publishers, New Delhi, 7th Edition, 2018.

Reference Books:

3. Fellows P J, *Food Processing Technology: Principles and practice,* CRC Wood head Publishing Ltd., Cambridge, 4th edition, 2016.
4. Berk.z, *Food Process Engineering and Technology*, Elsevier Academic Press, Newyork, 3rd Edition, 2018.
5. John M. de Man, *Food process engineering and technology*, Academic Press, Elsevier: London and New York, 1st edition, 2009.

Journals:

1. Journal of Food Science
2. Journal Nutrition and Food Science
3. Journal of Food Science and Technology.

E-Resources

1. https://www.webstaurantstore.com/article/454/types-of-cooking-methods.html (Unit - 1)
2. https://millets.res.in/m_recipes/Nutritional_health_benefits_millets.pdf (Unit-2)
3. https://www.pearsonhighered.com/assets/samplechapter/0/1/3/4/0134204581.pdf (Unit-3)
4. https://www.slideshare.net/ektabelwal/milk-36869317 (Unit-4)
5. https://www.slideshare.net/Supta2013/fruits-vegetables-33840373 (Unit-5)

Core-II Food Science Practicals
(For those who joined since 2021-22)

Semester: I **Hours per Week: 4**
Sub. Code: HBNDC12P /HBFPC12P **Credit: 3**

Course outcomes:

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

CO1: Acquire skills in food preparation techniques.

CO2: Learn microscopic examination in starch foods.

CO3: Understand and improve their skills in food handling techniques.

CO4: Learn changes during cooking in different foods.

List of Experiments:

1. **Principles of Food Safety and Lab Management Techniques**: Measurement of Ingredients, Determination of Edible Portion.

2. **Cereal Cookery:** Microscopic Examination of Starches, Gelatinization of starch

3. **Preparation of Fermented Foods by using Cereals and Millets**: Idli, Appam, Dosai, Bajra Porridge.

4. **Preparation of Granules:** Gluten Formation, Methods of Cooking - coarse and fine cereals.

5. **Different types of cooking methods:** Cooking Quality of Raw and Parboiled Rice by different methods - Pressure Cooker, Straining, Absorption, Steaming and Microwave Cooking.

6. **Pulse cookery:** Factors affecting Pulse Cookery – Hard water, Soft water, Soaking, Addition of acid, Alkali, Enzyme, pressure cooking eg. Any whole gram and any dhal

7. **Egg cookery:** Boiling and Parching, Omelet and Custard, Quality determination of Egg

8. **Meat, fish and poultry:** Methods of Cooking, Common Recipes, Tenderization.

9.**Milk cookery**: Problems in Milk Cookery and their Prevention, Milk preparations: Cheese, Curds, paneer, butter and Milk Kafir.

10.**Frying of Foods in Oil**: Smoking Temperature, Methods of Cooking.

11.**Stages of sugar cookery:** white Sugar, Jaggery ,Palm Jaggery, crystallization of sugar and Sugar Products.

12.**Vegetables and Fruits:** Effect of acid, alkali and over cooking on vegetables containing different pigment and enzymatic browning in vegetables and fruits and any four methods of prevention, Color and Textural Changes on Cooking, Preparation of selected recipes.

13.**Beverages:** Types and Preparation of beverage under the following types- refreshing, nourishing, stimulating, soothing and appetizing.

14.Fireless Cooking- Puffed Rice,Peanut butter balls, Chocolate truffles, Veg Hungcurd Sandwich, Fruit Sushi.

Text Books:

1. Mohini Sethi and Eram S Rao**,** *Food Science – Experiments and Applications,* CBSPublishers, New Delhi, 2nd Edition, 2019.
2. Srilakshmi. B, *Food Science – Laboratory Manual,* Scitech Pub Pvt Ltd, Chennai,6th Edition, 2015.

Reference Books:

3. Fellows P J, *Food Processing Technology: Principles and Practice,* CRC Woodhead Publishing Ltd., Cambridge, 4th edition, 2016.
4. Brown A, *Understanding Food Principles and Preparation*,

Wordsworth Publisher,London, 5th edition, 2014.
5. Gerhard Feiner, *Meat Products Handbook: Practical Science and Technology,*CRC Press, 2006.

Journals:

1. International Journal of Food Science and Technology.
2. Current Nutrition and Food Science.
3. Advance Journal of Food Science and Technology.

E-Resources

1. www.myrecipes.com/recipe/cereal-milk-bars (Ex-2)
2. https://pulses.org/recipes/best-of-india (Ex-6)
3. https://www.slideshare.net/powerofknowledge3/egg-cookery (Ex-7)
4. https://in.pinterest.com/lindaruis/meat-fish-and-poultry/ (Ex-8)
5. https://www.tarladalal.com/recipes-using-milk-doodh-full-fat-milk-buffalo-milk-full-cream-milk-514 (Ex-9)

Core-III Human Nutrition
(For those who joined since 2021-22)

Semester: II **Hours per Week: 5**
Sub. code: HBNDC21 **Credit: 3**

Course Outcomes:

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

CO1: Understand nutritional management in special conditions.
CO2: Appreciate implications of poor dietary and lifestyle practices**.**
CO3: Describe the metabolic role of nutrients and their complex interrelationships.
CO4: Critically evaluate the methodology and derivation of requirements for micronutrients and macronutrient.

Unit I **(15 hours)**

Energy -Definition, Unit of measurement , Direct and indirect calorimeter, Determination of energy value of food, Total energy requirement, Factors affecting physical activity, Basal Metabolic rate, determinants of Basal metabolic rate, Factors affecting basal metabolic rate, Resting energy expenditure, thermic effects of food, factors affecting the thermic effects of food, Recommended allowances for calories, Energy requirements of adults expressed in terms of Reference man and Reference woman, Energy requirements for different age groups.

Unit II **(15 hours)**

Carbohydrates - Definition and composition, Classification of carbohydrate, Source, Digestion and absorption - Regulation of blood sugar, Hormonal controls and functions of carbohydrates in the body.

Dietary Fibre- Definition, Soluble and Insoluble fibres, Sources of fibre, Components, Physiological effects of dietary fibre, Role of fibre in human nutrition.

Unit III **(15 hours)**

Proteins- Definition, Classification, Nutritional classification of proteins and amino acids, Functions, Sources, Digestion, Absorption and evaluation of protein quality

Lipids- Definition, Classification, Functions, Sources, Fatty acid role in food, Digestion and absorption. Essential fatty acids: Role in body fat, functions, source.

Unit IV **(15hours)**

Macro Minerals- Calcium, Phosphorous, Magnesium, Potassium, Sodium and Chloride Distribution in the body; functions, Food sources and requirements effects of deficiency

Micro / Trace Minerals - Iron, Iodine, Zinc, Fluoride and Copper Distribution in the body; functions, Food sources and requirements effects of deficiency.

Unit V **(15 hours)**

Fat Soluble Vitamins- Vitamin A, D, E and K: Functions, requirements, sources and effects of deficiency

Water Soluble Vitamins – Thiamine, Riboflavin, Niacin, Vitamin B6, Folic acid, Vitamin B12 Biotin and Pantothenic acid, Vitamin C: Functions, requirements, sources and effects of deficiency.

Water -Water balance, Water compartment and physiological variation.

Text Books:

1. Srilakshmi B., *Nutrition Science*, New Age International (P) Ltd, Publishers, Fifth multi colour edition, 2019.
2. Mahtab.S.Bamji, Kamala Krishnaswamy and G.N.V Brahmam, *Text Book of Human Nutrition***,** Oxford and IBH Publishing Company, Fourth Edition.2019.

Reference Books:

3. Jim Mann, A. Stewart Truswell., Appetite: *Essentials of Human Nutrition*, Oxford University Press, 2007.
4. Swaminathan, M., Essentials *of Foods and Nutrition, Volume I and II* Ganesh and Co., Madras, 2015.
5. Maurice E. Shils, James A. Olson, Moshe Shike, *Modern Nutrition in health and disease*, Vol. I & II Lea & febiger Philadelphia, A waverly Company, eighth edition, 1994.

Journals:

1. American Journal of Clinical Nutrition
2. British Journal of Nutrition
3. The Indian Journal of Nutrition and Dietetics

E-Resources:

1. http://www.fao.org/3/y5686e/y5686e04.htm
2. https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1467-3010.2007.00616.x
3. https://www.eufic.org/en/whats-in-food/article/what-are-proteins-and-what-is-their-function-in-the-body
4. https://medlineplus.gov/definitions/mineralsdefinitions.html#top
5. https://www.medicalnewstoday.com/articles/195878#the-13-vitamins

Core-IV Human Physiology Practicals

(For those who joined since 2021-22)

Semester: II **Hours per week:** 3

Sub. Code: HBNDA22P **Credit:** 2

Course outcomes:

On successful completion of this course, the Student will able to:

CO1: Learn and Improve basic knowledge on blood analysis and urine analysis

CO2: Understand the basic concepts, processes, and factual information in the areas Of human physiology

CO3: Gain knowledge and develop skills in handling Sphygmomanometer, Sahli's Apparatus.

CO4: Get training on first aid for common emergency procedures.

List of Experiments

Blood Analysis

1. Determination of Haemoglobin
2. Determination of blood group, Clots and RH factor

Urine Analysis

3. Analysis of normal urine
4. Analysis of abnormal constituents in urine
5. Estimation of urine sugar
6. Estimation of urine albumin
7. Estimation of urine bile salt

Demonstrations

8. Clinical examination of B.P
9. Clinical examination of respiratory system
10. Enumeration of arterial pulse
11. Demonstration of first aid

Text Books:

1. Dr.S.Rajan and Mrs. R.Selvi Christy, *Experimental Procedures in Life Sciences*, Anjanaa Book House, Chennai, 1st Edition, 2010.
2. Ochei and kolhatkar, *Medical Laboratory Science Theory and Practice*, Tata MCHill Publication, 4th edition, 2008.

Reference Books:

1. Ramakrishnan S, Sulochana KN, *Manual of medical Laboratory Techniques*, Jaypee Publisher, 1st edition, 2008.
2. Shankarashivaraja, MK Ganesh, *Laboratory Manual for Practical Biochemistry*, Jaypee Publisher, 1st edition, 2008.
3. Ghai CL, A *Textbook of Practical Physiology*, Jaypee Publisher, 7th edition, 2007.

Journals:

1. European Journal of Applied Physiology
2. Journal of Medical Sciences
3. The Journal of Laboratory and Clinical Medicine

E-Resources:

1. https://www.pdfdrive.com/a-textbook-of-practical-physiology-e175223735.html
2. https://www.pdfdrive.com/practical-textbook-of-biochemistry-for-medical-students-e187182647.html
3. https://www.pdfdrive.com/laboratory-protocols-in-applied-life-sciences-d157736244.html
4. https://www.pdfdrive.com/textbook-of-human-physiology-for-dental-students-d187617928.html
5. https://www.pdfdrive.com/essentials-human-physiology-e1543905.html

First Allied I - Human Physiology
(For those who joined since 2021-22)

Semester: II **Hours per week: 6**
Sub. Code: HBNDA23 **Credit: 5**

Course outcomes:
On successful completion of this course, the student will be able to:

CO1: understand of Respiratory, Cardiovascular, Digestive, Excretory, Neurophysiology, and Reproductive System.
CO2: Identify how changes in normal physiology lead to disease.
CO3: Explain how the activities of organs are integrated for maximum efficiency.
CO4: Aware about the common diseases / disorders affecting each system.
CO5: Demonstrate an understanding of physiological terminology.
CO6: Gain an understanding of the causes and diagnosis of disease.

Unit I **(18**hours)

Blood: Composition and Functions, Blood clotting and its Significance, Blood Groups, Blood Transfusion and its Importance.

Lymphatic system- Lymph, Lymph Glands and its Functions.

Unit II **(18 hours)**

Heart: Structure of Human Heart and Functions, Cardiac Cycle, EGC and its Importance.

Respiratory System - Respiratory Organs -Structure and their Functions – Mechanism ofRespiration.

Unit III **(18 hours)**

Digestive System: Brief Description of Organs of the Gastrointestinal Tract Tract, Accessory Organs of Digestion – Structure and function of Liver, Gall Bladder and Pancreas.

Excretory system: Structure and Function of Organs of Urinary System, Mechanism ofUrine Formation.

Skin: Structure, Functions and Regulation of Body Temperature.

Unit IV **(18 hours)**

Nervous system - Elementary Anatomy of Nervous System and Reflexes.

Brain: Brain Anatomy, Functions of Different Parts of the Brain in Brief, Autonomic, Sympathetic and Parasympathetic Nervous System.

Special Senses – Eye, Ear, Nose and Tongue - Structure and Functions.

Unit V **(18 hours)**

Reproductive system: Reproductive System of Male and Female, Menstrual Cycle, Menarche and Menopause, Fertilization.

Endocrine system: Listing of Endocrine Glands and Location, Functions of Thyroid, Parathyroid, Adrenal, Pancreas and Pituitary glands

Text Books:

1. Chatterjee C.C., *Human Physiology*, CBS Publishers & Distributors Pvt. Ltd, New Delhi, 11th edition, 2016.
2. Vidya Ratan, *Handbook of Human Physiology*, Jaypee Brothers Medical Publishers(P) Ltd, New Delhi, 7th edition, 2004.

Reference Books:

3. Muthaiya N M, *Human Physiology*, Jaypee Brothers Medical Publishers(p) ltd, New Delhi, 4th edition, 2006.
4. Guyton A C and Hall J B, *Text Book of Medical Physiology*, W B, Sanders Company, Prime Books (Pvt) Ltd., Bangalore, 9th edition, 2010.
5. Kumar R and Kumar M, *Guide to Prevention of Lifestyle Diseases*, Deep and Deep publications, New Delhi, 2004.

Journals:

1. European Journal of Applied Physiology
2. Journal of Medical Sciences
3. The Journal of Laboratory and Clinical Medicine

E-Resources:

1. https://www.pdfdrive.com/fundamentals-of-anatomy-and-physiology-for-nursing-and-healthcare- students-e176005292.html#
2. https://www.pdfdrive.com/essentials-of-medical-physiology-6th-edition-e32299678.html
3. https://www.pdfdrive.com/essentials-of-anatomy-and-physiology-e25774384.html
4. https://www.pdfdrive.com/textbook-of-human-physiology-for-dental-students-d187617928.html.
5. https://www.pdfdrive.com/essentials-human-physiology-e1543905.html

Extra Credit-V Food Hygiene and Sanitation
(For those who joined since 2021-22)

Semester: II
Sub. Code: HBNDX2 **Credits: 2**

Course Outcomes:
Upon completion of the course, students will have knowledge on
CO1: The principles and practices of hygiene and sanitation applied to the food industry.
CO2: Training of supervisory personnel in sanitation procedures.
CO3: Identification and prevention of potential sources of food contamination.
CO4: Proper standards and procedures for keeping the facilities and equipment sanitary.

Unit I
Introduction to sanitation and hygiene: Food Sanitation and Principles of Sanitation Personnel Hygiene.

Unit II
Personal hygiene & safety:

Necessity for personal hygiene, Health of staff,
Personal appearance, Sanitary practice habits- Protective clothing- Safety at the work place.

Unit III
Sanitary procedures in food industry:
Importance of sanitary procedures in Food processing - Cleaning procedures – Cleaning in place cleaning out place. Cleaning and sanitizing and their importance.

Unit IV
Pest control with respect to food safety:
Importance, Classification of pest, effect of pesticides on pest & their methods of application, precaution to be taken while handling pesticides.

Unit V
Pre-requisite procedures in food industry: Good Manufacturing Practice (GMP), Good Hygienic Practice (GHP), Total Quality Management and Hazard Analysis and Critical Control Points (HACCP).

Text Books:
1. Roday. *Food Hygiene & Sanitation,* McGraw-Hill Education (India) Pvt Limited,2nd edition, 2011.
2. Norman G. Marriott and Robert B. Gravani, *Principles of Food Sanitation*, Aspen publisher, 5th edition, 2006.

Reference Books:
3. Forsythe, S.J. and Hayes, P.R. *Food Hygiene, Microbiology* and HACCP. Gaitersburg, Maryland: Aspen publisher, 1998.
4. Hui, Y.H., Bruinsma, B., Gorham, R., Nip, *Food Plant Sanitation.* New York: Marcel Dekker, 2003.
5. Rees, N. and D. Watson. *International Standards for Food Safety*. Gaitersburg, Maryland: Aspen publisher, 2000.

Journals:
1. Journal of Food Safety and Hygiene

2. Journal of Food Safety
3. Journal of Healthcare and Hygiene

E-Resources:

1. www.food.gov.uk
2. www.foodsafetymagazine.com/
3. www.epathshala.nic.in
4. www.epgp.inflibnet.ac.in

CORE –V Nutritional Biochemistry
(For those who joined since 2021-22)

Semester: III **Hours /week:5**
Subject Code: HBNDC31 **Credits :4**

Course Outcomes:

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

CO1: Develop a clear knowledge of the principles of bio chemistry (as applicable to humannutrition)

CO2: Clear experience into the chemistry of major nutrients and physiologically importantcompounds

CO3: Have an experience on metabolic pathways.

CO4: Have knowledge about the basis of reactivity of biologically relevant molecules andtheir interactions.

Unit - I **(15hours)**

Enzymes- Definition, classification, enzyme specificity, enzyme inhibition, factors affectingenzyme activity, Co-enzymes and Iso-enzymes.

Vitamins- Biochemical functions of Fat soluble and Water-soluble vitamins.

Minerals- Biochemical Functions of Macro nutrients (Ca,P,Mg,Na,K,Cl,S) and Micro nutrients(Fe, Cu, I, Mn, Zn, Mo**, Co, Se, Cr, Fl).**

Unit - II **(15hours)**

Carbohydrates -Definition and Classification, structure, properties of monosaccharides. Monosaccharides- Glucose, Fructose, Galactose. Disaccharides – Maltose, Lactose, Sucrose. Polysaccharides– Starch, Glycogen. Carbohydrates Metabolism- Glycolysis, PDH pathway, TCA cycle, Gluconeogenesis, Glycogenesis, Glycogenolysis, HMP shunt.

Unit - III **(15hours)**

Amino Acids - Definition, Classification, Structure, properties and functions. Metabolism of amino acid – General aspects (Transamination, Deamination, Decarboxylation), Metabolism of ammonia, Urea Cycle.

Proteins - Definition, Classification, Structure, Properties and Functions, Biological importanceof Peptides.

Unit - IV **(15hours)**

Lipids– Definition, Functions, Classifications. Fatty acid - Definition classification, physical and chemical properties. Triglycerides, Phospholipids, glycolipids, (Definition, Functions, Classifications, Properties) Steroid (Elementary Level). Beta oxidation of Fatty acids and Biosynthesis of Fatty acids. Synthesis and utilization of ketone bodies, Cholesterol Metabolism.

Unit - V **(15hours)**

Nucleic acid– Structure of DNA & RNA. Synthesis and breakdown of nucleic acids. Replication, Transcription andTranslation.

Biological oxidation – Electron transport chain, Oxidative phosphorylation. Fluid balance, Electrolyte Balance and Acid – Base Balance.

Text Books

1. Dr.U.Satyanarayana,U.Chakrapani, Biochemistry, Elsiever Publication, 5th Edition, 2017.
2. Dr.Kondreddy Rambabu ,Dr.Pendyala Siva Kumar, Dr.Pendyala Kameswari, Texbookof Biochemistry, AITBS publishers, India, 2nd Edition, 2014.

Reference Book:

3. David L.Nelson , Michael M.Cox Lehninger, *Principle Biochemistry,* Macmillan Publishers,7th Edition, 2017.
4. Victor Rodwell, David Bender , P. Anthony Weil , Peter Kennelly , Kathleen Botham, *Harper's Illustrated Biochemistry,* Lange Publishers, 30th Edition 2017.
5. Donald Voet, Judith G.Voet, *Biochemistry,* John Wiley and Sons Publisher, 4th Edition2016.

Journals:

1. Journal of Biochemistry.
2. Journal of Medical Biochemistry.
3. Journal of Nutritional Biochemistry.

E-Resources:

1. https://www.pdfdrive.com/biochemistry-e187234482.html
2. https://www.pdfdrive.com/textbook-of-biochemistry-for-medical-students-e186671773.html
3. https://www.pdfdrive.com/lippincotts-biochemistry-6th-edition-e41485405.html
4. https://www.pdfdrive.com/textbook-of-biochemistry-e14983388.html
5. https://www.pdfdrive.com/lehninger-principles-of-biochemistry-e189596394.html

CORE VI-Nutritional Biochemistry Practicals
(For those who joined since 2021-22)

Semester: III **Hours /week:5**

Subject Code: HBNDC32P **Credits:4**

Course Outcomes:

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

CO1: Have a clear knowledge on pH and Buffer

CO2: Be familiar with qualitative tests

CO3: Have a clear idea on quantitative determinations

CO4: Perform analysis and evaluate theoretical data in the lab.

Unit - I:

pH and Buffer

1. Measurement of pH
2. Preparation of phosphate Buffer
3. Preparation of Chloride Buffer

Moisture and Ash

4.Determination of the Moisture content

5.5.Determination of Total Ash Content

Unit - II:

Carbohydrates

Qualitative Test:

1.Reaction of Monosaccharide's–Hexoses- Glucose, Fructose, Galactose.

2. Reaction of Di-saccharides - Lactose, Maltose, Sucrose.3. Reaction of Polysaccharides -- Starch, Dextrin.

Quantitative Test:

4. Determination carbohydrate content by Calorimetric method

Unit- III:

Aminoacids

Qualitative Test:

1. Reactions of amino acids – Phenyl alanine, Tyrosine, Tryptophan, Cysteine, Methionine, Arginine.

Quantitative Test:

2. Determination of Protein Content by Calorimetric method.

Unit -IV:

Fats:

Qualitative Test:

1. Reactions of fats and oils – General reactions of lipids (Mustard oil, Coconut oil,Olive oil

Quantitative Test:

2. Determination of Acid value number
3. Determination of Saponification value
4. Determination of Iodine value

Unit - V:

Vitamins and Minerals

1. Estimation of ascorbic acid content of foods by titrimetric method/Calorimetric method.
2. Estimation of calcium in foods by Titrimetric method

Demonstration

Chromatography (Paper):

3. Amino Acids
4. Pigments

Text Books:

1. Ritu Mahajan, *Practical biochemistry (laboratory Manual) for Pharmacy students*,Vayu Education of India, 2009.
2. S. Sadasivam& A.Manickam, *Biochemical Methods*, New age International Publishers 2000.

References:

1. David T Plummer, *An introduction to Practical Biochemistry*, 3rd edition, 1988.
2. Arti Nigam/ Archana Ayyagari , *Lab manual in Biochemistry, Immunology and Biotechnology*, Tata McGraw- Hill Publishing Company Ltd., 2008.
3. Donald Voet, Judith G.Voet, *Biochemistry*, John Wiley and Sons Publisher, 4th Edition2016.

Journals:

1. Journal of Analytical Biochemist ry.
2. The international Journal of Biochemistry.
3. Journal of Nutritional Biochemistry.

E – Resources:

1. https://www.pdfdrive.com/practical-textbook-of-biochemistry-for-medical-students-e187182647.html
2. .https://www.pdfdrive.com/principles-and-techniques-of-practical-biochemistry-and-molecular-biology- e188304313.html
3. https://www.pdfdrive.com/practical-biochemistry-e187196416.html
4. https://www.pdfdrive.com/laboratory-techniques-in-biochemistry-and-molecular-biology-vol -4-e184893598.html
5. https://www.pdfdrive.com/viva-in-biochemistry-e187670022.html

SECOND ALLIED - I
Food Microbiology
(For those who joined since 2021-22)

Semester: III **Hours /week: 6**
Subject Code: HBNDA33 **Credits: 5**

Course outcomes:

This course will enable the students to:

CO1: Know the different types and morphology of microorganisms.
CO2: Understand the factors affecting the growth in controlling the growth curve of microorganisms.
CO3: Able to preserve the perishable and non-perishable foods from microbial contamination and microbial spoilage.
CO4: Comprehend principles of various preservation and control techniques.
CO5: Have an experience on Microbial Growth in Food
CO6: Understand the nature of microorganisms involved in food infections and intoxications.

Unit I **(18 hours)**

Introduction to Food microbiology & Characteristics of Microorganisms in Food: History and Development of Food Microbiology -Definition and Scope of food microbiology. Classification of microorganisms and Nomenclature- Characteristics and

morphology of microorganisms- Bacteria, Fungi, Algae, Yeast and Virus - Importance of microorganisms in food.

Unit II **(18 hours)**

Microbial Growth in Food: Microbial Growth Characteristics- Bacterial growth curve- Factors affecting the growth of microorganisms in food: Intrinsic Factors, Nutrient Content and pH, Redox Potential, Antimicrobial Barrier and Water Activity. Extrinsic Factors: Relative Humidity, Temperature and Gaseous Atmosphere.

Unit III **(18 hours)**

Microbiology spoilage in foods: Microbiology of Plant based Foods- Contamination, Spoilage and Preservation of Vegetables and Fruits, Cereals and Cereal Products, Pulses, Nuts and oilseeds, Sugar and Sugar Products, Microbiology of animal based Foods: Milk and Milk Products, Meat and Meat Products, Sea foods, Egg and Poultry and Canned Foods

Unit IV **(18 hours)**

Control of Microorganisms in Foods: Principles and methods of preservation- High temperature, low temperature, drying, Fermentation- Importance of LAB, Saccharomyces cerevisiae, Radiation, chemical preservatives, Bio preservatives, Hurdle technology, Active packaging, Novel processing technology.

Unit V **(18 hours)**

Food Intoxication and Food infection: Classification of food borne disease, Foods involved, Diseases outbreak, Preventive and control measures.

Intoxication: Botulism and Staphylococcal intoxication.

Infection: Salmonellosis, Clostridium Perfringens illness, Bacillus cereus, Ecoli, Shigellosis, Yearsinia and Streptococcus faecalis.

Text Books:

1. William C. Frazier, *Food Microbiology*, Tata McGraw Hills Publishing Company Limited, Chennai, 2014
2. Jay M.J, *Modern Food Microbiology*, CBS Publishers and Distributors, New Delhi, 4th Edition, 2015.

Reference Books:

3. Matthews.K.R, *Food microbiology an Introduction*, ASM Press, 4th Edition, 2017
4. Adams, MR and Moss, MO, Food Microbiology, New Age International (P) Ltd., New Delhi, 2015.
5. Ray, B. & Bhunia, A, *Fundamental Food Microbiology*, CRC press, 5th Edition, 2018.

Journals:

1. Journal of Food Microbiology
2. Journal of Food & Industrial Microbiology
3. International Journal of Food Microbiology

E-Resources:

1. https://www.pdfdrive.com/food-microbiology-d55747381.html
2. https://www.pdfdrive.com/food-microbiology-e58597702.html

3. https://www.pdfdrive.com/fundamental-food-microbiology-fifth-edition-e175981800.html
4. https://www.pdfdrive.com/food-microbiology-an-introduction-e166783912.html
5. https://www.pdfdrive.com/foodborne-parasites-food-microbiology-and-food-safety-e157137947.html

EXTRA CREDIT -Marine Food Processing
(For those who joined since 2021-22)

Semester: III **Hours /week: 6**
Subject Code: HBNDX3 **Credits: 5**

Course outcomes:
Upon completion of the course, students will be able to
CO1: To learn general about marine.
CO2: To understand the technologies involved in marine food processing
CO3: To get knowledge on food safety and Quality attributes of marine food.
CO4: To learn the nutritional benefits of marine foods
CO5: To learn about food preservation techniques
CO6: To know about the different food packaging methods used in Marine Food Industry

Unit I
Marine Environmental Science: Marine Eco-system, Marine Pollution, Marine Food Sources.

Unit II
Evaluation of Marine Food Qualities: Processing of fish- crab, prawns, seaweeds. Postharvest quality changes, post-harvest losses, Methods for assessing and preventing losses.

Unit III
Microbiology of fish products: Storage and Handling, Preservation – freezing techniques and irradiation process, value addition, preparation of fish products (fermented fish, fish products, fish soups, fish powder, prawn powder and cutlets), seaweed products like pickles and hydrocolloids.

Unit IV
Nutritional benefits of marine resources – fish, fish oil, seaweeds and other marine sources.

Unit V
Packaging and labeling: Importance of packaging and labeling, Packaging functions, Packaging materials, Requisites of good packages.

Text Books:
1. P.S. Meadows, *An Introduction to Marine Science*, Springer Netherlands, 2013.
2. F. Parthiban, *Microbiology of Fish and Fishery Products,* Daya Publishing House, 2018.

Reference Books:
3. P.S. Meadows, *An Introduction to Marine Science***,** Springer Netherlands, 2013.
4. Ioannis S. Boziaris, *Seafood Processing Technology, Quality and Safety,IFST*

Advances in Food Science,Wiley, 2013
5. Ramasamy Santhanam,*Nutritional Marine Life*,Taylor & Francis, 2014.

Journal:

1. Journal of food processing and Technology
2. Journal of Fisheries Science.com
3. Journal of Aquatic Food Product Technology

E-Resources:

1. https://www.slideshare.net/pramodgpramod/marine-pollution-76857615
2. https://www.slideshare.net/ShoebulIslam/methods-of-quality-assessment-of-fish-78011081
3. https://www.slideshare.net/sridevi244/contamination-preservation-spoilage-of-fish
4. https://www.powershow.com/view/12558NDIyM/NUTRITIONAL_VALUE_OF_SEAFOOD_powerpoint_ppt_presentation
5. .https://krishi.icar.gov.in/jspui/bitstream/123456789/25122/1/16_Seafood%20packaging.pdf

CORE VI -Nutrition for Life Span
(For those who joined since 2021-22)

Semester: IV **Hours /week:5**
Subject Code: HBNDC41 **Credits: 4**

Course Outcomes:

This course will enable the students to:

CO 1: To understand the concept of an adequate diet and the importance of meal planning
CO 2: To know the factors affecting the nutrient needs during the life cycle and the RDA forvarious groups.
CO 3: To impart knowledge on the importance of nutrition during life span
CO 4: Explain how dietary needs may change during the lifespan.

Unit I **(15 hours)**

Basic Principles of Meal Planning - Definition, principles involved in meal planning and factors affecting meal planning. Recommended allowance-RDA for Indians, basis for requirement, energy allowance for various activities. General concepts about growth and development through different stages of life.

Unit II **(15 hours)**

Pregnancy and lactation - Nutrition during Pregnancy - Weight gain, physiological changes, nutritional requirements, complications and nutritional problems in pregnancy. Nutrition during Lactation - physiology of lactation, hormonal control. Milk output and factors affecting it, nutritional components of colostrum and mature milk. Nutritional requirementsof lactating women.

Unit III **(15 hours)**

Nutrition during Infancy - Growth and development, factors influencing growth, advantages of breast feeding, breast feeding vs bottle feeding, factors to be considered in

bottle feeding. Weaning Foods - Weaning foods and commercial baby foods. Nutritional requirements of infants, feeding programme. Problems in feeding normal and premature infants.

Unit IV **(15 hours)**

Nutritional needs of pre-school children (1-5 year) - Nutritional and food requirements of preschool children. Factors to be considered while planning meals for pre-school children. Eating problems of children and their management, preparation of supplementary foods using available low-cost foods. **Nutrition for School children** - Nutritional requirement, meal planning for school children, dental caries and packed lunch.

Unit V **(15 hours)**

Nutrition during adolescence – Food and nutrient requirements, changes in growth pattern, puberty, menarche, changes in food habits, binge eating disorder, predisposition to osteoporosis, anaemia, premenstrual syndrome, malnutrition due to early marriage, nutritional programmes.

Nutrition in adulthood – Food and nutrient requirements, changes in consumption pattern - physical, mental and social changes influencing meal pattern.

Nutrition in old age – Food and nutrient requirements, physical, physiological, biological and psychological changes influencing meal pattern.

Text Books:

1. Vinodhini Reddy, PrahladRao, Gouthm Sastry and Kashinath, *Nutrition Trends inIndia NIN***,** Hyderabad, 1993.
2. Srilakshmi,B., *Dietetics* , New Age International Pvt. Ltd, 6th edition, 2010.

References:

3. Madhu S., *Therapeutic Pediatic Nutrition*, Jaypeebrothers medical publishers, 2011.
4. Swaminathan M, *Essentials of Food and Nutrition***,** VolI& II, Ganesh & Co., Madras,2001.
5. Willams S.R. *Basic Nutrition & Diet Therapy*, Mosby, Inc.,St.Louis, 11th edition, 2001.

Journals:

1. Journal of World review of nutrition and dietetics
2. Journal of Nutrition Today
3. Journal of Nutrition and Dietetics

E-Resources:

1. www.scimagojr.com
2. www.foodandnutritionresearch.net
3. www.nutrition.gov
4. https://www.nutrition.org.uk/nutritionscience/life/880-preschoolchildren.html
5. https://pubmed.ncbi.nlm.nih.gov/5803053/

CORE VIII-Nutrition for Life Span Practicals
(For those who joined since 2021-22)

Semester: IV **Hours/week:5**
Subject code: **HBNDC42P** **Credits: 4**

Course Outcomes

This course will enable the students to:

CO 1: Explain nutritional requirements at different stages of the lifespan.

CO 2: Evaluate factors that may affect nutritional status throughout the life cycle.

CO 3: Apply practical guidelines for menu planning and food preparation provision relevant to different stages of the lifespan

CO 4: Know about nutritive value of Indian foods

Unit I **(15 hours)**

Planning menu for Infants

Planning, preparing and serving a meal for an infant of 1-3 years.
Planning and preparing an indigenous weaning mix, Indian Multipurpose food (CFTRI), win food, malted food.

Unit II **(15 hours)**

Planning menu for Preschool children, Pregnant and Lactating Planning, preparing and serving a meal for a preschool child Planning, preparing and serving a meal for a Pregnant Woman Planning, preparing and serving a meal for a Lactating mother

Unit III **(15 hours)**

Planning menu for school going children and adolescents Planning, preparing and serving a meal for a school going childrenPlanning, preparation of any five packed lunches. Planning, preparing and serving a meal for an adolescent girl and boy.

Unit IV **(15 hours)**

Planning menu for Adult and old age

Planning, preparing and serving a meal for an adult (Sedentary, moderate and heavy worker)Planning, preparing and serving a meal for an old age person.

Unit V **(15 hours)**

Planning menu for different income level people

Planning, preparing and serving a meal for low income family, middle income family and high income family.

Text Books:

1. *Nutrient requirements and Recommended Dietary Allowances for Indians*, ICMR, National Institute of Nutrition, Hyderabad, 2002.
2. *Dietary guidelines for Indian,* ICMR, National Institute of Nutrition, Hyderabad,2003.

Reference Books:

3. Swaminathan M, *Essentials of Food and Nutrition*, VolI& II, Ganesh & Co.,Madras, 2000.
4. Willams S.R. Basic *Nutrition & Diet Therapy,* Mosby, Inc.,St.Louis 11th edition , 2001.

5. Gopalan C, RN Ramasastri and S.C Balasubra-mania, *Nutritive value of IndianFoods*, National Institute of Nutrition, Hyderabad1977.

Journals:

1. Journal of World review of nutrition and dietetics
2. Journal of Nutrition Today
3. Journal of Nutrition and Dietetics

E-Resources:

1. www.scimagojr.com
2.www.foodandnutritionrese
arch.net3.www.nutrition.gov
4. https://www.nutrition.org.uk/nutritionscience/life/880-preschoolchildren.html
5. https://pubmed.ncbi.nlm.nih.gov/5803053/

CORE IX -Food Toxicology
(For those who joined since 2021-22)

Semester: IV **Hours /week: 5**
Subject Code: HBNDC43 **Credit:4**

Course outcomes:

Upon successful completion of this course, the student will be able to

CO1: A graduate student has knowledge about principles of food toxicology and natural constituents that are toxicants and natural contaminants that act as toxicants and substance toxicity evaluation in particular.

CO2: Be able to demonstrate sufficient knowledge about the occurrence and significance of major food-borne toxicants.

CO3: Be aware of the Allergens, toxic constituents and anti-nutritional factors of plant foods

CO4: Be able to demonstrate a fundamental knowledge of risk assessment and food safety as it is applied to toxic agents in the human food chain.

Unit I **(18 hours)**

Introduction to food toxicology: Classification, Dose, Determinants of toxins in foods, naturally occurring toxins from animals, Bacterial and fungal and sea food sources. Risk assessment in food toxicology; Laws and regulation of safety assessment of foods including food additives.

Unit II **(18 hours)**

Biological Hazards–Infections and Infestations, Overview of Illnesses and Basic Bacteriology, Bacterial Pathogens, Basic Virology, Viral Food borne Diseases,Prion Diseases, Helminthic and Protozoan Food borne Illnesses.

Unit III **(18 hours)**

Allergens, toxic constituents and anti-nutritional factors of plant foods: Enzyme inhibitors, Trypsin and Chymotrypsin inhibitor, Amylase inhibitor, Flatulence causing sugars,Phytolectins).

Unit IV **(18 hours)**

Agricultural and industrial contaminants in foods: Pesticides residues in fruits and vegetables, Animal drug residues in food, Metal contaminants in foods and their toxicity in human body such as lead, arsenic and mercury.

Unit V **(18 hours)**

Food additives as toxicants: Artificial colours, Preservatives, sweeteners. Derived Food toxicants- Processing & Packaging, Toxicants generated during food processing such as nitrosamines, maillard reaction products like acrylamide, benzene, dioxins and furans heterocyclic amines and aromatic hydrocarbons and irradiation, persistent organic pollutants. Risk of genetically modified food, Toxicological aspects of nutrient supplements, toxicity implications of nanotechnology in food.

Text Books:

1. Deshpande S.S, *Handbook of Food Toxicology*, CRC Press, 2016.
2. Altug, Tomris, *Introduction to Toxicology and Food*, CRC Press, 2019.

References:

3. Ashish Sachan, Suzanne Hendrich, *Food Toxicology: Current Advances and Future Challenges*, Apple academic publisher, 2018.
4. Charis M. Galanakis, *Food Toxicology and Forensics***,** Elsevier Science Publisher, London, 2020.
5. Witczak.A, Zdzislaw, *Toxins and Other Harmful Compounds in Foods*,CRC Press, 1st Edition, 2017.

Journals:

1. Journal of Food Science and Toxicology
2. Journal of Experimental Food Chemistry
3. Journal of Nutrition & Food Sciences

E-Resources:

1. https://www.academia.edu/39021544/Introduction_to_Food_Toxicology_Second_ Edition.
2. https://www.pdfdrive.com/food-toxicology-e15363777.html
3. https://www.pdfdrive.com/handbook-of-food-toxicology-food-science-and-technology-e161488643.html
4. https://www.pdfdrive.com/food-toxicology-current-advances-and-future-challenges-e158425464.html
5. https://www.pdfdrive.com/an-introduction-to-toxicology-e28470290.html

SECOND ALLIED –II
Human Development and Family Relationships
(For those who joined since 2021-22)

Semester: IV **Hours /week: 6**
Subject Code: HBNDA44 **Credits: 5**

Course Outcomes:

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

CO1: Learn about the concept of growth and development

CO2: Understand development aspects (both normal and exceptional) from conception to oldage.

CO3: Learn about the concept of prenatal development and post-natal care
CO4: To impart knowledge on the importance of children with special needs
CO5: Acquire complete knowledge about the behavior pattern of the individual and variousfactors influencing them.
CO6: Understand the biological, psychological, social and cultural influences of lifespanhuman development

Unit I **(18 hours)**

The concept of growth and development, Factors that influence development.

Prenatal Development - Conception, signs and stages of pregnancy, test tube baby. Prenatal care - Management of normal pregnancy - hygiene, diet and medical supervision and hazards during pregnancy. Types of child birth.

Post-natal Care, prevention of gynecological complications and adjustment of the newborn to temperature, breathing, feeding and elimination.

Unit II **(18 hours)**

Infancy (Birth to 2 years) - Development - physical and motor, social, emotional, cognitive and language, Minor ailments, Care of infants, feeding, toilet training, bathing, clothing, sleeping and immunization, prevention of accidents, importance of mothering and emotional
development. Importance of psychological needs.

Early childhood (preschool stage 2-6 years) – physical and motor development, emotional, social, cognitive and language development, creativity, importance of play, importance of family relationship, behavior problems – causes and treatment.

Unit III **(18 hours)**

Late childhood (elementary school period 6-12 years) – developments physical, social, emotional, cognitive and language.

Children with special needs – identification and rehabilitation.

Unit IV **(18 hours)**

Adolescence (12-18 years) physical, emotional, intellectual and motor development, personal adjustment and maladjustment. Delinquency – causes, prevention and rehabilitation. Drug addiction and alcoholism – rehabilitation.

Adulthood (18-60 years) – characteristics and developmental tasks.

Old age (60 years and above) – physical and psychological changes, problems of the aged, family attitude towards the aged, place of the aged in Indian Society.

Unit V **(18 hours)**

Human Relations – Marriage – Meaning, Functions and types, Motivate for marriage.

Adjustments in marriage during early period and child bearing period – Personal adjustment, in-law's adjustment, sexual adjustment and adjustments to parenthood, marriage counseling.

Sex Education – meaning, need for sex education.

Text Books:

1. Santrock, John W., *Child Development***,** McGraw Hill Education, thirteenth edition, 2017.
2. Hurlock Elizabeth B., *Child Development*, Tata McGraw Hill Education, sixth edition, 2017.

Reference Books:

3. Walsh Bridget A, et al. *Introduction to Human Development and Family Studies,* Psychology Press. 2017.
4. Papalia Diana et. al., *Human Development***,** McGraw Hill Education, ninth edition, 2017.
5. Hurlock Elizabeth B., *Developmental Psychology,* A Life Span Approach, Tata McGraw Hill Education, fifth edition, 2017.

Journals

1. Journal of young investigator
2. Journal of child and family studies
3. Journal of family communication

E-Resources

1. www.familystudies.uconn.edu
2. www.humansciences.okstate.edu
3. www.hdfs.missouri.edu
4. https://www.healthychildren.org/English/ages-stages/teen/Pages/Stages-of-Adolescence.aspx
5. https://www.economicsdiscussion.net/human-resource-management/human-relations/human-relations/32398

EXTRA CREDIT -Waste Management in Food Industries
(For those who joined since 2021-22)

Semester: IV
Sub Code: HBNDX4 **Credits: 2**

Course outcomes:

Upon completion of the course, students will be able to understand

CO1: Importance of waste management in food industries
CO2: Knowledge on waste treatment and safe disposal methods
CO3: Byproduct utilization of wastes
CO4: Unit operations in waste treatment

UNIT I **(10 hours)**

Introduction: Classification of waste. Characterization of food industrial wastes from Fruit and vegetable processing industry, Beverage industry; Fish, Meat & Poultry industry, Sugar industry and Dairy industry.

UNIT II **(10 hours)**

Treatment methods for liquid wastes from food process industries; Design of ActivatedSludge Process, Rotating Biological Contactors, Trickling Filters, UASB, Biogas Plant.

UNIT III **(10 hours)**

Treatment methods of solid wastes: Biological composting, drying and incineration;

Design of Solid Waste Management System: Landfill Digester, Vermicomposting Pit.

UNIT IV **(10 hours)**

Biofilters and Bioclarifiers, Ion exchange treatment of waste water, Drinking-Water treatment, Recovery of useful materials from effluents by different methods.

UNIT V **(10 hours)**

Waste disposal methods – Physical, Chemical & Biological; Economical aspects of wastetreatment and disposal.

Text Books:

1. A, Green JH, Kramer, *Food Processing Waste Management*, AVI, 1979.
2. PL, Rittmann BE, McCarty, *Environmental Biotechnology: Principlesand Applications*, Mc-Grow- Hill International, 3rd editions., 2001.

References:

3. Herzka A &Booth RG. Food Industry Wastes: Disposal andRecovery**,** Applied Science Pub Ltd., 1981.
4. Fair GM, Geyer JC , Okun DA. *In Water &Wastewater Engineering.* JohnWiley &Sons, Inc.,1986.
5. RE, Bartlett, *Wastewatertreatment*, Processing Agricultural &Municipal Wastes;AVI. GE, Inglett; : Applied Science Pub Ltd,, 1973.

Journal

1. International Journal of Environment and waste management
2. Journal of waste management and disposal
3. Journal of waste management

E-Resources

1. www.omicsonline.org
2. www.imedpub.com
3. www.imedpub.com
4. https://www.slideshare.net/Ankit7733/biofiltration
5. https://byjus.com/biology/waste-disposal/

CORE –X Diet Therapy – I
(For those who joined since 2021-22)

Semester-V **Hours/Week: 5**
Sub Code: HBNDC51 **Credits: 4**

Course outcomes:

The students will be able to

CO 1: Apply nutritional knowledge to analyze personal dietary intakes, to plan nutritious meals using nationally established criteria to meet recommended goals.

CO 2: Understand and calculate body mass index (BMI), and use such calculations to predict desirable weight ranges for individuals.

CO 3: Explain the relationship between nutrition and health, and nutrition and

development.

CO4: Understand the significant of nutrition in the management of diseases affecting gastro intestinal tract.

Unit I **(15 hours)**

Diet therapy: Principles of planning diet, nutritional care process, Basic concepts of diettherapy. Therapeutic adaptations of normal diet, principles of therapeutic diets.

Routine Hospital Diets: clear fluid, full fluid, soft and normal diet, Pre-operative and post-operative diets.

Special feeding techniques - parenteral and enteral feeding

Dietitian: Role of dietitians in Nutritional care, planning diet counseling.

Unit II **(15 hours)**

Nutritional care for weight management: Obesity - Aetiology, assessment, types, complications and principles of diet management.

Underweight: Aetiology, limitations, complications and principles of diet management.

Unit III **(15 hours)**

Nutritional care for deficiency disorders: PEM and Vitamin A deficiency and Anemia-Causes, Types, symptoms and diet management.

Nutritional care for febrile condition: Typhoid, Malaria and Tuberculosis- Causes, symptoms, metabolic changes in fever and dietary management.

Unit IV **(15 hours)**

Nutritional care for diseases of the Gastro Intestinal tract: peptic ulcer, gastritis, constipation, diverticulosis, Diarrhea, Mal absorption syndrome, celiac sprue, tropical sprue, lactose intolerance, Inflammatory Bowel Disease, Irritable Bowel Syndrome, Gastroesophageal reflux disease (GERD) - Aetiology, symptoms, complications and principles of diet management.

Unit V **(15 hours)**

Nutritional care for diseases of liver and biliary system: Jaundice, Cirrhosis of liver, Viral Hepatitis, Hepatic Encephalopathy, Role of alcohol in liver disease- Aetiology, symptoms, complications and principles of diet management.

Diseases of Gall Bladder and Pancreas – Cholelithiasis, Cholecystitis, Cholecystectomy, Acute and chronic Pancreatitis- Aetiology, symptoms, complications and principles of diet management.

Text books:

1. Srilakshmi, B, *Dietetics*, New Age International (P) Ltd, Chennai, 7th edition 2019.
2. Shubhaangini Joshi, *Nutrition and Dietetics***,** McGraw Hill publication, New Delhi,3rd edition 2017.

References:

3. Mahan, L.K., Stump, S.E and Krause, S, *Food Nutrition & Diet therapy*, W.B. SaundersCo, 11th edition, 2012

4. Shills, E.M and Olson, S.J and SMC, *Modern nutrition in Health and Diseases***,** VolumeII, Lea &Febringes, Philadelphia, 8th edition, 2014.

5.Robinson, *Normal and Therapeutic Nutrition***,** Oxford & LBM Publishing, Calcutta,Bombay, 17th edition, 2012.

Journals:

1. The American Journal of Clinical Nutrition, Published by the American Society forClinical Nutrition, Inc., USA
2. Nutrition Abstracts and Reviews, CMB International, U.K.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Home ScienceCollege for women, Coimbatore

E-Resources:

1. https://itcollege.ac.in/itdc/wp-content/uploads/2020/10/DR-neelam-Kumari.pdf
2. https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/medical-nutrition-therapy-for-weight-loss
3. https://www.nhp.gov.in/healthlyliving/healthy-nutrition
4. http://www.lllnutrition.com/mod_lll/TOPIC12/m121.pdf
5. https://slideplayer.com/slide/6183777/

CORE –XI Diet Therapy – I Practicals
(For those who joined since 2021-22)

Semester-V **Hours/Week: 3**
Sub Code: HBNDC52P **Credits: 2**

Course outcomes:

The students will be able to

CO1: Obtain an accurate knowledge on dietary assessment, calculation of the nutritional requirements, planning of appropriate nutritional care and the process nutritional care plan fora client.

CO2: To acquire skill development in planning therapeutic diets using food exchange lists

CO3: To have greater exposure to dietetic practices followed in Indian hospital

CO4: know about nutritive value of Indian foods

Unit – I **(9 hours)**

- Planning and preparation of fluid food preparation, clear fluid and full fluid.
- Planning and preparation of recipes for soft diet, mechanical and pureed
- Planning, preparation of recipes using protein concentrates, sugar substitutes.

Unit - II **(9 hours)**

- Planning. preparation and calculation of diet in Obesity
- Planning. preparation and calculation of diet in Underweight
- Planning. preparation and calculation of diet in Protein Energy Malnutrition

Unit – III **(9 hours)**

- Planning. preparation and calculation of diet in Anaemia
- Planning. preparation and calculation of diet in Typhoid & Malaria
- Planning. preparation and calculation of diet in Tuberculosis

Unit – IV **(9 hours)**

- Planning. preparation and calculation of diet in Peptic Ulcer
- Planning. preparation and calculation of diet in Diarrhoea & Constipation
- Planning. preparation and calculation of diet Inflammatory and Irritable BowelSyndrome

Unit – V **(9 hours)**

- Planning. preparation and calculation of diet in jaundice & Cirrhosis of liver
- Planning. preparation and calculation of diet in Cholelithiasis and Cholecystitis
- Planning. preparation and calculation of diet in Acute and chronic Pancreatitis

Text Books:

1. *Clinical Dietetics Manual*, Indian Dietetic Association,2011.
2. Gopalan C., RN. Ramasastri and S.C. Balasubra-manian, "*Nutritive Value ofIndian Foods*", National Institute of Nutrition, Hyderabad,2021.

Reference Books:

3. Mahan, L.K., Stump, S.E and Krause, S, *Food Nutrition & Diet therapy*, W.B.Saunders Co, 11th edition, 2010
4. Shills, E.M and Olson, S.J and SMC, *Modern nutrition in Health and Diseases*,Volume II, Lea &Febringes, Philadelphia,8th edition, 2014.
5. Robinson, *Normal and Therapeutic Nutrition*, Oxford & LBM Publishing, Calcutta,Bombay, 17th edition, 2010.

Journals:

1. The American Journal of Clinical Nutrition, Published by the American Society forClinical Nutrition, Inc., USA
2. Nutrition Abstracts and Reviews, CMB International, U.K.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Home ScienceCollege for women, Coimbatore.

E-Resources

1. www.mntinc.org
2. www.nutritionaltherapy.com
3. www.mnpgdpg.org
4. http://www.lllnutrition.com/mod_lll/TOPIC12/m121.pdf
5. https://slideplayer.com/slide/6183777/

Core-XII - Community Nutrition
(For those who joined since 2021-22)

Semester: V **Hours /week: 5**
Subject Code: HBNDC53 **Credits: 5**

Course Outcomes:

The students will be able to

CO1: Gain insight into the concepts of health and epidemiology of communicable diseases

CO2: Understand the nutritional problems in India and gain knowledge on measures toovercome malnutrition.

CO3: Have greater exposure to assessment of nutritional status

CO4: Acquire knowledge about nutrition education

CO5: Become aware of National and International organizations

CO6: Acquire knowledge about Nutrition intervention programs

Unit I **(15 hours)**

Malnutrition Nutrition and health in National development. Malnutrition- meaning, factors contributing to malnutrition, over nutrition. Nutritional disorders- Epidemiology, clinical features, prevention and dietary treatment for Protein Energy malnutrition, nutritional anaemia & vitamin deficiency disorders.

Unit II
(15 hours)

Strategies to overcome malnutrition: Definition: IMR, NMR and MMR. Measures to overcome malnutrition, increased agricultural production and nutritious foods and nutrition gardens, food technology, food fortification and enrichment, nutrition education, nutrition intervention programmes.

Assessment of nutritional status: Direct assessment - Diet surveys, anthropometric, clinical and biochemical estimation. Indirect assessment- Food balance sheet, ecological parameters and vital statistics.

Unit III **(15 hours)**

Nutrition Education: Meaning, nature and importance of Nutrition education to the community and lessons to be taught. Methods of education- use of audiovisual aids Use of computers to impart nutrition education – power point presentation, e-learning, Organization of Nutrition education programmes: Principles of planning, executing and evaluating nutrition education programmes, problems of nutrition education programmes

Unit IV **(15 hours)**

Role of National and International organizations: National Organization concerned with food and nutrition – ICMR, NIN, NNMB CFTRI, DFRL and NIPCCD. International Organization concerned with Food and Nutrition- FAO, WHO, UNICEF, World Bank, ICAR, ICMR, NIN, CFTRI, NIPCCD, FAO, WHO, UNICEF and NNMB.

Unit V (15 hours)

Nutrition intervention programs: Genesis objectives and operation of nutrition intervention programmes in India – School Lunch Programme, CMNMP, ICDS, TINP organized by government for vulnerable sections of the population. National Nutritional Anaemia Prophylaxis Programme, National Prophylaxis Programme against Vitamin A Deficiency Diseases, Goitre Control Programme. National Nutrition policy, National food security, National nutrition policy- thrust areas and implementation at national level, Impact of National Nutrition policy, COVID-19 Guidelines.

Text Books:

1. Swaminathan, M., Essentials of Food and Nutrition**,** Bangalore Printing and Publishing Co. Ltd, Bangalore, 2017.
2. Srilakshmi, B., Nutrition Science, New Age International Publication, New Delhi, 2019.

Reference Books:

3. Park, A. Park's, Textbook of Preventive and Social Medicine, XIX Edition M/S Banarasidas, Bharat Publishers, 1167, Prem Nagar, Jabalpur, 428 001(India), 2009.
4. Bamji M.S, Prahlad Rao N, Reddy V., Textbook of Human Nutrition**,** Oxford and PBH Publishing Co. Pvt. Ltd , New Delhi, II Edition, 2007.
5. Bhatt D.P, Health Education**,** Khel Sahitya Kendra, New Delhi, 2011.

Journals:

1. Journal of Nutrition and Health
2. Journal of Preventive Nutrition and Food Science
3. Journal of Nutrition Today

E-Resources:

1. https://www.medicosrepublic.com
2. https://ashesleftbehind.blogspot.com
3. https://www.ncbi.nlm.nih.gov
4. http://www.ignouhelp.in › ignou-mscdfsm
5. https://guides.lib.utexas.edu

COURSE IV-GENERAL INTEREST
Women Studies

Semester: V

Hours /week: 3

Subject Code: HBWS5

Credits: 2

Course Outcomes:

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

CO1: Know the concept, need and scope of women's studies
CO2: Become aware of the details of feminist theories
CO3: Acquire knowledge about women's educationCO4: understand health status of women in India

Unit I (9 hours)

Concept of Women's Studies: Concept and need for Women's Studies – Scope of Women's Studies – Women's Studies as an academic discipline. Women's Movements – Pre- independent, Post-independent and Current women's movements.

Unit II (9 hours)

Feminists Theories: Liberal Feminism – Rationality, Freedom, Education. MarxistFeminism – Production, Reproduction, Class, Alienation, Marriage and Family. Radical Feminism – Gender, Patriarchy, Reproductive Technology, Motherhood. Socialist Feminism – Class and Gender, Division of Labour, Unified and Dual System, Exploitation. Indian Women– Family, Caste, Class, Culture, Religion, Social System.

Unit III

Women's Education: Gender bias in enrolment – Curriculum content – Dropouts.Negative capability in Education – Values in Education – Vocational Education.

Recent Trends in Women's Education – Committees and Commissions on Education. Adult Literacy and Non – formal education for women's development. Women in organised and unorganised sector. Training, skills and income generation.

Unit IV (9 hours)

Gender in Health: Health status of women in India – Mortality and Morbidity factors influencing health – Nutrition and health – HIV and AIDS control programme.National Health and Population Policies and Programmes – Maternal and Child Health (MCH) to Reproductive and Child health approaches, Issues of old age.Women and Environment – Nature as feminine principle – Basic needs in Rural and Urban Environments – Care and management of natural resources – Depletion of natural resources –Sustainable environment and impact on women.

Unit V (9 hours)

Girl Child in Society: Child labourers – Changing role of women – Marriage – Single parent

– Motherhood – Widows. Indian Constitution and provisions relating to women. Personal laws – Labour Laws – Violence against, women – Legalprotection – Family Courts – Enforcement machinery – Police and Judiciary. Human Rights as Women's Rights.

Text Books:

1. Desai, N and M. Krishnaraj. *Women and Society in India.* Delhi: Ajantha, 1987.
2. Forbes, G. *Women in Modern India***.** New Delhi: CUP, 1998.

Reference Books:

3. UNDP *Human Development Report.* OUP, New Delhi, 2000.
4. Devgan Aadesh. *Crime against Women and Children: An Emerging Social Problem***.**New Delhi: Cyber Tech, 2008.
5. Gonesekere Savitri (Ed) Violence, *Law and Women's Rights in South Asia***.** NewDelhi: Sage, 2004.

Journal

1. Asian Journal of women studies
2. Indian Journal of Gender Science
3. International Journal of Gender and Women Studies

E-Resources

1. www.jaduniv.edu.in
2. www.ignou.ac.in
3. www.sascwr.org
4. https://www.who.int/health-topics/gender#tab=tab_1
5. https://opentextbc.ca/womenintheworld/chapter/chapter-12-rights-of-the-girl-child/

EXTRA CREDIT
Information, Education and Communication Materials for Development

Semester: V
Subject Code: HBNDX5

C

redits: 2

Course outcomes:
The learner will be able to:

CO1: Content analysis of various IEC materials for development messages.

CO2: Designing layouts for various IEC materials and Writing scripts on selected

developmental issues for radio, and T.V programmes

CO3: Viewing and recording various types of television and radio programmes

CO4: Preparation of various graphic (IEC) materials

Unit I

Concept of IEC Material - Meaning, objectives, characteristics of IEC Material - Importance and scope of IEC material for development- Different types of IEC materials for development- Role of IEC material for development in various level.

Unit II

Guidelines for Development of IEC Materials Selection of IEC material: Strength and Limitations of Various IEC materials - Criteria for selecting IEC material - IEC materials for combining for greater impact Developing a creative brief - Importance of creative brief. - Elements of creative brief Preparing prototype IEC materials.

Unit III

Various Types of IEC Materials for Development Graphics and audiovisual charts, posters, flashcards, flexes, flip books, pamphlets, leaflets, brochures, booklets, modules, manuals Mass Media: IEC materials for radio, television, newspapers and magazines - Radio scripts writing - T.V. programme scripts writing - Newspaper, magazine article writing.

Unit IV

Emerging Trends in Educational Technology 16 (a) Educational Technology in Formal Education, Non-Formal Education, Informal Education, Distance Education and Open Learning Systems; (b) Uses of Communication Technology in Teaching – Videotape, Radio- Vision, Tele conferencing, CCTV, INSAT, Computer simulated Multimedia approach and problems of introducing new technologies in the Indian context.

Unit V

Using internet as pedagogical and communication tool: Using the Internet for teaching & research. - WWW, Website and web pages, Internet connectively – Browsing the Internet – Using Internet as an Educational Communication Tool: Online conferencing,
Videoconferencing, Conferencing & internet forums, Newsgroups & Blog, Wiki, Discussion Board, Chat Rooms, E-Journal, Digital libraries, Online Examinations.

Text Books:

1. Agarwal J.C, *Essential of Educational technology, Innovations in Teaching learning,* Vikas Publishing House Pvt. Ltd, New Delhi, third edition, 2014.
2. Leon Alexis, Leon Mathews., *Internet for everyone,* Vikas Publishing House, Pvt. Ltd, New Delhi, second edition 2012.

Reference Books:

3. Kumar Sanjay Pushp Lata, *Communication Skills***,** Oxford University Press, 2015
4. Rajaraman V, Introduction to Information Technology, third edition,

PHI Learning Private Limited, 2018.
5.Kumar Keval J, *Mass communication in India,* Jaico publishing house, Fifth Edition, 2021.

Journals:

1. Education Reform Journal
2. Information Systems Education Journal
3. Communications in Information Literacy

E-Resources:

1. www.eric.ed.go
2. www.comminit.com
3. www.ncbi.nlm.nih.gov
4. https://elearningindustry.com/top-educational-technology-trends-2020-2021
5. https://www.theasianschool.net/blog/role-of-internet-in-education/

Core - XIII Diet Therapy-II
(For those who joined since 2021-2022)

Semester: VI
Hours/week: 6
Sub code: HBNDC61
Credit: 4

Course out Comes

Upon successful completion of this course, students will be able to:

CO1: Develop and demonstrate a culturally-competent care in nursing as it relates to awareness of and sensitivity to patient dietary restrictions and preferences for cultural and religious reasons.

CO2: Apply knowledge of specific disease pathologies that require diet modification in order to restore homeostasis in patients.

CO3: Understand the modifications in nutrients and dietary requirements for therapeutic condition.

CO4: Learn recent concepts in dietary management of different diseases and preparation of therapeutic diets for various disease

Unit I
(15hours)
Diet in cardiovascular system

Etiology, Types, symptoms, complications, diagnostic test and principles of diet management for hyperlipidemia, Hypertension, Atherosclerosis, Ischemic Heart Disease, Congestive Cardiac Failure.

Role of fat in development of atherosclerosis- High fibre, low fat, sodium restricted diet. Nutrient and drug interaction in cardio vascular diseases

Unit II **(15 hours)**
Diet in Diabetes mellitus

Aetiology, types, symptoms, complications, diagnostic test and principles of diet management for Diabetes Mellitus- IDDM & NIDDM
Dietary Modifications with and without insulin - Food Exchange List – Glycemic Index and its use. Macronutrient modification -dietary carbohydrate to protein ratio of the diet.

Unit III (15 hours)

Diet in Renal disorder and disease

Aetiology, types, symptoms, complications, diagnostic test and principles of diet management for Glomerulonephritis- Nephrotic Syndrome, Acute and Chronic Renal failure.
Renal calculi, End Stage Renal Diseases (ESRD), Dialysis. Acid and alkali producing foods- Use of sodium and potassium exchange lists.

Unit IV (15 hours)

Inborn errors of metabolism – Aetiology, symptoms, complications, diagnostic test and nutritional management of Phenyl ketouria (PKU), Galactosemia and Maple syrup urine disease, Gout
Allergies – Food allergy and intolerance – Mechanism, Factors influencing, symptoms, tests for Allergy, Nutritional care and Elimination diet.

Unit V (15 hours)

Diet in Cancer Aetiology, types, symptoms, complications, diagnostic test and principles of diet management for Cancer- Nutritional problems of Cancer therapy -Role of food in prevention of cancer.
Therapeutic diet chart preparation& Dietary counseling Clients and counselors, client responsibility, attributes of a successful counselor, steps in counseling process, counselling guidelines.
Diet in COVID – Aetiology , Symptoms, Complications, Diagnostic, Role of food in preventing COVID, Immune boosting Foods for children, Vaccination.

Text Books:

1. F.P.Antia , *Clinical Dietetics & Nutrition***,** Oxford University Press, New Delhi 2018.
2. Srilakshmi, B., *Dietetics*, New Age International (P) Ltd, Chennai,7th edition, 2019.

Reference Books:

3. Shubhangini A. Joshi, *Nutrition And Dietetics***,** Oxford University Press, New Delhi, 4th Edition, 2015.
4. Krause and Mahan – *Food, Nutrition and Diet therapy*, W.B. Saunders company, London,6th Edition, 2016.
5. Robinson et. al ., *Normal and therapeutic nutrition*, Mac Millan Pub.Co., New York, 17th Edition, 2014.

Journals:

1. The American Journal of Clinical Nutrition, Published by the American Society for Clinical Nutrition, Inc., USA
2. Nutrition Abstracts and Reviews, CMB International, U.K.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Home Science College for women, Coimbatore.

E-Resources:

1. https://www.nin.res.in
2. https://www.elsevier.com
3. https://www.barnesandnoble.com
4. https://www.ebooksread.com
5. https://www.cabi.org

Core - XIV Diet Therapy-II Practicals
(For those who joined since 2021-22)

Semester: V **I**

Hours/week: 4

Sub code: HBNDC62P

Credits: 3

Course outcomes:

On completion of this course, students are expected to be able to:

CO1: Obtain an accurate dietary assessment, calculate the nutritional requirements, plan appropriate nutritional care, and explain the process of objective setting in the delivery of a nutritional care plan for a client.

CO2: To emphasis skill development in planning therapeutic diets using food exchange lists

CO3: To provide greater exposure to dietetic practices followed in Indian hospital

CO4: know about nutritive value of Indian foods

Unit - I **(13 hours)**

1. Standardization of common food preparation
2. Planning, preparation and calculation of diet in Hyperlipidemia
3. Planning. preparation and calculation of diet in Hyper tension

Unit - II **(13 hours)**

Preparation and calculation of diet in Atherosclerosis

4. Planning. preparation and calculation of diet in High fibre
5. Planning. preparation and calculation of diet in Type I Diabetes mellitus

Unit - III **(13 hours)**

6. Planning. preparation and calculation of diet in Type II Diabetes mellitus
7. Planning, preparation and calculation of low sodium diet

8. Planning, preparation calculation of diets in Glomerulonephritis

Unit - IV (13 hours)

9. Planning, preparation and calculation of diet in Acute and chronic Renal Failure
10. Planning, preparation and calculation of diet in Renal calculi
11. Planning, preparation and calculation of diet in PKU

Unit - V (13 hours)

12. Planning, preparation and calculation of diet in Allergy
13. Planning, preparation and calculation of diet in Cancer
14. Planning, preparation and calculation of diet in AIDS
15. Diet preparation for immune boosting foods

Text Books:

1. *Clinical Dietetics Manual*, Indian Dietetic Association, 2011.
2. Gopalan C., RN. Ramasastri and S.C. Balasubra-manian, *"Nutritive Value of Indian Foods"***,** National Institute of Nutrition, Hyderabad,1977.

Reference Books:

3. Shubhangini A. Joshi, *Nutrition and Dietetics***,** Oxford University Press, 4th Edition, 2015.
4. Krause and Mahan – *Food ,Nutrition and Diet therapy*, W.B. Saunders company, London, 6th Edition, 2016
5. Robinson et. al .,*Normal and therapeutic nutrition*, Mac Millan Pub.Co., New York, 17th Edition, 2014.

Journals:

1. The American Journal of Clinical Nutrition, Published by the American Society for Clinical Nutrition, Inc., USA
2. Nutrition Abstracts and Reviews, CMB International, U.K.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Home Science College for women, Coimbatore.

E-Resources

1.https://www.nin.res.in
2. https://www.elsevier.com
3.https://www.barnesandnoble.com
4. https://www.ebooksread.com
5. https://www.cabi.org

CORE XV Food Standard and Quality Control
(For those who joined since 2021-22)

Semester-VI

Hours/Week: 6
Sub Code: HBNDC63

Credits: 4

Course outcomes:

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

CO1: Critically evaluate the recent developments in the control of food safety.

CO2: Conduct risk assessments of food safety problems.

CO3: Knowledge on the requirements for compliance with national and International foodstandards.

CO4: Demonstrate knowledge of quality management systems, their implementation and the practical steps needed for implementation.

UNIT I **(15 hours)**

Food Safety – Meaning, Concept, Importance of Safe Food, Factors affecting Food Safety, Current Challenges to Food Safety. **Quality Control**-Definition, concept, Importance and Functions of Quality Control.

WHO assisted Activities in Food Safety, Role of Central Food Laboratory and State FoodLaboratories, Duties of Public Analyst and Food Inspector.

UNIT II **(15 hours)**

Food Quality Assurance – Meaning, Principles, Total Quality Management (TQM) – Meaning, Concepts, Need, Components,GMP, GHP. HACCP – History, Meaning, Principle, Guidelines forApplication of HACCP.

UNIT III **(15 hours)**

Food Laws and Regulations – History of Regulations in India, FAO, WHO, CODEX Alimentarius, CODEX India, BIS, AGMARK, Consumer Protection Act, FSSA, PFA, Essential Commodities Act , Export Act, FPO, ISO 22000, ISO 9000 Series, HALAL.

Guidelines for Food Labelling - name of food, weight, ingredients, date and storage conditions, preparation instructions, name and address of manufacturer.

UNIT IV **(15 hours)**

Food Quality Indices – Meat and Meat Products, Fish and Fish Products, Milk and Dairy Products, Vegetables, Fruits and their Products, Grains, Pulses and Oil Seeds Coffee Tea and Spices Food **Adulteration** – Definition, Nature of Adulterants, Methods of Evaluation of Food Adulterants and Toxic Constituents. **Additives** – Meaning, Classification, Types of Additives.

UNIT V **(15 hours)**

Sensory Assessments – Sensory Assessments on food quality (appearance, taste, texture, flavor). Different methods of sensory analysis- Difference test, Paired Comparision and Duo-trio Test, Ranking test -Ranking and hedonic rating- Sensitivity Test-Threshold and Dilution Test- Descriptive test and preparation of score card.

Text Books:

1. Thomas Ohlsson, Nils Bengtsson, Minimal Processing Technologies in the Food Industry -Business & Economics, Publisher CBS, 2002.

2. Gustavo V. Barbosa-Canovas, Maria S. Tapia, M. Pilar Cano, *Technology &Engineering*, CBS Publishers andDistributors, 2004.

Reference Books:

3. Philip,A.C. Reconceptualizing quality. New Age International Publishers, Banglore, 2001.
4. Bhatia,R. and Ichhpujan,R.L. Quality assurance in Microbiology. CBS Publishers andDistributors, New Delhi, 2004.
5. Kher, C.P. Quality control for the food industry. ITC Publishers, Geneva, 2000.

E-Resources:

1. www.fao.org
2. www.teaboard.gov.in
3. www.fssai.gov.in
4. https://www.eolss.net/Sample-Chapters/C10/E5-08-04.pdf
5. https://www.slideshare.net/shuchij10/sensory-assessment

CORE XVI Dietetic Internship

(For those who joined since 2021-22)

Semester-VI

Hours/Week: 4

Sub Code: HBNDC64P **Credits: 5**

Course outcomes:

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

CO1: Identify nutrition-related problems and determine and evaluate nutrition interventions.

CO2: Identify and describe the work of interprofessional teams and the roles of others with whom the registered dietician nutritionist collaborates in the delivery of food and nutrition services.

CO3: Graduates will be prepared to pass the national registration examination for dietician.

CO4: Discuss the impact of health care policy and different health care delivery systems on food and nutrition services to the consultant.

Aspects to be covered in the Dietary Internship training programs

It is compulsory for all the students to complete of the given institutionaltraining programs in reputed institution for a period of 15 days each. At the end of the final year, each student has to submit a report of the training and undergo a vivavoce examination.Marking system is as follows:

Internal marks will be awarded by the faculty of the department with whoseguidance the report is prepared.

Dietary InternshipTraining:

1. Assessing the nutritional status and diet history of patients.
2. Planning diet sheets, preparing and providing guidance in the production of therapeuticdiet.

3. Supervising the preparation of diets.
4. Supervising the delivery of trays to the patient.
5. Getting feedback from patients regarding diets.
6. Understanding the layout of hospital dietary unit.
7. Acquiring practical knowledge in diet counseling.
8. Under taking 2 case studies at hospital situation.

ELECTIVE –I
Family Resource Management
(For those who joined since 2021-22)

Semester: V

Hours /week: 5
Subject Code: HBNDE5A

Credits: 5

Course Outcomes:
After successful completion of this course, students will be able to:
CO1: Understand the principles and elements involved in management.
CO2: Learn the process and concepts of management.
CO3: Acquire knowledge about the standard of living and decision making.
CO4: Recognize the importance of wise use of resources to achieve one's goals.
CO5: Apply the management process to resources – particularly time, money and energy.

Unit – I (15 hours)

Management – Definition, principles and elements involved in management, **Process** – planning, controlling and evaluation. Motivation in management (Introduction to values, goals and standards)

Management Concepts - Goals and Values – their relationship to decision making.

Unit – II (15 hours)

Standard of Living – Definition, constituents – Means for raising the standard of living of families. **Decision Making** – steps, importance, types of decisions, Habitual versus Conscious decision making. Individual and group

decisions, resolving conflicts in group decisions.

Resources – Human and non-human resources. Characteristics of Resources, how they are utilized to achieve family goals.

Unit – III (15 hours)

Family - Concept, Role, life cycle changes and stages of family life cycle.

Work Simplification – Definition, importance, Mundel's classes of change

Time Management – Time Demands during different stages of the family life cycle, Time cost, Factors to be consider in making time and activities plans.

Unit – IV (15 hours)

Energy Management – Relation of energy to the stages of the family life cycle, Fatigue –Forms and effects of fatigue.

Family Income – Definition, Types - Money, Real and Psychic income, various ways of improving the income of the family, Family finance management, family budget – Definition and meaning, importance of budgeting, steps, factors affecting the budget. Engle's Law of Consumption.

Unit – V (15 hours)

Savings – Meaning, objectives, Needs for savings in the family, types of savings institutions and schemes.

Consumer – meaning and definition of consumer, consumer rights. Problems faced by the consumer.

Text Books:

1. Varghese,M.A et al. – "*Home Management*", New Age International (P) Limited, Publishers, 7/30 A, Daryaganj, New Delhi – 110002. Second Edition, 2017.
2. Singal Savita Prof. and Gandotra Veena Prof. *Family Resource Management. Historical and contemporary Developments,* Dominant Publishers and Distributors, New Delhi – 110002, 2014.

Reference Books:

3. Moore Tami James, Asay Sylvia M., *Home Management***,** SAGE Publications, Inc, 3rd Edition, 2017.
4. Seetharaman P. et. al, *An Introduction to Family Resource Management***,** Publisher CBS, 2019.
5. Tami James Moore, Sylvia M. Asay, *Family Resource Management***,** Publisher CBS, 2017.

Journals

1. Research Journal of Family, Community and Consumer Sciences.

2. Journal of Family and Consumer Sciences
3. The Journal of Asian Regional Association for Home Economics

E-Resources

1. www.joe.org
2. www.sciencelinks.jp
3. www.ecoursesonline.iasri.res.in
4. https://en.wikipedia.org/wiki/Energy_management
5. https://www.investopedia.com/terms/s/savings.asp

ELECTIVE – I Personnel Management
(For those who joined since 2021-22)

Semester: V **Hours /week: 5**
Subject Code: HBNDE5B **Credits : 5**

Course Outcomes:

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

CO1: Learn various processes in manpower planning, organizational and welfare measures.
CO2: Know about various laws related to welfare measures
CO3: Learn about leadership quality
CO4: Understand the Human Relations and Organisational Behaviour
CO5: Know about Employee Welfare Measure
CO6: Learn about Computer Applications in Human Resources Management

Unit I **(15 hours)**

Manpower planning: Manpower Planning process, Organising, Staffing, directing, and controlling – Estimation, manpower requirement – Factors influencing supply and demand of human resources – Role of HR manager – Personnel Principles.

Unit II **(15 hours)**

Organisation: Requirement of Organisation – Organisation structure – Organisation Hierarchical charts – Staffing Plan - Development and Operation of human resources - Managerial Staffing – Recruitment – Selection strategies – Placement and Training.

Unit III **(15 hours)**

Human Relations and Organisational Behaviour: Basic individual psychology – Approaches to job design and job redesign – Self managing work teams – Intergroup – Conflict in organizations – Leadership-Engineer as Manager – all aspects of decision making
– Significance of human relation and organizational – Individual in organization – Motivation

– Personality and creativity – Group dynamics, Team working – Communication and negotiation skills.

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Unit IV **(15 hours)**

Computer Applications in Human Resources Management- Computer applications in personnel training & EDP – Types of applications— Some specific applications— Managing data - Personnel and Systems management. Employee appraisal and assessment – Employee services –Managing New Technologies - Levels of change in the organizational Development – New methods of training and development – Performance Management.

Unit V **(15 hours)**

Employee Welfare Measures: Wages and Salary, Employee benefits, Compensation – Safety and health – GPF – EPF – Group Insurance – Housing - Pension. Laws related to welfare measures.

Text Books:

1. Decenzo David A, et.al, Human Resource Management, Wiley, Eleventh Edition, 2015.
2. Dr.Khan Abdul A., Dr.Taher, M. A., Human Resource Management and Industrial Relations. Dhaka: Abir Publications, Reprint 2013.

Reference Books:

3. Aswathappa, K., Human Resource Management: Text and Cases, TataMcGraw Hill Education, Eighth Edition, 2017.
4. Bernardin John H, Human Resource Management, An Experimental Approach, Tata McGraw Hill Education, Fifth edition, 2017.
5. Dessler Gary and Varkkey Biju, Human Resource Management, Pearson Education Limited, Fifteenth Edition, 2012.

Journals:

1. Human Resource Management Journal
2. International Journal of Human Resource Management
3. Journal of Group and Organization management

E-Resources:

1. www.similarweb.com
2. www.digitalistmag.com
3. www.humaninterest.com
4. https://www.thefreelibrary.com/Chapter+15+Computer+applications+in +human+ resources+management.-a0184699728
5. https://www.yourarticlelibrary.com/human-resource-management-2/employee-welfare/employee-welfare/99778

ELECTIVE – II Food Service Management
(For those who joined since 2021 onwards)

Semester: VI
Hours /week: 5
Subject Code: HBNDE5C **Credits: 5**

Course Outcomes:

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

CO1: To understand the basic principles of management in food services units.

CO2: Develop skills in setting up food service units.

CO3: To gain knowledge and develop skills in handling equipment and maintenance.

CO4: To gain about food production in food Service industry

CO5: To develop a knowledge base in key areas of institutional food administration.

CO6: To understand the Buying and accounting procedures in food service institution.

UNIT- I [15 hours]

Food Service Institutions: Types of food service Institution, Commercial and Non-Commercial Institutions. Commercial -Hotel, Motel, Restaurant, Bar, Pub, Fast Food Restaurant, Popular Catering. Non-Commercial-Transport Catering, welfare catering, Industrial Catering, Leisure linked Catering.

UNIT - II [15 hours]

Food plant -Types of Kitchen. Layout of different food service establishments-Lighting and ventilation adopted in different units such as Kitchen, storage and dining area, Work simplification.

UNIT - III [15 hours]

Equipment used in Food service industries: Classification of equipment, Application of electrical and non-electrical equipment for food storage, Preparation, Serving, Dishwashing. Kitchen equipment selection and care.

UNIT - IV [15 hours]

Quantity food preparation: Menu planning – Types of menu, Standardization and standardized recipes portion control. Quantity Food Service: Types of service, Styles of service - Waiter, waitress service, Counter service - snack bar, buffet service, Banquet.

UNIT V [15 hours]

Buying and accounting procedures in food service institution: Budget preparation, Portion control, Methods of cost control, Cost accounting, Cost concepts- Types of cost, Food cost control factors, Break even analysis. System of book keeping - Cash book, Purchase book, Sales book and purchase returns book, Sales returns book and journals.HACCP -Definition , Principles of HACCP.

Text Books:

1. Sethi, M. Malhan,S, *Catering Management: An integrated approach*, New Age International, 2007.

2. Sudhir Andrews, *Food and Beverage Service Training Manual*, Tata McGraw Hill
Publishing Company Ltd New Delhi ,2 nd Edition, 2011.

Reference Books:

3. Dr. Aggarwal D.K, *Housekeeping Management*, AMAN Publications, NewDelhi,2006.
4. Dr. Singh.R.K,, *Modern Trends in Hospitality industry*, AMANPublications,
NewDelhi, 2006.
5. John Wiley, *Book Of Yeild: Accuracy in Food Costing and Purchasing*, John Wiley & Son Bakers, 6th Edition, 2011.
6.

Journals:

1. Journal of Foodservice
2. Journal of Foodservice Management & Education
3. Journal of Foodservice Business Research

E-Resources:

1. https://ncert.nic.in/textbook/pdf/lehe104.pdf (Unit-1)
2. https://www.designcafe.com/guides/different-types-of-kitchen-layouts/ (Unit-2)
3. https://www.brainkart.com/article/Definition-and-Types-of-Equipment_35155/ (Unit-3)
4. https://www.hotelmanagementtips.com/types-of-food-service-styles/ (Unit-4)
5. https://psu.pb.unizin.org/hmd329/chapter/ch10/ (unit-5)

ELECTIVE – II
Women Entrepreneurship Development
(For those who joined since 2021-22)

Semester: V
Hours /week:5
Subject Code: HBNDE5D
Credits: 5

Course Outcomes:

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

CO 1: understand an insight and establishes the link between Women, technology andentrepreneurship from the perspective of gender.
CO 2: understand the administrative functions and operation mechanisms involved insensitizing women development programs.
CO 3: analyze women's participation in politics from a feminist perspective
CO 4: understand about usefulness of Technology Concepts and women entrepreneurship fortheir empowerment.
CO5: learn about Growth of Women entrepreneurship in India
CO6: understand about Entrepreneurial development programmes in India

Unit I
(12 hours)

Introduction - Concept of Entrepreneurship - Nature and Development of Entrepreneurship
- Entrepreneurial decision process - Entrepreneurial traits types - Culture and structure - competing theories of Entrepreneurship - Entrepreneurial motivation - Establishing Entrepreneurial Systems - development of woman entrepreneurs and the future of entrepreneurship.

Unit II **(12 hours)**

Self-Assessment and the Entrepreneurial Process - Identifying and evaluation the opportunity - commitment to opportunity – resources - control of resource and management structure. Entrepreneurial Careers – education – training - Entrepreneurial Ethics.

Unit III **(12 hours)**

The Business Idea - Sources of new ideas: The unexpected - incongruities - process need - industry and market structures – demographics - changes in perception - new knowledge - thebright idea – Consumers - existing companies - distribution channels - Government and Research and Development - Purposeful innovation and principles of innovation.

Unit IV **(12 hours)**

Women and Entrepreneurship – Growth of Women entrepreneurship in India, Entrepreneurial motivation, Factors effecting entrepreneurial growth, strategies for entrepreneurial development.

Unit V
(12 hours)

Financial institutions - Role of Financial institutions in women entrepreneurial activities,Entrepreneurial development programmes in India.

Text Books :

1.Dr.Gupta C.B, Dr.Sirivasan N.P, Entrepreneurship Development in India, Sultan Chand and Sons, 2015
2. Hisrich Robert D, et.al, Entrepreneurship, McGraw Hill India, 2020.

Reference Books:

3. Dr.Hattangadi Vidya, Entrepreneurship – Need of the Hour, Himalaya Publishing House, 2nd Edition, 2016.
4. Kumari Namita, Women Entrepreneurship in India, Understanding the role of NGOs, Notion Press, 2014.
5. Beatrice E. et.al, Women and Entrepreneurship**,** Routledge Publication, 2013.

Journals:

1. Journal of Women's Entrepreneurship and

Education
2. International Journal of Gender and Entrepreneurship
3.The Journal of Entrepreneurship

E-Resources:

1.www.emeraldinsight.com
2. www.omicsonline.org
3. www.tandfonline.com
4. https://www.slideshare.net/ijtsrd/role-of-financial-institutions-for-the-development-of-women-entrepreneurship-in-india
5. https://www.yourarticlelibrary.com/women/women-entrepreneurship/women-entrepreneurship/9981

ELECTIVE-III
Food Adulteration
(For those who joined since 2021-22)

Semester: V I **Hours/week : 5**

Sub code: HBNDE6A **Credits: 5**

Course outcomes:

Upon completion of the course, students will be able

CO1: To familiarize about the testing methods for adulteration.
CO2: To test adulteration in food samples.
CO3: To know the foods adulterated in our day-to-day life.
CO4: To know the consequences of adulteration
CO5: To know the permissive level of food additives to be used.
CO6: To understand the quality of food available at our door step.

UNIT - I

(15 hours)

Food adulteration: Definition, Classification, Health hazards caused by various adulterants - Critical levels of metals in various foods, Food Adulteration Act.

UNIT- II

(15 hours)

Composition and quality criteria for plant foods: Food grains, Fruits & Vegetables, Fats and Oils, Spices and condiments, Beverages- Alcoholic & Non Alcoholic.

UNIT- III

(15 hours)

Composition and quality criteria for animal foods: Egg, Milk and Milk Products

&Flesh Foods.

UNIT- IV

(15 hours)

Composition & quality criteria for Sugar and Sugar products, Preserves & Tin Foods.

UNIT -V

(15 hours)

Food additives: Introduction, Classification- Antioxidants, Preservatives, Emulsifiers, Stabilizers, sweeteners, thickening agents, chelating agents, curing agents, leavening agents, anti-caking agents, colouring agents, flavouring agents.

Text Books

1. Leo M.L.Nollet, Handbook of Food Analysis, CRC Press, 3rd edition, Volume-I, 2015.
2. Reilly, C, Metal contamination of food: its significance for food quality and human health. John Wiley & Sons.2008.

Reference Books:

3. Colin Wrigley, Cereal Grains: Assessing and Managing Quality, Wood head Publishing, 2016.
4. Shalini Sehgal, A laboratory Manual of Food Analysis, Tata McGraw-Hill, 2016.
5. Morris B. Jacob, Chemical Analysis of Foods and Food Products, John Wiley & Son Bakers, 3rd Edition, 2010.

Journals

1. Journal of American Chemical Society
2. Journal of Food Science
3. International Journal of food studies

E-Resources

1.https://www.vedantu.com/biology/food-adulteration
2.https://www.slideshare.net/EshfaqBhatt/sensory-evaluation-of-fruits-and-vegetables
3.https://en.engormix.com/poultry-industry/articles/poultry-meat-quality-t34396.htm
4.https://www.czarnikow.com/blog/quality-control-measures-in-sugar
5.https://www.who.int/news-room/fact-sheets/detail/food-additives

ELECTIVE-III
Sports Nutrition
(For those who joined since 2021-22)

Semester: VI
Hours /week: 5
Subject Code: HBNDE6B
Credits: 5

Course Outcomes:

After successful completion of this course, the students will able to

CO 1: To develop the student's knowledge on sports nutrition

CO 2: Improve the knowledge on common weight management in Sportspeople.

CO 3: Understand the concept of fluid maintained in sports person

CO4: Gain more knowledge on different types of micronutrients need for their fitness

CO5: To understand the principles of sports nutrition and its practical application to both elite and recreational athletes.

CO6: Acquire knowledge on Sport injury and rehabilitation.

UNIT - I

(15 hours)

Importance of Health and Physical Fitness: Introduction to Sports Nutrition- Nutrition Guidelines and Food Pyramid, My Plate. Cardiorespiratory and muscular assessment; Nutrition Assessment, Computerized Nutrition Assessment, Periodization and nutrition planning, health related fitness.

UNIT -II **(15 hours)**

Determination of Energy Expenditure in Sports and Exercise: using various methods, Energy Systems and Exercise, Metabolism and predicting needs, Carbohydrate diet planning and ergogenic aids. Personalized Nutrition, Healthy Eating and Balanced Diet.

UNIT -III **(15 hours)**

Protein and Body Building: Protein diet planning, Fats/Lipids- diet planning, Water & Electrolyte Balance, Temperature Regulation, Fluid Replacement Products. Assessment of Hydration: Estimation of sweat loss and sweat rate; urine volume and indicators of dehydration (Water, Urine and Thirst).

UNIT -IV **(15 hours)**

Weight Management: Body Composition analysis, Weight regulation through nutrition and exercise, disordered - Eating Behaviours in Athletes / The Female Athlete Triad.

UNIT -V **(15 hours)**

Important Micronutrients for Exercise: B complex vitamin and specific

minerals. Exercise induced oxidative stress and role of antioxidants. Sports injury and rehabilitation: Stress and strain, Basic injuries in upper and lower limb, neck, trunk and hip joint and nerve injuries, acute and chronic back ache, foot problem in sports, role of physiotherapy and yoga, preventive exercise program - How to avoid Sports Injuries, Role of Warm-up and Cool Down.

Text books:

1. Benardot, D, *Advanced sports nutrition*. Champaign, IL: Human Kinetics, 2006.
2. Burke, L, *Practical sports nutrition*, Champaign, IL: Human Kinetics, 2007.

Reference Books:

3. Don MacLaren, *Advances in Sport and Exercise Science: Nutrition and Sport*,
   Published by Churchill Livingstone, Elsevier. 2007.
4. Judy A Driskell, *Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition*, Ira Wolinsky, CRC Press, 2000.
5. Nancy Clark, MS, RD*, Sports Nutrition Guide Book***,** Human Kinetics Publisher, 2013.

Journals:

1. Journal of the International Society of Sports Nutrition
2. Journal of Sports Medicine
3. Clinical Journal of Sports medicine

E-Resources

1. www.jissn.biomedcentral.com
2. www.topendsports.com
3. www.sportsnutritionsociety.org
4. www.scandpg.org
5. www.ais.gov.au

Skill Based Elective- Bakery and Confectionery Practicals
(For those who joined since 2021-22)

Semester: I **Hours per Week: 2**
Sub. Code: HBNDE14P/ HBFPE14P **Credit: 2**

Course Outcome:

Upon completion of the course, students will gain knowledge on
CO 1: Various methods of dough mixing and factors involving during mixing
CO 2: Raw materials used in bakery & confectionery and its role.
CO 3: Scaling of ingredients for commercial baking.
CO 4: Faults and remedies of bakery products.

LIST OF EXPERIMENTS:

1. Preparation of white bread.

2. Preparation of pizza base.
3. Methods of cake mixing.
4. Preparation of sponge cake and cupcake.
5. Preparation of butter cookies.
6. Stages of sugar cookery.
7. Preparation of fondant icing, royal icing and marzipan.
8. Preparation of fudge and fondant.
9. Preparation of groundnut candy.
10. Preparation of chocolate.

Text Books:

1. Yogambal Ashokkumar, *Textbook of bakery and confectionery***,** Phipublisher, Second edition, 2012.
2. *Bakery 1*- Students handbook and practical manual**.** Central Board of SecondaryEducation, 2013.

Reference Books:

3. Wayne Gisslen, *Handbook on practical baking Wheat associates*.John Wiley & Son Bakers, New delhi, 1966.
4. Manley, Duncan. *Biscuit Doughs Manual 2***,** Wood head Publishing Ltd., England.2009.
5. Hui, Y.H, Bakery products, *Science and Technology*, Black Well publishing, 2006.

Journals:

1. Bakery & Mill Journal
2. Journal Of Culinary Science & Technology
3. Bakery & Confectionery - Researchgate

E-Resources:

1. www.nios.ac.in
2. www.epathshala.nic.in
3. www.epgp.inflibnet.ac.in
4. www.angrau.ac.in
5. https://food.ndtv.com/lists/10-best-chocolate-recipes-694662

Skill Based Elective – Home Furnishing Practicals

(For those who joined since 2021-22)

Semester: II **Hours/Week: 2**
Subject Code: HBNDE24P **Credits: 2**

Course Outcomes:

Upon completion of this course, the student shall be able to

CO1: Know about different types of home textiles

CO2: Understanding the production method of different types of home textile products

CO3: Know about living room furnishing

CO4: Gain the knowledge about bed, kitchen and table linen

List of Practicals:

Prepare the following home furnishing accessories are stitching to available raw material / any base material in functional and decorative style.

1. Wall Coverings
   a. Draperies– 3 various styles
   b. Curtains– 3 various styles
   c. Wall Hanging – 3 various styles
2. Floor Coverings
   a. Carpets
   b. Rugs
   c. Matt
3. Living Room Furnishing
   a. Sofa covers
   b. Cushion and covers
   c. Bolster and covers
4. Bed Linens
   a. Baby Bed
   b. Pillow cover
   c. Quilt cover
5. Kitchen Linen
   a. Apron
   b. Mixie and Grinder cover
   c. Dish cloth
6. Table Linen
   a. Doilies
   b. Table napkins
   c. Runners

Textbooks:

1.Virginia Hencken Elsasser, Julia Sharp, *Know Your Home Furnishings*, Wiley-Blackwell, 2nd edition, 2017.

2.V.Ramesh Babu, S.Sundaresan, *Home Furnishing***,** Woodhead Publishing India in Textiles, 2018.

Reference Books:

1.Dorophy, ***"****Pillows, Curtains and shades Step by Step: 25 Soft- Furnishing Projects for the Home*", Wiley-Blackwell, 2017

2. Dorophy wood, ***"****Sew Your Own Soft Furnishings***"**, South Water Publisher, 2010.

Journals:

1.Home Textiles Today
2.Journal of Textile Research
3.International Journal of Home Science

E-Resources:

1. https://www.architecturaldigest.com/story/creative-wall-coverings-that-put-wallpaper-paint-tile-to-shame
2. https://www.britannica.com/technology/floor-covering
3. https://www.housebeautiful.com/room-decorating/living-family-

rooms/g715/designer-living-rooms/
4. https://in.pinterest.com/linenme/kitchen-linen-linen-aprons-and-tea-towels/
5. https://www.ikea.com/in/en/cat/table-linen-20538/

SKILL BASED ELECTIVE - III
Kitchen Garden Practicals
(For those who joined since 2021-22)

Semester: III **Hours /week: 2**
Subject Code: HBNDE34P **Credits: 2**

Course Outcomes:

After successful completion of this course, the students able to

CO1: Know the different types of the kitchen garden.
CO2: Learn the various types of soil and fertilizers understand importance and cultivation of fruits and plants.
CO3: Acquire skills in the irrigation method in kitchen garden.
CO4: To gain the knowledge to cultivate the vegetables

List of Practicals:

1. Planning and lay-out of kitchen garden. Types of garden – Inground, Vertical, Container, Raised – bed, etc.
2. Types of Soil, tools, manures, fertilizers, seed, water etc.
3. Methods of irrigation in kitchen garden.
4. Preparation of different beds for vegetables, Vegetables in kitchen garden - Cowpea, Cluster bean, Coriander, Brinjal, Onion, and Tomato.
5. Preparation of nursery bed and transplanting.
6. Identification and control of vegetable pest and control of vegetable diseases.
7. Use of different pots for vegetable cultivation in terrace garden.
8. Preparations of vermicomposting, zero energy cool chambers.
9. Post – Harvest handling of plant procedure.
10. Visit to different Kitchen Garden.

Textbooks:

1. Richard Bird, **"***The Kitchen Garden Book Kitchen***"**, Southwater Publishing, 2012.
2. Ankur Tiwari, *Kitchen Gardening Mini Handbook***,** Thoughtlytics Internet Pvt. Ltd;1st edition, 2019.

References:

1.Naqsh Mansoor, *The Beginners Gardening Guide For Creating Your Own Kitchen Garden***,** Wiley-Blackwell, 2016.
2. K.S.Yawalkar, *Vegetable crops of India,* Agri-Horticultural Pub. House, 2004.
3. Lisa Bond, *A to Z Gardening for Beginners,* ASIN: B073T3YSHM.

Journals:

1. Everyday Old House.com.
2. My Gardening Journal

3. Royal Horticultural Society

E – Resources:

1. www.finegardening.com
2. www.agritech.tnau.ac.in
3. www.kitchengarden.co.uk
4. www.kitchengardenseeds.com
5. www.savvygardening.com

SKILL BASED ELECTIVE –IV
Food Product Development Practicals
(For those who joined since 2021-22)

Semester: IV **Hours /week: 3**

Subject Code: HBNDE45P **Credits: 2**

Course Outcomes:

After successful completion of this course, the students able to

CO1. Acquire skills to know the need and stages of food product development.

CO2. Find out the shelf life, select appropriate packing and labelling for developed food Product.

CO3. Compute pricing of product and provide appropriate marketing strategy.

CO4: Gain the knowledge about food storage and transportation

Unit I **(9 hours)**

Food Needs and Consumer Preferences: Needs and types of food consumption trends. Economic, psychological, anthropological and sociological dimensions of food consumption.Concepts and definitions. Factors to be considered for food product, development (external and internal factors).

Unit II **(9 hours)**

Designing New Products: Types of food products: Line extensions, new to world products, innovative-creative products, existing products repositioned, reformulated, new form, new size and new package. Stages of product development: conceptual stage, development stage, commercial stage. Formulation based on sources availability and cost competitiveness for concept developments of new products.

Unit III **(9 hours)**

Shelf Life and Shelf Life Prediction: Definition of shelf life, internal and external factors affecting shelf life of products, methods of shelf life studies- Real time and ASLT, predictive modelling (direct method), Q10 concept.

Unit IV **(9 hours)**

Packaging Design Considerations and Graphics: Food labelling. Factors to

be considered for package design- Facts about product, facts about market and facts about packaging materials.

Unit V (9 hours)

Storage and Transportation: Types and mode of transportation, optimization of transport taking in to account the type of product, distance and storage facilities.

Text Books:

1.Brody, Aaron L ed., *Developing new food products for a changing market place,* CRC Press, 2008.

2.Howard R. Moskowitz, *Packaging Research in Food Product Design and Development*, Wiley–Blackwell, 2009.

Reference Books

3. Richard Earle, *Food Product Development*, CRC Press; 1st edition, 2001.

4.Catherine Side, *Food Product Development: Based on Experience*, Wiley-Blackwell; 1st edition, 2003.

5.Olickle, J. K., *New Product Development and value added*. Food Development Division, Canada: Agriculture, 1999.

Journals:

1. International Journal of Food Science and Technology
2. International Journal of Food Engineering – De Gruytr
3. Food Technology

E – Resources:

1. http://www.brookfieldengineering.com/
2. https://nzifst.org.nz/resources/foodproductdevelopment/Chapter-3-1-2.htm
3. https://worldwidescience.org/topicpages/s/shelf+life+determination.html
4. https://courses.lumenlearning.com/boundless-marketing/chapter/packaging/
5. https://forto.com/en/blog/modes-transportation-explained-best/

SKILL BASED ELECTIVE -V
Food Preservation Practicals
(For those who joined since 2021-22)

Semester: V **Hours /week: 3**

Subject Code: HBNDE54P **Credits: 2**

Course outcomes:

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

CO 1: perform food preservation techniques using various preservation methods

CO2: choose the right method and equipment for the preservation and processing of thevarious foods with the highest sensory and nutritional quality for the enhanced shelf life

CO3: acquire the skill for producing and preserving some common foods, and

identify themost important aspects of their processing and preservation.

CO4: apply principles of food preservation to pilot scale production of processed food and evaluate variation in processing parameters or product formulation on product properties

Unit I **(9 hours)**

Preservation by sugar

Preparation of Jam: Mixed fruit jam, Apple jam, Guava jam, Pineapple jam Preparation of jelly: Apple jelly, Guava jelly, Tuttifrutti.

Unit II **(9 hours)**

Preparation of Squash: Pineapple squash, Orange squash, Sappota squash and Grapesquash.

Fruit preserves- fruit bar, Ginger murabha.

Unit III **(9 hours)**

Preservation by salt: Pickles – Onion pickles, Mango pickle, Garlic Pickle, Dried fish Vathalvadakam- cluster bean vathal, brinjal, bittergourd, ladies finger Vadamkam- Rice, sago.

Unit IV **(9 hours)**

Preparation of Spice products: Tomato sauce, tomato ketchup

Unit V **(9 hours)**

Preservation by fermentation Saurekaurat, Curd, Lassie, Wine

Text Books:

1. NirmalK.Sinha and JiwanS.Sidhu, *Handbook of fruits and fruit processing*"**,** Wiley-lackwell, 2012.

2. NirmalK.Sinha and JiwanS.Sidhu,,*Handbook of vegetables and vegetablesprocessing"***,** Wiley-Blackwell, 2012.

Reference Books:

3. Verma L.R and Joshi V.K, *Post harvest technology of fruits and vegetables,Handling, processing, fermentation and waste management***,**Wiley-Blackwell, 2011.

4. Fereidoon Shahidi, *Handbook of Antioxidants for Food Preservation*,Wiley-Blackwell,2015.

5.Srilakshmi B, Food Science, New age publication, Delhi, 8th edition, 2019.

Journals:

1. Journal of Food & Microbiology
2. Journal of Food Processing & Technology
3. Journal of Food Processing & Preservation

E-Resources

1. www.newfoodmagazine.com
2. www.nzifst.org.nz
3. www.itrhd.com
4. https://www.tarladalal.com/tomato-ketchup-tomato-sauce-homemade-tomato-

ketchup-40725r

5. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=5168

SKILL BASED ELECTIVE
Food Adulteration Practicals
(For those who joined since 2021-22)

Semester: VI

Hour/week: 3

Subject Code: HBNDE65P

Credits: 2

Course outcomes:
After successful completion of this course, students will be able to
CO1: Educate about common food adulterants and their detection.
CO2: impart knowledge in the legislator aspects of adulteration.
CO3: educate about standards and composition of foods
CO4: learn about the role of consumer**.**

List of experiments:

Unit I **(9 hours)**

1.Detection of Vanaspati in ghee or butter.
2.Detection of Kasseri flour in basin (gram flour).
3.Detection of Metanil yellow in turmeric.

Unit II **(9 hours)**

4.Detection of aregmone oil in edible oil.
5.Detection of chicory in coffee.
6.Detection of adulteration in milk.

Unit – III **(9 hours)**

7.Detection of adulteration in spices.
8.Detection of adulteration in honey.
9.Detection of adulteration in grains/grain-based flours.

Unit – IV **(9 hours)**

10.Testing adulteration of cereal and cereal products
11.Testing adulteration of pulses
12.Testing adulteration of sugars & Preserves

Unit – V **(9 hours)**

13. Testing adulteration of Beverages.
14.Testing adulteration of condiments

Text Books

1. Shyam Narayan Jha, *Rapid Detection of Food Adulterants and Contaminants*-Theory and Practice Central Institute of Post-Harvest Engineering and Technology, India, 2016.
2 .Pearson D, The chemical analysis of foods, Longman GroupLtd, 7th edition, 2019.

References:

1. Battershall Jesse P. (Jesse Park*)*, *Food Adulteration and Its Detection*, Public domain in the USA, 2017.
2. Ranganna,S . *Handbook of Analysis; QC for Fruits & Vegetable Products***,** Publisher Mcgraw Hill, second edition, 2014.
3. E.M.Ma,Jester; *Standard Methods for examination of Dairy Products Jacob*; Chemical methods of Food Analysis, 2015.

Journals

1. Journal of the International Society of Sports Nutrition
2. Journal of Sports Medicine
3. Clinical Journal of Sports medicine

E-Resources

1.ww.jissn.biomedcentral.com
2.www.topendsports.com
3. www.sportsnutritionsociety.org
4. http://egyankosh.ac.in/bitstream/123456789/33697/1/Practical%20-13.pdf
5.https://vikaspedia.in/health/health-campaigns/beware-of-adulteration/methods-for-detection-of-common-adulterants-in-food.

NON MAJOR ELECTIVE
Food Preservation
(For those who joined since 2021-22)

Semester: III **Hour/week: 4**
Subject Code: HBNM3HS **Credits: 2**

Course outcomes:

Upon completion of the course, students will be able

CO1: Understand the principles of food preservation.
CO2: Acquire skills in methods of food preservation
CO3: Able to preserve the perishable and non-perishable foods from microbial contamination and microbial spoilage.
CO4: Comprehend principles of various preservation and control techniques.

Unit I **(12 hours)**

Food preservation - Definition, importance, Principles and Methods of Food Preservation. Classification of foods for processing. Need for preservation, types

of spoilage, role of micro- organism in food spoilage, prevention of food spoilage, shelf life of food products, Factors affecting shelf life.

Unit II (12 hours)

Preservation by addition of sugar- General Principles and methods of preparation of jams, jellies and Marmalades, theory of gel formation. Failure to jelly and jam to set. Preparation ofpreserves, squashes & syrups. Preservation by addition of salt Pickling and curing of meat & scope of food processing industry in India in developing Entrepreneur.

Unit III (12 hours)

Preservation by Use of High Temperature - Pasteurization, Sterilization and their types. Thermal death curve, calculation of process time, methods of heat transfer. Canning - steps, types of cans, advantages, disadvantages. Bottling - steps, advantages, disadvantages. Food dehydration - concept of dehydration and sun drying. Types of driers- advantages, disadvantages. Principle of dehydration-heat and mass transfer.

Unit IV (12 hours)

Preservation by use of Low Temperature, Types - Common types of cold storage, refrigeration- requirement of refrigerated storage, characteristic of refrigerant, refrigeration during transport, defects in cold storage. Freezing - Principles and methods of freezing, Freeze drying. Advantages and Disadvantages.

Unit V (12 hours)

Mechanism of microbial inhibition, mechanism and action of preservatives in processed food- Inorganic & Organic preservatives- Antibiotics- Mold inhibitors- Antioxidants and its role. Radiation of Foods: Sources of radiation, units of radiation- Mode of action of irradiation, radiation effect on proteins enzyme System-Microwave heating, properties of microwaves, applications in food processing and Preservation-Preservation of Semi moist foods: Principles and Intermediate moist foods

Text books

1. Srilakshmi. B; Food Science, New Age International (P) Limited Publishers, 6th edition, 2015.
2. Sivasankar. B; Food Processing and Preservation, PHI Learning PrivateLimited, 2011.

Reference Books:

1. Lillian Hoagland Meyer, *Food chemistry***,** CBS Publishers and Distributors, 2004.
2. Subbulakshmi. G and Shobha. A.U; *Food processing and preservation*, New AgeInternational (P) Limited Publishers, 2014.
3. Norman. N Potter, Joseph H. Hotchkiss, *Food Science*, CBS Publishers

and Distributors, 5th edition 1996.

Journals

1. Journal of Food & Microbiology
2. Journal of Food Processing & Technology
3. Journal of Food Processing & Preservation

E-Resources

1. www.newfoodmagazine.com
2. www.nzifst.org.nz
3. www.itrhd.comJournals
4. https://www.pdfdrive.com/food-microbiology-an-introduction-e166783912.html
5. https://www.pdfdrive.com/foodborne-parasites-food-microbiology-and-food-safety-e157137947.html

Non major Elective
Basics of Interior Design

(For those who joined since 2021-22)

Semester: IV
Hour/week: 4
Subject Code: HBNM4HS
Credits: 2

Course outcomes:

CO1: To enable the students to learn the basic concepts of interior design.

CO2: Understand the concepts of various elements

CO3: Acquire skills in interior designing

CO4: To develop the skill of applying the principles of design in decorating the interiors.

Unit I

Design – Meaning and Definition, Types – Structural and Decorative design, theircharacteristics, classification of decorative design.

U**nit II**

Elements of Design – Meaning, various elements – line, form and shape, size, color, texture, pattern, space, light.

Unit III

Principles of Design – Harmony, Balance, Rhythm, Emphasis, proportion. Application of design principles in interiors.

Unit IV

Colour in the home –concept, qualities – Hue, value, intensity. Classification ofcolors, Prang color system, color harmonies – Related and contrasting color

harmonies, psychology of color. Application of colour in interiors.

Unit V

Lighting in interiors – importance, classification based on sources, uses, illumination, factors to be considered in lighting for different areas of house.

Text books

1. Varghese and ogale, Home Management, Wiley Eastern, NewDelhi, 1994.
2. Faulkner, S.-and Faulkner R, Inside Today's Home, Rine hart publishing company,Newyork,1987.

Reference Books:

3. Caroline cliften et. al., The complete Home Decorator, Portland House New York, 2000.
4. Seetharaman, P and Pannu, P. Interior Design and Decoration, CBS publishers andDistributors, New Delhi, 2004.
5. Pratap R.M, Interior Design principles and practice, standard publishers distribution, Delhi, 1988.

Journals

1. Journal of Interior Design
2. Journal of interior design education and research
3. Journal of Housing and the Built Environment

E-Resources

1. http://uafulucknow.ac.in/wp-content/uploads/2020/04/Concept-of-FASHION-DESIGN-Unit-5.pdf
2. http://www2.hawaii.edu/~meidor/art_101/elements_of_design.html
3. https://www.invisionapp.com/design-defined/principles-of-design/
4. https://en.wikipedia.org/wiki/Color_theory
5. http://www.ilocis.org/documents/chpt46e.htm

FIRST SEMESTER
(For Microbiology and Chemistry)
Allied I Bio Chemistry –I
(For those who joined since 2021-22)

Semester: I **Hours per Week: 6**
Sub. Code: HBCHA14/HBMBA13 **Credit: 5**

Course outcomes:

Upon completion of the course, students

CO1: Gain basic knowledge of the structure and functions of the major biomolecules.
CO2: Understand the concepts on amino acid and protein
CO3: Gain knowledge about vitamins and minerals
CO4: Aware about the importance of vitamins in human development.
CO5: Gain knowledge about bio-chemical importance of minerals

CO6: Achieve the basics of genetic material and their metabolism

Unit I
(18 hours)

Carbohydrates – Definition, Functions, classifications, structure, physical and chemicalproperties, Biochemical importance.

Unit II (18 hours)

Amino acids -Definition, Functions, Classifications, Structure, Physical and chemicalproperties, Biochemical importance.

Proteins - Definition, Functions, Classifications, Structure (primary, secondary, tertiaryand quaternary), Physical and chemical properties, Biological importance of peptides.

Unit III (18 hours)

Lipids– Definition, Functions, classifications. Fatty acids—Definition classification, physical and chemical properties .Triglycerides, Phospholipids, glycolipids, steroids—outlinestudy

Unit IV (18 hours)

Nucleic acids - Definition, Functions, and Components –Nucleotides and nucleosides. DNA & RNA – structure and function, types. Differentiate between DNA and RNA.

Unit V (18 hours)

Vitamins - Definition, classifications and Biochemical importance.
Minerals - Definition, classifications and Biochemical importance.
Interrelationship between Vitamin-Vitamin, Vitamin-Mineral.

Textbooks:

1. Dr.U.Satyanarayana, U.Chakrapani, *Biochemistry*, Elsiever Publication, 5th Edition,2017.
2. Dr. Kondreddy Rambabu, Dr.Pendyala Siva Kumar, Dr.Pendyala Kameswari, *Textbook of Biochemistry*, AITBS publishers, India, 2nd Edition, 2014.

References Books:

1. David L. Nelson, Michael M. Cox Lehninger *Principles of Biochemistry*, MacmillanPublishers, 7th Edition, 2017.
2. Victor Rodwell, David Bender , P .Anthony Weil , Peter Kennelly , Kathleen Botham, *Harper's Illustrated Biochemistry***,** Lange Publishers, 30th Edition, 2017.
3. Donald Voet, Judith G.Voet, *Biochemistry*, John Wiley and Sons Publishers, 4thEdition, 2016.

Journals

1. International Journal of Biochemistry and Biophysics
2. International Journal of Biochemistry and Molecular Biology
3. International Journal of Biological and Chemical Sciences

E-Resources:

1. https://www.pdfdrive.com/biochemistry-e187234482.html
2. https://www.pdfdrive.com/textbook-of-biochemistry-for-medical-students-e186671773.html
3. https://www.pdfdrive.com/lippincotts-biochemistry-6th-edition-e41485405.html
4. https://www.pdfdrive.com/textbook-of-biochemistry-e14983388.html
5. https://www.pdfdrive.com/lehninger-principles-of-biochemistry-e189596394.html

SECOND SEMESTER
(For Microbiology and Chemistry) Allied II - Bio Chemistry –II
(For those who joined since 2021-22)

Semester: II **Hours per Week: 6**
Sub. Code: HBCHA24/HBMBA23 **Credit: 5**

Course outcomes:

Upon completion of the course, students will have knowledge on
CO1: Enzyme and its application
CO2: Understand the concepts metabolism
CO3: The major metabolic pathways in human metabolism
CO4: Aware about the importance of metabolism
CO5: The transmission of genetic information from DNA to DNA.
CO6: The transmission of DNA to RNA.

Unit I **(18 hours)**

Enzymes -- Definition, classification, properties, Factors influencing enzyme action. Enzyme specificity, enzyme inhibition, Application of enzymes in different field.

Coenzyme, types of coenzymes and its role in carbohydrate metabolism.

Unit II **(18 hours)**

Metabolism of Carbohydrates – Introduction to Metabolism, Metabolism of Carbohydrates -- glycolysis, PDH, TCA, Gluconeogenesis, Glycogenesis, Glycogenolysis, HMP Shunt, Uronic acid pathway.

Unit III **(18 hours)**

Metabolism of Amino acids and Proteins–Proteolytic enzymes –endopeptidase and exopeptidase. Decarboxylation, Deamination, Transamination, Urea cycle. Metabolism of phenyl alanine, tyrosine, tryptophan, histidine, proline and arginine.

Unit IV **(18 hours)**

Metabolism of Lipids – Biosynthesis of fatty acids, Oxidation of fatty acids, Ketogenesis. Metabolism of cholesterol, triglycerides and phospholipids.

Unit V **(18 hours)**

Nucleic acid – Biosynthesis of DNA and RNA, Protein.
Biological oxidation - ETC and Oxidative phosphorylation.

Textbooks:

1. Dr.U.Satyanarayana, U.Chakrapani, *Biochemistry,* Elsiever Publication, 5th Edition,2017.
2. Dr. Kondreddy Rambabu, Dr.Pendyala Siva Kumar, Dr.Pendyala Kameswari, *Textbook of Biochemistry,* AITBS publishers, India, 2nd Edition, 2014.

References Books:

3. David L. Nelson, Michael M. Cox Lehninger, *Principles of Biochemistry*, MacmillanPublishers, 7th Edition, 2017.
4. Victor Rodwell, David Bender , P .Anthony Weil , Peter Kennelly , Kathleen Botham, *Harper's Illustrated Biochemistry*, Lange Publishers, 30th Edition, 2017.
5. Donald Voet, Judith G.Voet, *Biochemistry***,** John Wiley and Sons Publishers, 4thEdition, 2016.

Journals

1. International Journal of Biochemistry and Biophysics
2. International Journal of Biochemistry and Molecular Biology
3. International Journal of Biological and Chemical Sciences

E-Resources:

1. https://www.pdfdrive.com/biochemistry-e187234482.html
2. https://www.pdfdrive.com/textbook-of-biochemistry-for-medical-students-e186671773.html
3. https://www.pdfdrive.com/lippincotts-biochemistry-6th-edition-e41485405.html
4. https://www.pdfdrive.com/textbook-of-biochemistry-e14983388.html
5. https://www.pdfdrive.com/lehninger-principles-of-biochemistry-e189596394.html

M Sc HOME SCIENCE NUTRITION AND DIETETICS

[Two Years Regular Programme]

(For those who joined since 2021-22)

PROGRAMME STRUCTURE

Sem	Subject Code	Course	Subject Title	Hour/ Week	Credit	CIA	ESE	Total Marks
I	HMNDC11	Core I	Advanced Food Chemistry	6	5	40	60	100
	HMNDC12	Core II	Advanced Human Nutrition	6	5	40	60	100
	HMNDC13	Core III	Advanced Food Microbiology	6	5	40	60	100
	HMNDC14	Core IV	Research Methodology and Statistics	6	5	40	60	100
	HMNDE1A/HMNDE1B	Elective I	a. Public Health Nutrition / b. Sensory Evaluation	6	5	40	60	100
	HMNDX1/HMNDX10	Extra Credit	Institutional Food Service Management / Online Certificate Course	-	2	-	100	100
			TOTAL	**30**	**25+2**	**200**	**300+ 100**	**500+ 100**
II	HMNDC21	Core V	Medical Nutrition Therapy I	6	5	40	60	100
	HMNDC22P	Core VI	Medical Nutrition Therapy I Practicals	6	5	40	60	100
	HMNDC23	Core VII	Advanced Nutritional Biochemistry	6	5	40	60	100
	HMNDC24P	Core VIII	Food Analysis Practicals	6	5	40	60	100
	HMNDE2A/HMNDE2B	Elective II	a. Guidance and Counselling in Nutrition Education / b. Food Packaging	6	5	40	60	100
	HMNDX2PW/ HMNDX20	Extra Credit	Scientific Writing for Project/ Online Certificate Course	-	2	-	100	100
			TOTAL	**30**	**25+2**	**200**	**300+ 100**	**500+ 100**
III	HMNDC31	Core IX	Medical Nutrition Therapy II	6	5	40	60	100
	HMNDC32P	Core X	Medical Nutrition Therapy II Practicals	6	5	40	60	100
	HMNDC33	Core XI	Nutrition Through Life Cycle	6	5	40	60	100
	HMNDC34	Core XII	Nutraceuticals and Functional Foods	6	5	40	60	100
	HMNDE3A/ HMNDE3B	Elective III	a. Food Safety and Quality Control b. Sports Nutrition	6	5	40	60	100
	HMNDX3/HMNDX30	Extra Credit	Diabetic Care and Education / Online Certificate Course	-	2	-	100	100
			TOTAL	**30**	**25+2**	**200**	**300+ 100**	**500+ 100**

IV	HMNDC41	Core XIII	Geriatric Nutrition	6	5	40	60	100
	HMNDC42	Core XIV	Dietetic Internship in Hospital	6	5	40	60	100
	HMND43PW		Dissertation	16	5	100	100	200
	HMSED4	Extra Credit	Skills for Employability Development		2	-	100	100
			Library	2				
			TOTAL	**30**	**15 + 2**	**180**	**220+ 100**	**400+ 100**
			GRAND TOTAL	**120**	**90+ 8**	**780**	**1120+ 400**	**1900+ 400**

*For online certification credit alone will be assigned on submission of certificate obtained through appearing for online examination from spoken tutorial, EDX, NPTEL etc.

Core I - Advanced Food Chemistry
(For those who joined since 2021-22)

Semester: I **Hours per week: 6**
Subject Code: HMNDC11 **Credit: 5**
Course outcomes:

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

CO 1: Explain the chemistry, structure and composition underlying the properties of various food components
CO2: The changes in physiochemical and functional properties of food constituents due to processing.
CO3: Understand basic concepts of new food product development.
CO4: To use the theoretical knowledge in various applications and food preparations.
CO5: Learn fundamentals of food processing technology and its process
CO6: Enable to learn about the food additives that are relevant to processed food industry for shelf life extension, processing aids and sensory appeal.

Unit I **(18 hours)**

Food in relation to health: Introduction to food science as a discipline and modern developments, Different methods of cooking, Functions of cooking.

Functional properties of foods: Definition, Structure and properties of food hydrocolloids. Hydrocolloids as gelling, emulsifying, thickening, stabilizing and coating agents. Important roles of proteins (Denaturation and Browning), Carbohydrates (Caramelization and Crystallization) and Fats (Emulsification) in altering the functional properties of food.

Unit II **(18 hours)**

Carbohydrates: Polysaccharides-Structure, Composition of starch, Properties and characteristics of food starches, Effect of heat on food starch properties, Factors

influencing gelatinization and dextrinisation changes. Modified food starches - Structure, composition and characteristics of non-starch polysaccharides such as Cellulose, Hemicellulose, Pectin and gums, Role of starch and non-starch polysaccharides in food Industries.

Properties of sugars and sweeteners: Sugars syrups, Sugar alcohols, sweeteners, sugar products, Role of sweetener in food products.

Unit III **(18 hours)**

Proteins: Amino acid-Classification, Structure, Composition of proteins and Properties, Classification and properties of proteins. Effect of heat on physio-chemical properties of proteins, Role of proteins in food products, Texturized vegetable protein, Protein concentrate and isolate preparation methods.

Enzymes: Classification and its nature, Mechanism of action, Factors influencing enzyme activity, Role of enzymes in food products, Immobilized enzymes and its application in food industries.

Unit IV **(18 hours)**

Fat/Oil: Structure, Composition and Properties of fat. Method of oil extraction- Oil composition and the properties, Refining of oil and winterization, Methods to determine the quality of fat/oil. Effect of processing on physico-chemical properties of fat/oil, Sources of fat and its shelf life, Quality changes in fat/oil during storage and prevention of fat spoilage, Role of fat/oil in food products, Fat substitutes.

Unit V **(18 hours)**

Food colours and Flavours: Pigments - Classification, Structure and properties, Effects of processing on stability of pigments in foods and the factors influencing stability of colours in foods, Role of colours in food products, Flavors, Taste and nonspecific saporous sensations. Flavour compounds in vegetables, Fruits and spices, Flavours produced from fermentation and volatiles on foods, Effect of processing on food flavours, Role of flavours in food products.

Text Books:

1. Shakuntala Manay.N, Shadaksharaswamy.M, *Food Facts and Principles,* New Age International Publishers, 4th edition, 2018.
2. John M. deMan, John W. Finley, W. Jeffrey Hurst, Chang Yong Lee, *Principles of Food Chemistry,* Springer Publishers, 4th edition, 2018.
3. Srilakshmi.B, *Food science,* New Age International Publishers, New Delhi, 8th edition, 2019.

Reference Books:

4. Fellows P J, *Food Processing Technology: Principles and practice,* CRC Wood head Publishing Ltd., Cambridge, 4th edition, 2016.
5. Srinivasan Damodaran, Kirk L. Parkin, *Fennema's Food Chemistry,* CRC Press, 5th edition, 2017.
6. Berk.z, *Food Process Engineering and Technology,* Elsevier Academic Press, Newyork, 3rd edition, 2018.

Journals:

1. Journal of Food Science
2. Journal of Food Science and Technology
3. Journal of Agricultural and Food Chemistry

E-Resources:

1. http://www.uprtou.ac.in/other_pdf/MFN_008.pdf
2. http://www.fao.org/3/x5738e/x5738e06.htm#TopOfPage
3. https://www.pdfdrive.com/introduction-to-proteins-structure-function-and-motion-second-edition-e187940292.html
4. https://www.pdfdrive.com/the-chemistry-of-oils-and-fats-sources-composition-properties-and-uses-e156997107.html

Core II - Advanced Human Nutrition

(For those who joined since 2021-22)

Semester: I **Hours per week: 6**
Subject Code: HMNDC12 **Credit: 5**

Course outcomes:

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

CO1: Gain in-depth knowledge of the physiological and metabolic role of macronutrients, fat soluble vitamins and electrolytes and their importance in human nutrition.
CO2: Enable the understanding of basis of human nutritional requirements.
CO3: Familiarize with the recent advances in nutrition and apply this knowledge in planning for public health programmes.
CO4: Critically evaluate and derive requirements for specific micronutrients
CO5: Recommendations through the life cycle and translate the knowledge into practical guidelines for dietary needs.
CO6: Discuss the Bioavailability, excess and deficiency condition of all nutrients.

Unit I **(18 hours)**

Human Nutritional Requirements: Development and Recent Concepts-Methods of determining human nutrient needs, Description of basic terms and concepts in relation to human nutritional requirements, Guidelines and Recommendations, Translation of nutritional requirements into Dietary Guidelines.

Energy: Determination of energy value of food, Physiological fuel value, Benedict's Oxy-calorimeter, Relation between oxygen required and calorimeter value. Total energy requirement, Measuring total energy requirement. Factors affecting physical activity, Basal metabolic rate - Measurement of basal metabolism, Determination of basal metabolic rate by calculation energy requirement during work and thermic effect of food, Regulation of Energy Metabolism and Body Weight, Control of food intake.

Unit II **(18 hours)**

Carbohydrates: Review of nutritional significance of carbohydrates and changing trends in dietary intake of different types of carbohydrates and their implications, Dietary fibre - Types, Sources and role and mechanism of action. Chemical composition and physiological significance - Resistant starch, Fructo-oligosaccharides, Glycemic Index and Glycemic load.

Unit III **(18 hours)**

Proteins: Protein Metabolism in muscle, Liver and Gastro Intestine, Amino acid and peptide transporters, Requirements and dietary guidelines, Therapeutic applications of amino acids, Peptides of physiological and nutritional significance.

Lipids: Nutritional significance of fatty acids - Saturated fatty acid, Mono unsaturated fatty acid, Poly unsaturated fatty acid and Trans fatty acids. Functions and deficiency of Essential fatty acids, Role of n-3 and n-6 fatty acids, Nutritional Requirements and dietary guidelines for visible and invisible fats in diets.

Unit IV **(18 hours)**

Vitamins: Definition, Classification, Metabolism (Digestion, Absorption, Transport, Storage and elimination), Bioavailability and factors affecting bioavailability, Biochemical and physiological functions, Interaction with other nutrients, Pharmacological and therapeutic effects - Fat soluble vitamins: (A, D, E, K) and Water soluble vitamins (B1, B2, B3, B5, B6, B9, B12, Vitamin C).

Unit V **(18 hours)**

Minerals: Definition, Classification, Food Source, Metabolism (Digestion, Absorption, Transport, Storage and Elimination), Bioavailability and factors affecting bioavailability, Biochemical and physiological functions, Interaction with other nutrients, Pharmacological and therapeutic effects - Macro Minerals (Calcium, Phosphorous, Sodium, Potassium). Micro Minerals (Iron, Zinc, Selenium, Iodine and Fluorine).

Body fluid and electrolyte balance: Water distribution in the body, preformed and metabolic water; maintenance and regulation of fluid and electrolyte balance.

Text Books:

1. Bamji, M.S., Krishnaswamy K. Brahmam G.N.V , *Textbook of Human Nutrition*. Oxford and Ibh Publishing Co. Pvt. Ltd. New Delhi, 4th edition, 2017.
2. Srilakshmi. *Nutrition Science,* New Age International Publishers, 8th edition, 2019.
3. Suryatapa Das, *Text Book of Human Nutrition*, Academic publishers, 1st edition, 2021.

Reference Books:

4. Susan G. Dudek, *Nutrition Essentials for nursing Practice,* Lippincot Williams DWilkias, Philadelphea, 2017.
5. Rhonda M. Lane, Human Nutrition: Navigating through the Maze, Kendall/Hunt Publishing Co, U.S, 3rd edition, 2019.
6. Kathleen Mahan and Sylvia Escort- Stump, *Food, Nutrition and Diet Therapy*, W.B.Saunder's Company London,11th edition, 2011.

Journals:

1. American Journal of Clinical Nutrition
2. Indian Journal of Nutrition and Dietetics
3. Journal of Clinical Nutrition and Food Science

E-Resources:

1. https://www.pdfdrive.com/introduction-to-human-nutrition-2nd-edition-e1688125.html.
2. https://www.pdfdrive.com/introduction-to-human-nutrition-e8482943.html
3. https://www.pdfdrive.com/vitamin-and-mineral-requirements-in-human-nutrition-e28893.html
4. https://www.pdfdrive.com/vitamins-and-minerals-e162099106.html
5. https://www.pdfdrive.com/advanced-nutrition-and-dietetics-in-nutrition-support-e158466498.html

Core III - Advanced Food Microbiology
(For those who joined since 2021-22)

Semester: I **Hours per week: 6**
Subject Code: HMNDC13 **Credit: 5**
Course outcomes:

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

CO1: Gain knowledge of the role of micro-organisms in health and disease.
CO 2: Know the important genera of microorganisms associated with food and their characteristics.
CO 3: Gain knowledge about distribution and role of microorganisms in food preparation and fermentation process and Improve their knowledge on natural food toxin.
CO4: Acquire knowledge on beneficial role of microorganism and relevance of microbiological safety of food.
CO5: Gain knowledge about distribution and role of microorganisms cause food borne diseases.
CO6: Understand the concept of HACCP in Food Industry.

Unit I **(18 hours)**

Introduction to Food microbiology: History and development of Food microbiology, Scope of food microbiology, General characteristics of microorganisms, Morphology, Classification, Motility, Nutrition, Respiration and reproduction - Bacteria, Viruses, Yeasts, Molds, Algae and Protozoa.

Unit II **(18 hours)**

Determination of microorganisms and their products in food: Sampling, sample collection, Transport and Storage, Sample preparation for analysis.

Microscopic and culture dependent methods: Direct microscopic observation, culture, Enumeration and isolation methods.

Chemical and Physical methods: Chemical, immunological and Nucleic acid based methods.

Culture independent techniques: PCR Based, DGGE, Metagenomics. Analytical methods for microbial metabolites - Microbial toxins and metabolites.

Unit III **(18 hours)**

Microorganisms and Food Preparation Fermentation process: Prebiotics, Probiotics and single cell proteins. Dairy products, Traditional Indian fermented foods and their health benefits. Fermented Beverages - Wine, Beer, Toddy and Vodka.

Natural Toxins in Food: Natural toxins of plant and animal origin, Microbial toxins (Algal toxins, Bacterial toxins and Fungal toxins).Natural occurrence, toxicity and significance. Food poisoning. Determination of toxicants in foods and their management.

Unit IV **(18 hours)**

Food borne diseases: Bacterial food borne diseases - Staphylococcal intoxication, Botulism, Salmonellosis, Shigellosis, Enteropathogenic Escherichia Coli Diarrhoea, Clostridium Perfringens gastroenteritis, Bacillus cereus Gastroenteritics.

Viral Food borne diseases: Norwalk virus, Norovirus, Reovirus, Rotavirus, Astrovirus, Adenovirus, Parvovirus, Hepatitis A Virus.

Animal Parasites Food borne diseases: Protozoa-Giardiasis, Amebiasis, Toxoplasmosis, Sarcocystosis, Cryptosporidiosis, Cysticercosis / Taeniasis. Roundworm:Trichinosis, Anisakiasis. Mycotoxins: Aflatoxicosis, Deoxyni valenol Mycotoxicosis, Ergotism.

Unit V **(18 hours)**

Food Adulteration: Food Commonly Adulterated, Common Adulterants b. Harmful effects of Adulterants and Methods for Detection of some Adulterants.
HACCP: An Effective Food Safety Assurance System, Need for HACCP, Benefits of HACCP, Principle of HACCP, Guidelines for Application of HACCP Principles, HACCP Status in India, HACCP Case Studies.

Text Books:

1. William C. Frazier, *Food Microbiology*, Tata McGraw Hills Publishing Company Limited, Chennai,5th edition, 2014.
2. Jay M.J, *Modern Food Microbiology*, CBS Publishers and Distributors, New Delhi, 4th edition, 2015.
3. Ramesh, K.V, *Food Microbiology*, MJP Publishers, Chennai.2019.

Reference Books:

4. Matthews.K.R, *Food microbiology an Introduction*, ASM Press, 4th Edition, 2017.
5. Adams, MR and Moss,MO,*Food Microbiology*, New Age International (P) Ltd., New Delhi,2015.
6. Ray, B. and Bhunia, A, *Fundamental Food Microbiology*, CRC press, 5th edition 2018.

Journals:

1. Journal of Food Microbiology
2. Journal of Food & Industrial Microbiology
3. International Journal of Food Microbiology

E-Resources:

1. https://www.pdfdrive.com/food-microbiology-d55747381.html
2. https://www.pdfdrive.com/food-microbiology-e58597702.html
3. https://www.pdfdrive.com/fundamental-food-microbiology-fifth-edition-e175981800.html
4. https://www.pdfdrive.com/food-microbiology-an-introduction-e166783912.html
5. https://www.pdfdrive.com/foodborne-parasites-food-microbiology-and-food-safety-e157137947.html

Core IV Research Methodology and Statistics
(For those who joined since 2021-22)

Semester: III **Hours /week: 6**
Subject Code: HMNDC14 **Credits: 5**

Course Outcomes:

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

CO1: Demonstrate knowledge of the scientific method, purpose and approaches to research.

CO2: Explain the types of research, objectives of research, research process and research designs.

CO3: Define a research problem and draft a research design for solving.
CO4: Apply the appropriate sampling techniques for projects.
CO5: Acquire knowledge about tools for data collection and sampling.
CO6: Ability to apply statistical techniques to research data for analyzing and interpreting data meaningfully.

Unit I **(18 hours)**

Introduction to Research Methodology: Meaning, Objectives and Significance ofresearch. Types of research and Research approaches and scientific methods. Criteria of good research. **Research process**: Selection and formulation of research problem, Specifying objectives, Formulating hypothesis and Deciding variables, Limitations and delimitations of the problem.

Unit II **(18 hours)**

Defining the Research Problem: Concept and need, Identification of Research problem, defining and delimiting Research problem.

Research Questions and Hypothesis: Variables and their linkages, characteristics of good Hypothesis. Research question and formulation of hypothesis-directional and non-directional hypothesis.

Research design: Purposes of research design -Fundamental, Applied andaction, Exploratory and descriptive, Experimental, Ex-post facto - Longitudinal and Cross sectional and Co-relational.

Data collection instrument: Observation, Questionnaire, Interview, Scaling method, Case study and Home visits. Reliability and validity of measuring instruments.

Unit III **(18 hours)**

Sampling design: Population and sample, Steps in sampling design, Criteria for selecting a sampling procedure ,Different types of sampling techniques - Probability sampling, Random sampling, Purposive sampling, Stratified sampling and Non-probability sampling. Advantages and disadvantages of sampling. Power analysis and sample size calculation in experimental design.

Unit IV **(18 hours)**

Research Tools: Scales of data measurements, Characteristics of good tool-Validity, usability and reliability. Types of tools and their uses - Questionnaire, Rating scale and Attitude scale -Interview-Structured and unstructured and - Observation-Participant and non participant Concept of data - Types and analysis of Qualitative and Quantitative data.

Use of online tools for data Collection: Survey conducted through Google form, Form plus, Survey sparrow.

Unit V **(18 hours)**

Statistical Testing of Hypothesis: Define Hypothesis, Hypothesis statement, Hypothesis testing, Null hypothesis

Parametric Tests: Definition, Merits and demerits. Types and it applications-Student T test (Independent, Paired, Two-Tailed and One-Tailed Tests), Anova, Z-Test.

Non-Parametric Tests: Definition, Merits and demerits. Types and it applications Chi-Square Tests and Spearman's Rank correlation. Difference between Parametric and Non Parametric test.

Application of computers in data analysis: SPSS, MAXQDA, ATLAS.ti, NVivo

Text Books:

1. Kothari, C.R. *Research Methodology (Methods and Techniques),* New Age International Publishers; 4th edition, 2019.
2. Gupta, S.P, *Research Methodology and Statistical Techniques,* Sultana Chand and Sons & Deep Publications, 2018.
3. Kumar, R. *Research Methodology: A Step-By-Step Guide for Beginners,* Sage Publications, 2011.

Reference Books:

4. Ranjit Kumar, *Research Methodology*, Sage publication, 4th edition, 2014.
5. Robert O. Kuehl Brooks/ cole. *Design of Experience: Statistical Principles of ResearchDesign and Analysis,* Wiley Publisher, 8th edition, 2013.
6. Wilcox R and R. *Fundamentals of modern statistical methods*, Springer Publisher New York, 2nd edition, 2010.

Journals:

1. Journal of Advanced Research
2. Journal of scientific Research
3. Journal of Research in Medical Sciences

E-Resources:

1. https://explorable.com/research- methodology
2. https://www.mbaknol.com/research-methodology/the-basic-types-of-research
3. https://www.pdfdrive.com/fundamental-of-research-methodology-and-statistics-e19853056.html
4. https://www.pdfdrive.com/spss-statistics-for-dummies-3rd-edition-e34460729.html
5. https://www.pdfdrive.com/spss-survival-manual-a-step-by-step-guide-to-data-analysis-using-spss-for-windows-version-10-e158709797.html

Elective I – a. Public Health Nutrition
(For those who joined since 2021-22)

Semester: I **Hours per week: 6**
Subject Code: HMNDE1A **Credit: 5**

Course outcomes:

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

CO 1: Know the various National and International organizations working for Nutrition
CO 2: Gain more knowledge on role of nutrition in health and prevalence of malnutrition in India.
CO 3: Understand the concept of measures to overcome malnutrition,
CO 4: Explain the Physiological, Anthropometric and Biochemical Assessment of thenutritional status.
CO5: Acquire knowledge about planning therapeutic diets according to the individual orpatients requirement in disease conditions.
CO 6: Educate the patients and family regarding nutritional care.

Unit 1 **(18 hours)**

Concept of Public Health Nutrition: Relationship between health and nutrition, Role of public nutritionist in the health care delivery system. Population Dynamics - Demography and Demographic cycle. World population trend - Birth rates, Death rates, Growth rates and Demographic trends in India - Age pyramid, sex ratio and Human Development Index. Health care facility - Role of public nutritionists in the health care delivery system, Primary Health Centre - Concept, functions.

Unit II **(18 hours)**

Assessment of Nutritional Status: Methods of Nutritional assessment-Nutritional anthropometry and Growth standards, Dietary and clinical assessment, Biochemical and Radiological assessment. Nutrition monitoring- Objectives and Agencies engaged in nutrition monitoring. Nutritional surveillance- Need for nutritional surveillance, Key indicators of nutritional surveillance programme.

Unit III **(18 hours)**

Nutrition Intervention Programmes in India: Objectives and operation of Feeding Programmes-Chief Minister Noon Meal Programme (CMNMP) and Integrated Child Development Service (ICDS).Primary Health Center (PHC)-Concept, Organization, Current status in India and delivery of service. National organization- ICMR, NIN, NNMB, CFTRI. International Organization-FAO, WHO, UNICEF, UNESCO, World Bank and package program of immunization.

Unit IV **(18 hours)**

Strategies to combat public nutrition problems: Protein energy malnutrition (PEM), Vitamin a deficiency, Iron deficiency anemia (IDA), Iodine deficiency disorder (IDD), Zinc deficiency, Beriberi and Pellagra, Folic acid and B12 deficiency, Scurvy, Rickets, Osteomalcia, Fluorosis and Lathyrism.Nutritional guidelines for emergency situations.

Unit V **(18 hours)**

Nutrition Education: Need, Scope, Importance and Theories of nutrition education, Process of nutrition education. Nutrition education communication: Programme, Formulation, Implementation and evaluation. Primary Health Care (PHC) and its role in preventing communicable diseases.

Text Books:

1. Srilakshmi, B. *Nutrition Science*, New Age International Publisher, New Delhi,6th edition, 2017.
2. Padmini Gupta, Ruchithakkar, *Nutritional Disorders and Community Health*, Pointer Publishers, Jaipur, 2003.
3. Suryatapadas, Textbook of Community Nutrition, Academic Publishers, 2016.

Reference Books:

4. Park A., Textbook of Preventive and Social Medicine, Twenty Third edition, 2015, Bhanot.
5. Edelstein S, *Nutrition in Public Health: A handbook for developing programmes and services*. Jones and Bartlett Learning, Third Edition, 2010.
6. Boyle M.A., Community *Nutrition in Action: An Entrepreneurial Approach*. 7th Edition, Brooks Cole.2016.

Journals:

1. American Journal of Clinical Nutrition
2. International Journal of Behavioral Nutrition and Physical Activity
3. Journal of Public Health Nutrition

E-Resources:

1. https://www.pdfdrive.com/public-health-nutrition-e196546358.html
2. https://www.pdfdrive.com/community-and-public-health-nutrition-e60389853.html
3. https://www.pdfdrive.com/handbook-of-nutrition-and-immunity-e175896624.html
4. https://www.pdfdrive.com/handbook-of-anthropometry-physical-measures-of-human-form-in-health-and-disease-e165859751.html
5. https://www.pdfdrive.com/practical-public-health-nutrition-e191432662.html

Elective I- b. Sensory Evaluation
(For those who joined since 2021-22)

Semester: I **Hours per week: 6**
Subject Code: HMNDE1B **Credit: 5**

Course outcomes:

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

CO 1: Understand the concept of food needs & consumer preference - market survey and its importance.
CO 2: Gain more knowledge on different kind of sensor organs and its functions.
CO 3: Understand knowledge about different types of sensory evaluation factors
CO 4: Understand the concept of quality and safety aspect of factors.
CO 5: Gain knowledge about instrument used for sensor evaluation
CO 6: Gain knowledge about food packaging concept and ADI

Unit I **(18 hours)**

Introduction to quality attributes of food: Appearance, flavour, textural factors and additionalquality factors.
Gustation: Introduction and importance of gustation. Structure and physiology of taste organs - tongue, papillae, taste buds, salivary glands. Mechanism of taste perception, Chemical dimensions of basic tastes - sweet, salt, sour, bitter and umami. Factors affecting taste quality, Reaction time, Taste modification, Absolute and recognition threshold. Taste measurement- Electronic Tongue, Taste abnormalities.

Unit II **(18 hours)**

Olfaction: Definition and importance of odour and flavor, Anatomy of nose, physiology of odour perception, Mechanism of odour perception, Theories of odour classification, Chemical specificity of odour. Odour measurement techniques- Historical perspective and emphasis on recent techniques- e- nose. Olfactory abnormalities, Instruments used for olfactory sensory evaluation.

Unit III **(18 hours)**

Colour: Introduction and importance of colour, dimensions of colour and attributes of colour; gloss etc. Perception of colour. Colour Measurement: Munsellcolour system, CIE colour system, Hunter colour system. Colour abnormalities. Instruments used for colour sensory evaluation.

Unit IV **(18 hours)**

Texture: Introduction, definition and importance of texture, Phases of oral processing,Texture perception, Receptors involved in texture perception, Rheology of foods.

Texture classification: Texture measurement-Basic rheological models, forces involved in texture measurement and recent advances in texture evaluation. Application of texture measurement in cereals, fruits and vegetables, dairy, meat and meat products. Instruments used for Texture evaluation.

Unit V **(18 hours)**

Quality, Safety & Regulatory Aspects: Product Stability, evaluation of shelf life, Changes in sensory attributes and effects of environmental conditions, Accelerated shelf life determination. Developing packaging systems for maximum stability and cost effectiveness, interaction of package with food. Regulatory Aspects-standard product and conformation to standards; Approval for Proprietary Product. Acceptable Daily Intake (ADI) of food additives.

Text Books:

1. Shadaksharaswamy,M., *Food Facts and Principles*, New Age International Private Limited., New Delhi,4th edition 2018.
2. Harry.T, Lawless, *Sensory Evaluation of food Principles and Practice*, Springer, 2nd edition, 2010.
3. Gail Vance Civille B.Thomas carr. *Sensory Evaluation Techniques*, CRC Press, 5th edition, 2016.

Reference Books:

4. Howard R. Moskowitz, I. Sam Saguy & Tim Straus, *An Integrated Approach to New FoodProduct Development,* Taylor and Francis Group, LLC.USA, 2009.
5. Harry T. Lawless, Sensory Evaluation of Food: Principles and Practice, Springer, 2nd edition, 2010.
6. Jacqueline H. Beckley, M. Michele Foley Elizabeth J. Topp&_J. C. Huang Witoon Prinyawiwatkul, *Accelerating New Food Product Design and Development*, BlackwellPublishing Company. IFT Press. USA, 2007.

Journals:

1. Asian journal of Science and Technology
2. Journal Food Quality and Preference
3. Journal of Sensory Studies

E-Resources:

1. https://www.pdfdrive.com/sensory-evaluation-techniques-fourth-edition-e175768895.html
2. https://www.pdfdrive.com/sensory-evaluation-of-food-principles-and-practices-e164908255.html
3. https://www.pdfdrive.com/sensory-evaluation-of-food-food-science-and-technology-e160983082.html
4. https://www.pdfdrive.com/sensory-evaluation-in-quality-control-e165837288.html
5. https://www.pdfdrive.com/sensory-evaluation-techniques-third-edition-e157723994.html

Extra credit - Institutional Food Service Management

(For those who joined since 2021-22)

Semester: I **Hours per week:**
Subject Code: HMNDX1 **Credit: 2**

Course outcomes:

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

CO 1: Gain knowledge of the type of food services in India and the factors whichhave led to their development.
CO 2: Learn theoretical knowledge in various applications and food preparations.
CO 3: Acquire knowledge about the Kitchen Management Principles and layout
CO 4: Improve their knowledge on different style of service, hygiene and sanitation.

Unit I

Food service industries in India: Acts and responsibilities. Fables, foibles, fraud and fact - note on eating preference and misinformation, Reliable information, Source of reliable information, Government information and regulations on healthful food program.

Unit II

Projecting and preserving nutrients during production, purchase, storage, cooking and serving. Types and function of menu, planning a menu according to food service type.

Unit III

Kitchen management Principles of layout, determination of equipment : Factors affecting the selection, Criteria for selection, Types of equipment, Basic materials used in manufacture of equipment, Installation and care of equipment, Fuel saving techniques, Physical planning - Architectural features, Floor, Walls, Lighting, Plumbing and Ventilation.

Unit IV

Food Service: Service areas, Methods and styles, Table winding up, Setting, Presentation techniques, Clearing and Customer relations. Laws governing food service institutions -Food laws, Labour laws, Laws concerning hygiene and safety.

Unit V

Environmental hygiene and sanitation: Hygiene in food plant hygiene, Safety handling and Personal hygiene, Prevent procedure followed in food service establishment to prevent accidents, Facilities and benefits to workers in each establishment.

Text Books:

1. Mohinisetihi, *Institutional Management*, New Age International Publishers, 2008.
2. Gupta, Ashim.,Basic of Hotel Office Management, ABD Publishers Jaipur 2014.
3. Axler, Bruce, H., Food and Beverage Service,Wiley New Delhi 2013.

Reference Books:

4. Arora R K, Encyclopaedia of Hotel and Hospitality Management: Food and Beverage Laws, APH Publishing New Delhi 2011.
5. Gupta, Ashim., Hotel Front Office Operations and Management,Anmol Publications New Delhi 2014
6. Newman, Jacqueline M. Chinese Buffets: A Trend Worth Exploring, Flavor & Fortune. ISACC. 2014**.**

Journals:

1. Journal of Food Science and Technology
2. Journal of Food Measurement and Characterization
3. Food Service Equipment Journal

E-Resources:

1. https://indiancompanies.in/indias-food-services-industry-sector/
2. https://www.slideshare.net/mimieazhar/menu-and-menu-planning-206167369
3. https://hospitalitystudy.wordpress.com/2013/07/16/kitchen-lay-out-design/
4. https://www.slideshare.net/schnkmr824/laws-and-regulations-related-to-food-industries
5. https://www.foodsafety.com.au/blog/a-food-handlers-guide-to-personal-hygiene

Core V- Medical Nutrition Therapy I
(For those who joined since 2021-22)

Semester: II **Hours per week: 6**
Subject Code: HMNDC21 **Credit: 5**

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

CO1: Understand the modifications in nutrients and dietary requirements for therapeutic condition.

CO2: Obtain knowledge on therapeutic diets and to develop capacity and attitude for taking up dietetics as a profession.

CO3: Understand the therapeutic role of diet and nutritional care With reference to weight management, fevers& infections and diseases of the gastrointestinal tract and hepatobiliary system.

CO4: Understand the etiology, physiologic and metabolic anomalies of acute and chronic diseases and patient needs.

CO5: Able to recommend and provide appropriate nutritional care based on pathophysiology, prevention/ and treatment of the various diet-related disorders/ diseases.

CO6: To facilitate the students to realize the principles of diet.

Unit I **(18 hours)**

Nutritional and dietary care Process in health: Depending on the state of growth and development of the individual at various activity levels and socioeconomic status.

Nutritional care process in disease: Nutritional screening/ assessment and identification of nutritional problem - Nutritional Intervention and Diet modification based on interpretation of Patient data- Clinical, Biochemical and other relevant data - Nutrition Education and Counseling .Evaluation of nutritional care.

Unit II **(18 hours)**

Dietary management in obesity: Prevalence, Classification, Etiology complication, Diet modification, Dietary management and pharmacology treatment in Obesity.

Dietary management in Underweight: Etiology, Limitation and dietary management in Underweight.

Dietary management in Eating disorders: Definition, Signs and symptoms and Complications / health risks, Diagnostic criteria and nutrition management in Anorexia nervosa and Bulimia nervosa.

Unit III **(18 hours)**

Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of fever and infection.

Fever: Typhoid, Malaria, H1N1, Dengue fever and chicken guinea, Covid-19, Role of Immune booster food in management of fever and infection.

HIV infection and AIDS: Epidemiology, Transmission of HIV, Defense pathophysiology, Clinical manifestations, HIV infection and other disease, Immunity and AIDS virus, Dietary management prevention and control.

Unit IV **(18 hours)**

Etiopathophysiology, metabolic and clinical aberrations, complications, prevention andrecent advances in the medical nutritional management of GI Disease.

Diseases of Esophagus and Stomach: Esophagitis, Dyspepsia, GERD, Peptic Ulcer, Gastritis &Gastroectomy, Dumping Syndrome.

Diseases of small and Large Intestine: Flatulence, Diarrhoea, Constipation, Hemorrhoids, Diverticular disease, Deuodinal Ulcer, Inflammatory Bowel Disease- Crohn's disease Ulcerative Colitis - Irritable bowel syndrome.

Malabsorption Syndrome: Celiac Sprue, Tropical Sprue, Steatorrhoea. Intestinal brush border deficiencies and Protein Losing enteropathy.

Unit V **(18hours)**

Etiopathophysiology, metabolic and clinical aberrations, Complications, Prevention and recent advances in the medical nutritional management of Liver, Gall bladder and pancreatic disorders.

Disease of Liver: Viral Hepatitis, Cirrhosis of Liver, Hepatic Encephalopathy, Wilson's disease& Liver Transplant.

Diseases of Gall bladder: Biliary Dyskinesia, Cholelithiasis,Cholecystitis,Cholecystectomy.

Disease of Pancreas: Acute pancreatitis, Chronic pancreatitis and Zollinger- Ellison Syndrome and Gout.

Text Books:

1. Srilakshmi, B**.,** *Dietetics,* New Age International (P) Ltd, 8th edition, Chennai. 2019.
2. Antia F.P. And Philip Abraham-*Clinical Nutrition and Dietetics,* Oxford University Press, 4th edition.2002.
3. Joshi .A.Shubhaangini , *Nutrition and Dietetics,* 4th edition, McGraw Hill publication,New Delhi, 2015.

Reference Books:

4. L. Kathleen Mahan, Sylvia Escott-Stump and Janice L Raymond, *Krause's Food & the Nutrition Care Process,* 15th edition, 2020.
5. Robinson, *Normal and Therapeutic Nutrition,* 17th edition, Oxford & LBM Publishing, Calcutta, Bombay, 1990.
6. Kathleen Mahan and Sylvia Escort- Stump, *Food, Nutrition and Diet Therapy,* W.B. Saunder's Company, London, 14th edition, 2016.

Journals:

1. The American Journal of Clinical Nutrition
2. Nutrition Abstracts and Reviews
3. The Indian Journal of Nutrition and Dietetics

E-Resources:

1. https://www.pdfdrive.com/nutrition-dietetics-practice-and-future-trends-e176409703.html
2. https://www.pdfdrive.com/oxford-handbook-of-nutrition-and-dietetics-e185402365.html
3. https://www.pdfdrive.com/krauses-food-the-nutrition-care-process-e175336715.html
4. https://www.pdfdrive.com/clinical-nutrition-e186572457.html
5. https://www.pdfdrive.com/nutrition-health-and-disease-a-lifespan-approach-e189164494.html

Core VI -Medical Nutrition Therapy I Practicals
(For those who joined since 2021-22)

Semester: II **Hours per week: 6**
Subject Code: HMNDC22P **Credit: 5**
Course outcomes:

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

CO1: Obtain an accurate dietary assessment calculate the nutritional requirement, plan appropriate nutritional care and explain the process of objective setting in the delivery of a nutritional care plan for a client.

CO 2: Emphasis skill development in planning therapeutic diets using food exchange lists.

CO 3: Provide greater exposure to dietetic practices followed in Indian hospital.
CO 4: Understand the importance of diet in health and disease conditions.
CO 5: Develop the practical skills about the modify the diet as per the diseasecondition.
CO6: Determine the dietary essentials for recovery and maintenance of various systems**.**

List of experiments

1. Standardization of common food preparation
2. Planning and preparation of diet for Obesity
3. Planning and preparation of diet for Underweight
4. Planning and preparation of diet for Dengue fever
5. Planning and preparation of diet for Covid-19
6. Planning and preparation of diet for Tuberculosis
7. Planning and preparation of diet for HIV and AIDS
8. Planning and preparation of diets for Peptic ulcer
9. Planning and preparation of diet for Diarrhoea
10. Planning and preparation of diet for Constipation
11. Planning and preparation of diet for Crohn disease
12. Planning and preparation of diet for Celiac Sprue
13. Planning and preparation of diet for Viral hepatitis
14. Planning and preparation of diet for Cholelithiasis
15. Planning and preparation of diet for Cholecystitis

Text Books:

1. Gopalan C., RN. Ramasastri and S.C. Balasubra-manian, *Nutritive Value of Indian Foods,* National Institute of Nutrition, Hyderabad, 2018.
2. .Vimala, *Advances in Diet therapy-Practical Manual*, New Age International Private Ltd, 2020.
3. *Clinical Dietetics Manual,* Indian Dietetic Association, 2nd edition 2018.

Reference Books:

4. Mahan L.K., Sylvia Escott-Stump - *Krause's Food Nutrition and Diet Therapy*, W.B. Saunders Company London,14th edition,2016.
5. Robinson, *Normal and Therapeutic Nutrition,* 17th edition, Oxford & LBMPublishing, Calcutta, Bombay, 1990.
6. Maimun Nisha, *Diet Planning For Diseases*, Kalpaz Publication, 2016.

Journals:

1. Asia Pacific Journal Clinical Nutrition
2. European Journal of Clinical Nutrition
3. Journal of Nutrition and Dietetics

E-Resources:

1. https://www.pdfdrive.com/manual-of-dietetic-practice-e175954283.html
2. https://www.pdfdrive.com/medical-nutrition-therapy-a-case-study-approach-e186656569.html
3. https://www.pdfdrive.com/applications-and-case-studies-in-clinical-nutrition-e185254994.html
4. https://www.pdfdrive.com/manual-of-dietetic-practice-e33501318.html
5. https://www.pdfdrive.com/manual-of-clinical-nutrition-management-e18838358.html

Core VII - Advanced Nutritional Biochemistry
(For those who joined since 2021-22)

Semester: II **Hours per week: 6**
Subject code: HMNDC23 **Credit: 5**

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

- **CO 1:** Augment the biochemistry knowledge at the postgraduate level
- **CO 2:** Explain the mechanisms and regulation adopted by the human body
- **CO 3:** Insight the interrelationships between various metabolic pathways
- **CO 4:** Achieve the basics of genetic material and their metabolism
- **CO 5:** Acquire an elaborate knowledge on Acid –Base regulation
- **CO 6:** Integrate their ideas on application of enzymes in various fields

Unit I **(18 hours)**

Enzymes: Definition, Classification, Properties, Coenzymes, Factors influencing enzyme action. Enzyme Specificity, Enzyme Kinetics, Enzyme Inhibition. Application of enzymes in different field.

Acid -Base Regulation: Definitions (Acid, Base, pH, Blood pH, Acid Base Balance, Buffer and Blood Buffers), Henderson- Hassel Balch Equation, Transport and buffering of CO_2 in blood. Buffering of non- volatile acids, Acidosis, Alkalosis, Anion gap, Role of kidney in acid base balance.

Unit II **(18 hours)**

Carbohydrates: Definition, Functions, Classifications, Structure, Physical and chemical properties, Biochemical importance. Metabolism and Regulation of Carbohydrates – Introduction to Metabolism, Metabolism of Carbohydrates-Glycolysis, PDH , TCA, Gluconeogenesis, Glycogenesis, Glycogenolysis, HMP Shunt, Uronic acid pathway. Glycogen storage disorders.

Unit III **(18 hours)**

Proteins: Definition, Functions, Classifications, Structure (primary, secondary, tertiary and quaternary), Physical and chemical properties, Biological importance of peptides. Metabolism and Regulation of Amino acids - Decarboxylation, Deamination, Transamination, Urea cycle. Metabolism of Phenyl Alanine, Tyrosine, Tryptophan, Histidine, Proline and Arginine. Inborn errors of amino acid metabolism.

Unit IV **(18 hours)**

Lipids: Definition, Functions, classifications. Fatty acids-Definition, Classifications, Physical and chemical properties .Triglycerides, Phospholipids, Glycolipids, Steroids-outline study. Metabolism and Regulation of Lipids – Biosynthesis of fatty acids, Oxidation of fatty acids, Ketogenesis. Metabolism of cholesterol, Triglycerides and Phospholipids. Lipid storage disorders.

Unit V **(18hours)**

Nucleic acids - Definition, Functions and components -Nucleotides and Nucleosides, DNA-structure, types and function. Differentiate between DNA and RNA, Nucleic acid-Biosynthesis of DNA and RNA, Protein. Biological oxidation-ETC and Oxidative phosphorylation.

Text Books:

1. Dr.Kondreddy Rambabu , Dr.Pendyala Siva Kumar, Dr.PendyalaKameswari, *Textbook of Biochemistry*, AITBS publishers, 2nd edition, 2014.
2. Dr.U.Satyanarayana, U.Chakrapani, *Biochemistry*, Elsiever Publication, 5th edition, 2017.
3. J.L. Jain, Nithin Jain, Sunjay Jain, *Fundamentals of Biochemistry* (Multi Colour Ed), S.Chand publisher, 7th edition, 2017.

Reference Books:

4. Donald Voet, Judith G.Voet, *Biochemistry,* John Wiley and Sons Publishers, 4th edition,2016.
5. David L. Nelson ,Michale m cox, *Lehninger, Principle of Biochemistry*,Macmillan Publishers,7th edition, 2017.
6. Victor Rod well, David Bender , P. Anthony Weil , Peter Kennelly , Kathleen Botham,*Harper's Illustrated Biochemistry,* Lange Publishers, 30th edition 2017.

Journals:

1. Journal of Biological Chemistry
2. Journal of Applied Biochemistry
3. Journal of Nutritional Biochemistry

E-Resources:

1. https://www.pdfdrive.com/nutritional-biochemistry-second-edition-e158739127.html
2. https://www.pdfdrive.com/introduction-to-nutrition-and-metabolism-fourth-edition-e167789063.html
3. https://www.pdfdrive.com/advanced-nutrition-and-human-metabolism-e186446303.html
4. https://www.pdfdrive.com/biochemistry-e187234482.html
5. https://www.pdfdrive.com/lehninger-principles-of-biochemistry-e158386180.html

Core VIII - Food Analysis Practicals
(For those who joined since 2021-22)

Semester: II **Hours per week: 6**
Subject Code: HMNDC24P **Credit: 5**
Course outcomes:

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

CO1: Understand the qualitative analysis of sample.
CO2: Understand various methods of quantitative estimations of biomolecules.
CO3: Learn the basic analytical techniques used for Food Analysis.
CO4: Gain Knowledge on identifying food adulterant.
C05: Understand quantitative analysis of food constituents and trace elements
CO6: Perform food analysis using advanced techniques

List of Experiments

1. Measurement of pH and preparation of buffer.
2. Determination of Acidity & pH in food sample/beverages.
3. Determination of Moisture in food sample.
4. Determination of Ash in food sample.
5. Determination of Fiber in food sample.
6. Determination of Total carbohydrates in food sample
7. Determination of Total Protein in food sample
8. Determination of Total Fat in food sample
9. Determination of Iodine Value in the food sample
10. Determination of Peroxide Value in the food sample
11. Tests for adulterants in the food sample.
12. Determination of Vitamin C in food sample

13. Estimation of calcium in food sample
14. Estimation of Iron in food sample
15. Estimation of phosphorous in food sample
16. Demonstrations - Chromatography**,** Electrophoresis

Text Books:

1. S. Sadasivam & A. Manickam, *Biochemical Methods*, New Age International Limited, 2nd Edition, 2005.
2. J.Jayaraman, *Dietary Guidelines for Indians, National Institute of Nutrition, Laboratory Manual in Biochemistry*, New Age International Limited, 1st edition, 2006.
3. Yeshajahu Pomeranz & Clifton E. Meloan, *Food Analysis: Theory and Practice*,Springer Publication,2002.

Reference Books:

1. David T Plummer, *An Introduction to Practical Biochemistry,* Tata McGraw- HillPublishing Company Ltd., 3rd edition, 2006.
2. Sathe A. Y, *A First Course in food analysis*, New Age International Limited, 1st edition,2012.
3. S. Suzanne Nielsen, *Food Analysis laboratory Manual*, Springer publication, 2nd edition,2015.

Journals:

1. Journal of Food and Drug Analysis
2. Journal of Agriculture and Food Chemistry
3. Journal of Food Composition and Analysis

E-Resources

1. www.ug.edu.gh/nutrition-dietetics/courses/diet-212-food-analysis-practical
2. old.fssai.gov.in/Portals/0/Pdf/Manual_Fruits_Veg_25_05_2016.pdf
3. https://www.elte.hu/en/Introduction-to-Food-Analysis
4. https://www.pdfdrive.com/chemical-food-analysis-practical-manual-e1091408.html
5. https://www.pdfdrive.com/manual-of-food-quality-control-e44738521.html

Elective II –a. Guidance and Counselling in Nutrition Education
(For those who joined since 2021-22)

Semester: II **Hours per week: 6**
Subject Code: HMNDE2A **Credit: 5**
Course outcomes:

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

CO 1: Understand the concept of guidance and counselling.
CO 2: Learn the characteristics of counsellors and counselling process.
CO 3: Understand about the counselling approaches and techniques.
CO 4: Acquired knowledge about the areas of counselling.
CO 5: Developed skills in guidance and counselling.
CO 6: Overall develop skills in counselling.

Unit I **(18 hours)**

Guidance and Counselling: Meaning, Nature, Scope, Principles, Goals, Needs of Guidance and Counselling of different groups, Relationship between guidance and counselling.

Types and Techniques used in guidance: Educational, Vocational, Socio-personal, Leisure time guidance; Individual and Group Guidance - Meaning and needs, Advantages, Techniques used, Role of audio-visual aids in guidance.

Unit II **(18 hours)**

Counsellors: Characteristics, Qualification and qualities, Skills and Competencies; Ethics - Do's and Don'ts, Limitations and Professional growth of counsellors, Tips for becoming effective counsellors. Counselling Process – Preparation and Pre requisites for counselling stages in counselling process Follow up and Review.

Unit III **(18 hours)**

Nutrition Counselling: Concept and importance of counseling in the nutrition care process, Understanding dietary patterns and food choices and their impact on counseling Behaviour Change, Communication and Models for behaviour change, Counseling strategies, Factors to be considered for Counseling, Conventional and non-conventional tools in counselling. Online Counselling Techniques tools used in Nutrition care process.

Processes involved in dietary counselling: Managing resources of the communicator/counselor, Designing of counseling plans - goals and objectives, evaluation instruments. Implementation: facilitating self-management of disease condition, Evaluation: evaluating adherence to dietary changes, Counseling approaches after evaluation

Unit IV **(18 hours)**

Areas of Counselling: Premarital and marital counselling, Family counselling, Parental counselling, Adolescent counselling, Counselling for girls and children belonging to special groups. Special Concerns of School Counsellor - Issues related to academic achievement, School dropout, Child abuse, Sexual abuse, Substance abuse, Family relations and child's right.

Unit V **(18 hours)**

Guidance Strategies for Social and Personal Problems: Developing self-confidence, Assertive training, Improving communication skills, Mental and Physical Methods of Relaxation, Self-improving Programmes- study skills training, Problem Solving Techniques, Managing Motivation, Time Management, Remedies for Procrastination, Decision Making.

Text Books:

1. Mahan,. Mahan L.K., Sylvia Escott-Stump - *Krause's Food Nutrition and Diet Therapy*, W.B. Saunders Company London,14th edition,2016.
2. Holli B Betsy and Beto A Judith, *Nutrition Counseling and Education Skills for Dietetics Professional*, Lippincot Williams and Wilkins;Wolters Kluwer, 6th edition. 2014.
3. Gibson L Robert and Mitchel H Marianne, *Introduction to Counseling and Guidance*, Publisher, Pearson education, 7th edition, 2015.

Reference Books:

4. Holli B Betsy and Beto A Judith, *Nutrition Counseling and Education Skills for Dietetics Professionals*, Lippincot Williams and Wilkins; Wolters Kluwer USA, 6th Edition, 2014.
5. Snetselaar L. *Nutrition Counseling Skills for the Nutrition Care Process*. Sudbury, Massachusetts: Jones Bartlett Publishers, 4th edition, 2009.
6. Stanley B.Baker&EdwinR.Gerler, Jr, *School Counseling for the Twenty First Century*, Pearson Education NewJersey, 4th edition, 2004.

Journals:

1. Journal of Nutrition Education and Behavior
2. International Journal of Behavioral Nutrition and Physical Activity
3. British journal of Guidance and counselling

E-Resources:

1. https://www.allpsychologyschools.com/counseling/types-of-counseling/
2. http://csefel.vanderbilt.edu/modules/module2/script.pdf
3. http://www.counselorindelhi.in/marriage-counseling.p
4. https://www.eatrightpro.org/practice/quality-management/nutrition-care-process
5. http://www.wageningenportals.nl/nutritionsecurity/topic/behaviour-change-and-nutrition-education

Elective II –b. Food Packaging
(For those who joined since 2021-22)

Semester: II **Hours per week: 6**
Subject Code: HMNDE2B **Credit: 5**
Course outcomes:

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

CO 1: Understand the concept of food packaging.
CO 2: Acquired knowledge about the metal packaging materials.
CO 3: Learn about the characteristics of glass packaging materials.
CO 4: Understand about the modified atmosphere packaging.
CO 5: Improve their skills in bar coding and labeling.
CO 6: Gain more knowledge about the packaging laws and regulations.

Unit I **(18 hours)**

Introduction to Food Packaging: Definitions, Functions of packaging, Containment, protection, Convenience, Communication, Package Environments, Physical environment, Ambient environment, Human environment, Green packaging, Active packaging, Intelligent packaging, Aerosol packaging, Antimicrobial packaging.

Unit II **(18 hours)**

Metal Packaging Materials: Container – Making Process, End Manufacture – Three – piece Can Manufacture – Two- piece can Manufacture, Aluminum Foils and containers.

Unit III **(18 hours)**

Glass Packaging Materials: Introduction, Forming process Blow and Blow (B&B), Press and Blow (P&B), Narrow Neck Press and Blow (NNPB). Closures for Glass Containers, Closure functions, Food Container Closures - Closure to retain internal pressure, Closure to contain and protect contents, Closure to maintain vacuum inside container, Closure to secure contents inside container.

Unit IV **(18 hours)**

Modified Atmosphere Packaging: Definitions, Principles, Gases used in MAP - Carbon-dioxide, Oxygen, Nitrogen, Carbon monoxide, Noble gases, Gas mixtures. Methods for creating MA conditions, Equipment for MAP, Packaging for MAP applications. Microbiology of MAP. Safety of MAP, Controlled Atmospheric storage (CAP).

Unit V **(18 hours)**

Bar coding and labeling: Printing of packages, bar codes and other marking. Sealing equipments, Labeling- RFID. Environmental and Eco issues and waste disposals, Packaging laws and regulations FDA, PFA.

Text Books:

1. M.L.Rooney, *Active Food Packaging*, Blackie Academic & Professional Publisher, London, 2012.
2. Chiellini, E., *Environmentally Compatible Food Packaging*, Wood Head Publishing Ltd.,2008.
3. Coles, R., Dowell, D.M., Kirwan, J. *Food Packaging Technology*, Black Well Publishing Ltd., 2009.

Reference Books:

4. NIIR Board, *"Food Packaging Technology Handbook"*, National Institute of Industrial Research, New Delhi, 2004.
5. Gordon L. Robertson, *Food Packaging Principles & Practice*, CRC Press, 3rd edition, 2013.
6. Sudhir Gupta, Handbook of Packaging Technology, Engineers India Research Institute, New Delhi, 2007.

Journals:

1. Journal of Food Packaging
2. International Food Research Journal
3. Journal of Packaging Technology and Research

E-Resources:

1. https://www.pdfdrive.com/bio-based-materials-for-food-packaging-green-and-sustainable-advanced-packaging-materials-e176352009.html
2. https://www.pdfdrive.com/food-packaging-technology-sheffield-packaging-technology-e161258497.html
3. https://www.pdfdrive.com/food-packaging-and-preservation-e158425359.html
4. https://www.pdfdrive.com/food-packaging-and-preservation-e158425359.html
5. https://www.pdfdrive.com/food-packaging-principles-and-practice-3rd-edition-e175266330.html

Extra Credit - Scientific Writing for Project
(For those who joined since 2021-22)

Semester: II
Subject Code: HMNDX2PW **Credit: 2**

Course outcomes:

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

CO 1: Understand the different forms of scientific writing.

CO 2: Acquire knowledge on preparing outlines as a guide for plan of writing.

CO 3: Learn drafting titles, subtitles, tables and illustrations.

CO4: Learn the writing process as a Reflecting, re- reading – checking organizations,content, clarity, grammer brevity and precise in writing.

Unit I

Scientific Writing as a means of communication: Different forms of scientific writing. **Articles in Journals:** Research notes and reports, Review articles, Monographs, Dissertations, Bibliographies, Books chapters and articles.

Unit II

How to formulate outlines: The reason for preparing outlines – as a guide for plan of writing, as skeleton for the manuscript.

Kinds of outline: Topic outline, Conceptual outline, Sentence outlines, Combination of topic and sentence outlines

Unit III

Drafting titles, subtitles, tables, illustrations: Tables as systematic means of presenting data in rows and columns and lucid way of indicating relationships and results.

Formatting tables: Title, Body stab, Stab column, Column head, Spanner head, Box head.

Appendices: Use and guidelines.

Unit IV

The writing Process: Getting started, Use outline as a starting device, Drafting, Reflecting, Re-reading: Checking organizations, Content, Clarity, Grammar, Brevity and precise in writing, Drafting and re- drafting based on critical evaluation.

Unit V

Parts of dissertation/research report/article: Introduction, Review of literature, Methods, results and discussion, Summary and abstract, References.

Writing for grants: The question to be addressed, Rational and importance of the question being addressed, Empirical and theoretical framework, Presenting pilot study/data or background information, Research proposal and time frame, Specificity of methodology,

organization of different phases of study, Expected outcome of study and its implications, Budgeting, Available infrastructure and resources, Executive summary.

Text Books:

1. Michael Jay Katz, From Research to Manuscript: *A Guide to Scientific Writing,* Dordrecht, Publisher: Springer Netherlands, 2009.
2. Claudio Dr. Luz, *How to Write and Publish a Scientific Paper: The Step by Step Guide Paper back*, Publisher, Dr. Luz Claudio, 2016.
3. Gastel Barbara and Day Robert, *How to Write and Publish a Scientific Paper,* Publisher: Greenwood; 8th Edition, 2016.

Reference Books:

4. Thomas C.George, *Research Methodology and Scientific Writing*, Ane Books Pvt. Ltd, 1st edition, 2016.
5. Wayne C. Booth Gregory G. Colomb Joseph M. Williams, *The Craft of Research*, 3rdedition, Publisher University of Chicago, 2011.
6. Robert A. Day Barbara Gaste, *How to Write and Publish a Scientific Paper*, Green wood Publishing group,8th edition,2016.

Journals:

1. Scientific Journal
2. Journal of Writing Research
3. International Journal of Education Research

E-Resources:

1. https://www.pdfdrive.com/from-research-to-manuscript-a-guide-to-scientific-writing-e185397339.html
2. https://www.pdfdrive.com/how-to-write-illustrate-a-scientific-paper-e158701474.html
3. https://www.pdfdrive.com/research-methodologies-for-beginners-e185804256.html
4. https://www.pdfdrive.com/handbook-of-scientific-proposal-writing-e165569300.html
5. https://www.pdfdrive.com/writing-convincing-research-proposals-and-effective-scientific-reports-e53393242.html

Core IX- Medical Nutrition Therapy II
(For those who joined since 2021-22)

Semester: III **Hours/week: 6**
Subject Code: HMNDC31 **Credits:5**
Course outcomes:
After successful completion of this course, students will be able to:

CO1: Demonstrate knowledge of nutrition principles and their application to disease prevention.
CO2: Explain the different diseases affect the organs.
CO3: Describe diagnostic test for various diseases.
CO4: Interpret and translate scientific knowledge and principles related to nutrition intopractical information.
CO5: Obtain knowledge on therapeutic diets and to develop capacity and attitude for takingup dietetics as a profession.
CO6: Demonstrate a knowledge of medical terminology and medical abbreviations associated with nutrition related diseases and conditions.

Unit I **(18 hours)**

Dietary management in physiological stress Normal cellular processes, injury and response of cells to injurious agents, cellular adaptations, stress and Physiologic Effects. Nutrition in wound healing, Surgery: Pre and post-surgical dietary management, Burns, Classification, Complication, Dietary management, Sepsis: Dietary management**,** Dietary management in Trauma, Physiological, metabolic and hormonal response to injury.
Inborn errors of metabolism: PKU, MSUD, Tyrosinemia, Homocystinuria, Glycogen storage Disorder Galactosemia,Glutaricaciduria .

Unit II **(18 hours)**

Dietary management of Cardio Vascular Diseases Prevalence, Etiology and Risk Factors, Clinical diagnostic tests and nutrition management for - Dyslipidemias, Atherosclerosis, Angina Pectoris and Myocardial Infarction (MI) and Congestive Cardiac Failure (CCF), Prevention through life style modifications, Dietary management - Low fat, low cholesterol and medium chain triglyceride diet Dietary management of Hypertension - Definition, Classification and Causes, Signs & Symptoms and Complications, Dietary management - Diet related factors influencing hypertension, DASH diet - Lifestyle modification.

Unit III **(18 hours)**

Dietary management of Diabetes mellitus - Prevalence, Types, Etiology and Signs and Symptoms, Factors affecting normal blood glucose levels, Impaired glucose homeostasis, Diagnostic test for diabetes, Complications of diabetes - macro-vascular and micro-vascular Management of Diabetes, Food exchange list, Glycemic index of foods, Carbohydrate counting and Resistant starch, Sweeteners and sugar substitutes, Meal planning approaches - With and without Insulin and during sickness. Medications - Oral hypoglycemic drugs and Insulin. Lifestyle modification and exercise to manage diabetes mellitus. Management of Hypoglycemia, Types, symptoms and fasting state hypoglycaemia, Postprandial or reactive hypoglycemia. Dietary treatment in reactive hypoglycaemia.

Unit IV **(18 hours)**

Dietary management of Kidney Diseases: Etiology, clinical signs &symptoms, Physiology & functions of kidney, Kidney function tests. Types of kidney diseases - Glomerulonephritis, Nephrotic Syndrome, Acute Renal Failure (ARF), Chronic Renal Failure (CRF), End Stage Renal Disease (ESRD)-Dialysis and Kidney Transplant. Nephrolithiasis/Renal Calculi a) aetiology, Types of stones and nutritional care- acid and alkaline ash diet. Use of sodium, potassium and phosphorus exchange lists in diet planning of kidney diseases patient.

Unit V **(18 hours)**

Cancer - Carcinogenesis - pathogenesis and progression of cancer, role of nutrients, foodstuffs and food additives in cancer. Therapies and their clinical and metabolic implications. Types, Symptoms Diagnosis. Cancer therapies and treatment - side effects and nutritional implications, Dietary management

Text Books:

1. Srilakshmi, B**.,** *Dietetics*,New Age International (P) Ltd, Chennai.8th edition, 2019.
2. Antia F.P. And Philip Abraham, *Clinical Nutrition and Dietetics*, Oxford University Press, 4th edition.2002.
3. Shubhaangini Joshi, *Nutrition and Dietetics,* 4th edition, McGraw Hill publication, New Delhi, 2015.

Reference Books:

4. L. Kathleen Mahan, Sylvia Escott-Stump and Janice L Raymond, *Krause's Food & the Nutrition Care Process*, Saunders Publishers, 15th edition, 2020.
5. Robinson, *Normal and Therapeutic Nutrition*, Oxford & LBMPublishing, Calcutta, Bombay, 17th edition, 1990.
6. Kathleen Mahan and Sylvia Escort- Stump, *Food, Nutrition and Diet Therapy*, W.B. Saunder's Company London, 14th edition, 2016.

Journals:

1. Journal of Nutrition and Dietetics
2. Journal of Nutrition & Food Sciences
3. Journal of Nutrition and Metabolism

E-Resources:

1. https://www.pdfdrive.com/nutrition-dietetics-practice-and-future-trends-e176409703.html
2. https://www.pdfdrive.com/oxford-handbook-of-nutrition-and-dietetics-e185402365.html
3. https://www.pdfdrive.com/krauses-food-the-nutrition-care-process-e175336715.html
4. https://www.pdfdrive.com/clinical-nutrition-e186572457.html
5. https://www.pdfdrive.com/nutrition-health-and-disease-a-lifespan-approach-e189164494.html

Core X – Medical Nutrition Therapy II Practicals
(For those who joined since 2021-22)

Semester: III **Hours /week: 6**
Subject Code: HMNDC32P **Credits: 5**

Course outcomes:

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

CO1: Obtain an accurate knowledge on dietary assessment, calculation of the nutritional requirements, planning of appropriate nutritional care and the process nutritional care plan fora client.

CO2: To acquire skill development in planning therapeutic diets using food exchange lists
CO3: To have greater exposure to dietetic practices followed in Indian hospital
CO4: Have skills to plan diets for various disease conditions
CO5: Plan and conduct nutrition guidance and lifestyle modification programmes for various diseases Conditions.
CO6: Obtain knowledge on link between nutrition and medicine.

List of experiments

1. Planning and preparation of diet for Pre and post operative condition.
2. Planning and preparation of diet for Burns
3. Planning and preparation of diet for Phenylketouria
4. Planning and preparation of diet for Atherosclerosis
5. Planning and preparation of diet for Myocardial Infarction
6. Planning and preparation of diet for Hypertension
7. Planning and preparation of diet for Type I diabetes Mellitus
8. Planning and preparation of diet for Type II diabetes Mellitus
9. Planning and preparation of diet for Gestational diabetes
10. Planning and preparation of diet for Acute and Chronic Renal failure
11. Planning and preparation of diet for Nephrolithiasis
12. Planning and preparation of diet for Dialysis
13. Planning and preparation of diet for Breast cancer
14. Planning and preparation of diet for Lungs cancer
15. Planning and preparation of diet for Cervical Cancer

Text Books:

1. Gopalan C., RN. Ramasastri and S.C. Balasubra-manian, *Nutritive Value of Indian Foods*, National Institute of Nutrition, Hyderabad, 2018.
2. V.Vimala, *Advances in Diet therapy-Practical Manual*, New Age International Private Ltd, 2020.
3. *Clinical Dietetics Manual,* Indian Dietetic Association, 2nd edition 2018.

Reference Books:

4. Mahan L.K., Sylvia Escott-Stump - *Krause's Food Nutrition and Diet Therapy* W.B. Saunders Company London 14th edition, 2016.
5. Robinson C.H.,*Normal and Therapeutic nutrition*, Mac millan Publishing Co. Inc, Newyork,17th edition,1990.
6. L. Kathleen Mahan, Sylvia Escott-Stump and Janice L Raymond, *Krause's Food & the Nutrition Care Process,* Saunders Publishers, 15th edition, 2020

Journals:

1. Asia Pacific Journal Clinical Nutrition
2. European Journal of Clinical Nutrition
3. International journal of Nutrition and Dietetics

E-Resources:

1. https://www.pdfdrive.com/manual-of-dietetic-practice-e175954283.html
2. https://www.pdfdrive.com/medical-nutrition-therapy-a-case-study-approach-e186656569.html
3. https://www.pdfdrive.com/applications-and-case-studies-in-clinical-nutrition-e185254994.html
4. https://www.pdfdrive.com/manual-of-dietetic-practice-e33501318.html
5. https://www.pdfdrive.com/manual-of-clinical-nutrition-management-e18838358.html

Core XI - Nutrition through Life Cycle
(For those who joined since 2021-22)

Semester: I **Hours per week: 6**
Subject Code: HMNDC33 **Credit: 5**

Course outcomes:

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

CO 1: Gain more knowledge on different food groups and Recommended DietaryAllowances for different age groups
CO 2: Improve their knowledge on nutrition during pregnancy and lactation
CO 3: Learn about the nutrition in infants and preschool children
CO 4: Acquire knowledge on nutrition in school age
CO 5: Understand the concept of nutrition during adulthood
CO 6: Improve their knowledge on common nutritional problems in old age

Unit I **(18 hours)**

Concept of different food groups, Recommended Dietary Allowances for Indians, Basis for requirement, Computation of allowances.

Nutrition in pregnancy: Stages of gestation, Maternalweight gain, Physiology of pregnancy, Nutritional requirements and Dietary guidelines during pregnancy, Nutrition related complications with special focus to adolescent pregnancy and general complications of pregnancy, HIV/AIDS during pregnancy - Dietary concerns, Role of Exercise and Fitness during pregnancy.

Unit II **(18 hours)**

Nutrition in Lactation: Physiological adjustments during lactation, Hormonal controls and reflex action, Lactation in relation to growth and health of infants, Physiology of milk production, Problems of breast feeding, Nutritional components of colostrum and mature milk, Special foods during lactation, Nutritional requirements and dietary guidelines during lactation. Galactogouges, Lactation Management in normal & special conditions.

Unit III **(18 hours)**

Nutrition in Infants: Infant feeding and nutrient needs Feeding in early and late infancy and Feeding problems, Low birth weight and Preterm infants. Nutritional requirement, Supplementary feeding and weaning foods.

Nutrition in preschool children: Growth and development and Nutritional requirements, Nutrition for children with special health care needs, feeding problems, Factors to be considered for menu planning and packed lunch.

Unit IV **(18 hours)**

Nutrition in School going children: Early and middle childhood, Growth and development, food habits, Nutritional needs and feeding, Packed lunch.

Nutrition during adolescence: Physical growth, Physiological and psychological problems associated with pubertal changes, Nutritional needs eating disorders- Anorexia nervosa and Bulimia.

Unit V **(18 hours)**

Nutrition in Adult: Physiological and Psychosocial changes, Common nutritional concerns Nutritional requirements and dietary recommendation, Physical Activity in adulthood.

Nutrition in Elderly: Physiological and Psychosocial changes during old age, Aging Process, Nutritional requirements of the Elderly, Nutrition care and nutrition needs during illness and chronic conditions- Sensory loss, Oral health and GI functions, Neuromuscular and skeletal functions, Renal and cardiac function, Immuno-competence.

Text Books:

1. Bamji, M.S., Krishnaswamy K. Brahmam G.N.V , *Textbook of Human Nutrition*. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, 4th edition, 2017.
2. Swaminathan, M. *Advanced Textbook on Food Science and Nutrition,* Vol:2, Reprinted, Bangalore Printing and publishing Co Inc., Bangalore, 2nd edition, 2015.
3. Srilakshmi. *Dietetics*, New Age International Publishers, 8th edition, 2019.

Reference Books:

4. Kathleen Mahan and Sylvia Escort- Stump, *Food, Nutrition and Diet Therapy*, W.B. Saunder's Company London,11th edition, 2011
5. Susan G. Dudek, *Nutrition Essentials for nursing Practice*, Lippincot Williams D Wilkias, Philadelphea, 2017.
6. Gopal,C.Kamalakrishnaswamy, *Nutrition in Major Metabolic Disease,* Oxford India Paperbacks Publisher,1st edition 2000.

Journals:

1. American Journal of Clinical Nutrition
2. Indian journal Medical Research
3. Journal of Nutrition

E-Resources:

1. https://www.pdfdrive.com/nutrition-through-the-life-cycle-nutrition-through-the-life-cycle-e58112526.html
2. https://www.pdfdrive.com/nutrition-through-the-life-cycle-e187862410.html
3. https://www.pdfdrive.com/essentials-of-life-cycle-nutrition-e185708272.html
4. https://www.pdfdrive.com/nutrition-through-the-life-cycle-fourth-edition-e157150036.html
5. https://www.pdfdrive.com/nutrition-through-the-life-cycle-e157415567.html

Core XII Nutraceuticals and Functional Foods
(For those who joined since 2021-22)

Semester: III **Hours /week: 6**
Subject Code: HMNDC34 **Credits: 5**
Course outcomes:

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

CO1: Recognize the structures of the major bioactive food constituents that are being incorporated into functional foods.
CO 2: Recognize functional food products that are nutritionally logical, technically feasible,and that also are in compliance with FDA regulatory guidelines.
CO3: Assess the properties and function of Nutraceuticals.
CO4: Identify the differences between a dietary supplement and functional food/nutraceuticals, and the labeling/marketing around these substances.
CO 5: Specify research areas within functional foods, nutraceuticals, and dietary supplements.
CO6: Knowledge on the role of functional foods, nutraceuticals and dietary supplements in health and disease

Unit I **(18 hours)**

Historical perspective, classification, scope & future prospects. Applied aspects of the Nutraceutical Science. Sources of Nutraceuticals. Relation of Nutraceutical Science with other Sciences: Medicine, Human physiology, genetics, food technology, chemistry and nutrition.

Unit II **(18 hours)**

Microbes as Functional Foods: Prebiotics - Definition, role of prebiotic as functional ingredient. Probiotics- Definition, Role of probiotic as functional ingredient. Synbiotics- Definition, Role of probiotic as functional ingredient. Health effects of probiotics including mechanism of action. Probiotics in various foods: fermented milk products, non-milk productsetc. Quality Assurance of probiotics and safety.

Unit III **(18 hours)**

Functional Components from Plant Sources: a. Dietary fiber - Types and sources, Physical and Physiological properties .Phenolic compounds – Phytoestrogens (Isoflavones, Lignans) Flavonoids – Quercetin, kaempferol, Flavones, Limonene, Flavonols-Catechin, Phenolic acid-Ellagic acid, Caffeic acid c. Phytosterols and phytostenols d. Saponins d) Tannins e. Carotenoids - Lycopene, Beta-carotene, Lutein and zeaxanthin.

Unit IV **(18 hours)**

Functional Components from Animal Sources: a. Proteins – Lactalbumin, Lactoglobulin, Lactoferrin, Immunoglobulins, b. Derived peptides – Casein, Phospho Peptides, Glycomacro peptides, c. Lactose. Mineral – Zinc, Selenium, Calcium d. Dietary lipids - Conjugated Linolenic Acid, Linoleic acid, Oleic acid, GLA e. Omega 3 and Omega 6 Fatty Acids f. Structured Lipids.

Unit V **(18 hours)**

Food as remedies: Nutraceuticals bridging the gap between food and drug, Nutraceuticals in treatment for cognitive decline, Obesity and Cardiovascular diseases, Nutraceutical remedies for common disorders like oral and gut health, Bone health and Diabetes mellitus, cancer. Immune boosting nutraceuticals.

Text Books:

1. Rotimi E. Aluko, *Functional Foods and Nutraceuticals,* Springer Science & Business Media, 2012.
2. Bagchi & Debasis & Preuss & Harry G. & Swaroop & Anand, *Nutraceuticals and Functional Foods in Human Health and Disease Prevention,* C RC Press, 2016.
3. Robert E.C. Wildman, Robert Wildman, Taylor C. Wallace, *Handbook of Nutraceuticals and Functional Foods,* by CRC Press, 2nd edition, 2016.

Reference Books:

4. Kavitha sharma,kanchan mishra, and kamal senapati and corina danciu, *Bioactive Compounds in Nutraceutical and Functional Food for Good Human Health*, Springer Science, 2021.
5. Dilip Ghosh et al., *Innovation in Healthy and Functional Foods*, CRC Press, 2016.
6. Sareen S. Gropper, Jack L. Smith, *Advanced Nutrition and Human Metabolism*, Cengage Learning, 7th edition, 2016.

Journals:

1. Nutraceuticals world
2. Journal of medical nutrition and nutraceuticals
3. Journal of nutraceuticals and nutrition

E-Resources:

1. https://www.researchgate.net/publication/343846825_Nutraceuticals_History_Classification_and_Market_Demand
2. https://www.pdfdrive.com/beneficial-microbes-in-fermented-and-functional-foods-e166059146.html
3. https://www.pdfdrive.com/chemical-and-functional-properties-of-food-components-third-edition-chemical-functional-properties-of-food-components-e188029045.html
4. https://www.pdfdrive.com/omega-3-fatty-acids-and-the-dha-principle-e161329463.html
5. https://www.pdfdrive.com/nutraceuticals-and-functional-foods-in-human-health-and-disease-prevention-e167230386.html

Elective III a. Food Safety and Quality Control
(For those who joined since 2021-22)

Semester: IV **Hours /week: 6**
Subject Code: HMNDE3A **Credits: 5**

Course Outcomes

Upon completion of the course, students will be able to

CO1: Critically evaluate the recent developments in the control of food safety.
CO2: Conduct risk assessments of food safety problems including genetic modification.
CO3: Knowledge on the requirements for compliance with national and International foodstandards.
CO4: Understand International food safety legislation.
CO5: Demonstrate knowledge of quality management systems, their implementation and thepractical steps needed for implementation.
CO6: Learn standards related to food safety and quality.

Unit I **(18 hours)**

Food Spoilage: Definition, factors influencing food spoilage, Types of food,Spoilage such as microbes, enzymes and insects; Changes in food quality due to spoilage, Methods for detection of food spoilage; Concept of food preservation and the principles. Food Safety: Need and importance of food safety in food industries, Factors affecting food safety.

Unit II **(18 hours)**

Methods of evaluation of food quality: Sensory evaluation -Discrimination tests-Triangle test, duo-trio test, paired comparison. Rating tests -ranking test, hedonic rating test, numerical Scoring test, composite scoring. Sensitivity tests-threshold test, dilution test.
Objective technique-Physical method-Penetrometer, Compressimeter, Shortometer Farinograph.Chemical Method- Nutrient Analysis. pH meter.
Microbiological methods of quality evaluation - shelf life assessment.

Unit III **(18 hours)**

Common adulterants, tests to detect adulterants contaminants, naturally occurring toxins in food metallic pesticide and preservative contaminants. Non nutritive food components and their potential health effects, phoyphenols, tannins, phytooestrogens, cyanogenic compounds, lecithin, saponins.

Unit IV **(18 hours)**

Government and trade standards for quality: food laws and regulations – PFA , FPO and Food Safety Act 2006. BIS standards, Agmark standards, Compulsory National legislationAct, Essential Commodities Act, Consumer protection Act. International Standards for export, Codex Alimentarius, WTO, ISO, WHO and FAO, FSSA, APEDA and MPEDA.

Unit V **(18 hours)**

Rules and regulations for setting up of a processing unit: Criteria for ingredients and finishedproducts. Aspects of microbiological safety in food preservation technologies, Establishmentand implementation of HACCP, Continuous assessment System, Total quality management and quality audits in food industries.

Text Books:

1. Pulikat Mathur, *Text book of Food Safety and Quality Control*, Orient Blackswan Publisher, 2018.
2. Halde, *Objective Food Science and Safety standards*,Jain Brothers Publishers,2015.
3. Lásztity, R, *Food Quality and Standards,* Eolss Publishers Company Limited, (Vol-1& 2),2009.

Reference Books:

4. Lásztity, R, *Food Quality and Standards*,Eolss Publishers Company Limited,Vol-3, 2009.
5. Alli, I, *Food quality assurance: principles and practices*. CRC Press, 2019.
6. Luning, P. A., &Marcelis, W. J, *Food quality management: technological and managerialprinciples and practices.* Wageningen Academic Publishers, 2009.

Journals:

1. Journal of Food Quality and Hazards Control
2. International Journal of Food Safety, Nutrition and Public Health
3. Journal of Food Safety

E-Resources:

1. https://www.cliffsnotes.com/study-guides/biology/microbiology/food-microbiology/food-spoilage
2. https://hmhub.me/methods-food-evaluation
3. https://www.vedantu.com/biology/food-adulteration
4. https://www.mondaq.com/india/food-and-drugs-law/244880/laws-governing-the-food-industry-in-india--revisited
5. https://food.unl.edu/seven-principles-haccp

Elective III b. Sports Nutrition
(For those who joined since 2021-22)

Semester: III **Hours /week: 6**
Subject Code: HMNDE3B **Credits: 5**

Course Outcomes

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

CO1: Understand the characteristics, physiology, and body composition needs of different different power/strength in a sports person.

CO2: Gain in-depth knowledge of macronutrient's energy importance in sports events
CO3: Enable the understanding of basic micronutrients importance during the competition
CO4: Understand the concept of Weight management in Sportsperson
CO5: Understand the role of ergogenic aids- their dose, safety, and efficacy to enhance sports performance.
CO6: Acquire knowledge on supplements of Protein and Amino acids.

Unit I **(18 hours)**

Nutrition for strength sport athletes: Types and characteristics of strength or high intensity sports (sprinting, throwing, body building etc). Physiology of energy systems. Nutritional requirements- macronutrients- carbohydrates, fats proteins. Muscle building- post exercise anabolic window. Impact of resistance training on body composition of athletes in strength sports. Micronutrient requirements. Nutrient periodization in training and competition.

Unit II **(18 hours)**

Nutrition for weight, sports- combat sports, individual events. Types and characteristics- physiological needs, body composition and energy systems used. Macro and micronutrient requirements in training and competition. Hydration guidelines in weight class sports. Making weight- weight loss and gain in training and competition. Strategies to promote healthy weight loss in athletes.

Unit III **(18 hours)**

Micronutrient requirements of team sport athletes - Macronutrient needs of team sport athletes according to training and position on the field. Carbohydrate intake- pre, during and post event/training. Proteins and amino acids- Type, Amount and timing of ingestion. Fat requirements

Unit IV **(18 hours)**

Micronutrient requirements of team sport athletes -Role of vitamins and minerals in energy metabolism, Blood formation, Bone health, and Antioxidants. Fluid and electrolyte requirements. Hydration strategies in athletes based on rules of the sport, Available time and opportunities to hydrate on the field.

Unit V **(18 hours)**

Use of Nutritional supplements in strength/power sports- use, effects, efficacy and safety. Creatine monohydrate, Sodium bicarbonates, Nitrates, B-Alanine, Caffiene. Protein supplements- Whey, Casein, Egg Albumen, Soy Protein, Pea Protein & Other Vegan

Proteins/Protein Blends), Protein Bars, Protein shakes. Amino acids supplements - Amino Acid Supplements- BCAA, Glutamine, Arginine, Taurine. Fat burners, Ergogenic aids.

Text Books:

1. Manore, M., Meyer, N. L., & Thompson, J. *Sport nutrition for health and performance*, Human Kinetics, 2009.
2. Ranchordas, M. K., Rogerson, D., Ruddock, A., Killer, S. C., & Winter, E. M, *Nutrition for tennis: practical recommendations,* J Sports Sci Med, 2013.
3. Rankin J W, *Nutrition for very high intensity sports in Sports Nutrition: A Practice manual for professionals* edited by Marie Dunford, 2006.

Reference Books:

4. Slater, G., & Phillips, S. M. *Nutrition guidelines for strength sports: sprinting,weightlifting, throwing events, and bodybuilding*, Journal of sports sciences, 2011.

5. McArdle, W. D., Katch, F. I., &Katch, V. L, *Sports and exercise nutrition*, Lippincott Williams & Wilkins, 2009.
6. Dan Benardot,*Advanced Sports Nutrition*,Human Kinetics publishers,2011.

Journals:

1. British Journal of Sports medicine
2. International Journal of Sport Nutrition and Exercise Metabolism
3. Journal of International Society of Sports Nutrition

E-Resources:

1. https://www.pdfdrive.com/nutritional-applications-in-exercise-and-sport-nutrition-in-exercise-sport-e163327830.html
2. https://www.pdfdrive.com/nutrition-in-sport-e9596094.html
3. https://www.pdfdrive.com/nutrition-and-metabolism-in-sports-exercise-and-health-e178549344.html
4. https://www.pdfdrive.com/essentials-of-sports-nutrition-and-supplements-e175251805.html
5. https://www.pdfdrive.com/sports-nutrition-vitamins-and-trace-elements-second-edition-nutrition-in-exercise-sport-e156737603.html

Extra Credit - Diabetic Care and Education
(For those who joined since 2021-22)

Semester: III **Hours /week:**
Subject Code: HMNDX3 **Credits: 2**

Course outcomes:
This course will enable the students to:

CO1 Apply knowledge of diabetes pathologies that require diet modification inorder to restore homeostasis in patients.
CO2: Understand the modifications in nutrients and dietary requirements for therapeuticcondition.
CO3: Learn recent concepts in dietary management of diabetes.
CO4: Develop skills in planning and preparation of therapeutic diets for diabetes.

Unit I

Pathophysiology of Diabetes: Types and causes, Disease process, Diagnostic criteria, Screening for Diabetes – why, when and how? (Urine sugar and blood sugar), Continuum of care (primary, secondary, tertiary)

Unit II

Long term complications: Macro vascular complication: It includes coronary artery disease, cerebral vascular and peripheral vascular disease – type, risk factors and intervention strategies. Micro vascular complication: Diabetes Eye disease, Neuropathy, Nephropathy – Disease stage, diagnosis and treatment. Other complications (foot, skin, gastrointestinal disorders, endocrine disease, psychological factors.

Unit III

Management of Diabetes: overview: Aims of treatment, the importance of overall metabolic control, internationally recognized standards of care. The evidence for good control, physical assessment and laboratory assessment.

Unit IV

Practical management of Diabetes: Dietary management, insulin and oral therapy, Avoiding and managing hypo and hyperglycemia, Self -management strategies during special situations (sick days, travel, hypoglycemic events, etc), Self-monitoring (glycemic control & complications related to diabetes), Lifestyle issues, Newer trends in management.

Unit V

Special considerations: Diabetes in children and adolescents, Diabetes in pregnancy, Diabetes in the elderly, Diabetes & infection, Diabetes in people living in poverty and surgical considerations in Diabetes.

Text Books:

1. Richard I.G. Holt, *Text book of Diabetes*, Wiley Blackwell publication, UK, 5th edition,2017.
2. David Levy, *Practical Diabetes Care*,John Wilney Publisher,4th edition,2018.
3. Shashank R Joshi,*RSSDI Text Book of Diabetes*, Jaypee Brothers Medical Publishers,2020**.**

Reference Books:

4. Kumthekar Ajit.B, *Practical management of Diabetes*, Jay pee Brothers Medical Publishers, 2011.
5. Rudy Bilous, Richard Donnelly, Iskandar Idris, *Handbook of Diabetes*, Wiley Blackwell publication, 5th edition, 2021.
6. Janet Titchener, *Diabetes Management: A Manual for Patient-Centred Care*, CRC press, 1st edition, 2020.

Journals:

1. Journal of Clinical Nutrition
2. Journal of Neuro inflammation
3. Journal of Pharmaceutical Health Care and Sciences

E-Resources:

1. https://www.pdfdrive.com/american-diabetes-associations-standards-of-medical-care-in-diabetes-e38635770.html
2. https://www.pdfdrive.com/barriers-in-preventing-long-term-complications-among-patients-with-type-2-diabetes-mellitus-at-the-e75042570.html
3. https://www.pdfdrive.com/nutritional-management-of-diabetes-mellitus-practical-diabetes-e161197856.html
4. https://www.pdfdrive.com/nutritional-management-of-diabetes-mellitus-practical-diabetes-e161197856.html
5. https://www.pdfdrive.com/handbook-of-dsm-5-disorders-in-children-and-adolescents-e187750795.html

XIII Geriatric Nutrition
(For those who joined since 2021-22)

Semester: IV **Hours /week: 6**
Subject Code: HMNDC41 **Credits: 5**
Course outcomes:
This course will enable the students to:
CO 1: Be aware of the issues facing the elderly in India

CO 2: Acquire knowledge about issues and challenges of ageing
CO 3: Learn about the geriatric counselling
CO 4: Understand about the clinical and social aspect of geriatric
CO5: Examine the chronic diseases caught by the elderly people.
CO6: Acquire Knowledge on relationship between nutrition and wellness

Unit I **(18 hours)**

Introduction to Ageing: Introduction to geriatric care-concept of gerontology. Ageing - Biology of ageing- Theories of ageing, Disengagement theory, Activity theory, Selective theory and Continuity. Microscopic theories, Changes in ageing scenario-Interaction between biological and psychological in ageing. Interaction between physiological and social processes in ageing. Drug, food, and nutrient reaction. Dietetics of Geriatric Care-Nutritional requirement, Food requirement, dietary modification.

Unit II **(18 hours)**

Issues and challenges of Ageing: Economic dependence/ poverty, Elderly in rural/ urban area. Abuse, Neglect, Abandonment, Physical, Health and Sensory problems. Crime against elderly, Retirement and related issues. Ageing sensory system and issues with falling. Common complaints during ageing.

Unit III **(18 hours)**

Geriatric Guidance and Counselling: Definition, Principles, Dimensions, Process and techniques of counselling, Counseling the older person, Common problems requiring counselling, Counselling under special situation. Depression in old age. Exercise-yoga, meditation. Behavior therapy: Rational-emotive behavior therapy (REBT), Horticultural therapy. Music therapy, Art therapy, Bibliotherapy.

Unit IV **(18 hours)**

Clinical Geriatric: Nutritional related problems of old age-osteoporosis, obesity, neurological dysfunction, Anaemia, Malnutrition and constipation. Infection and Immunity. Degenerative disorders in elderly-Dementia, Alzheimer, Parkinson's disease. Disorders of upper GIT, Disorders of lower GIT, Disorders of Liver, Disorders of Billiary system and pancreas. Infection of Respiratory system

Unit V **(18 hours)**

Social Geriatric: Role of Govt. and NGOs in Socio –economic status of the elderly. Geriatric service for the elderly in western countries and India. Structure of geriatric service, family as basic unit- models of geriatric service. Day hospital, day care centre, long stay care institution. Home forthe aged, function of the day hospital staff and patients of day hospital. Ethical issues in geriatric medicine-age limits on health care. Life sustaining measures.

Text Books:

1. Gary Cheuk, *Advanced Age Geriatric Care*,Springer International Publishing,2018.
2. Srilakshmi, B., *Dietetics*, New Age International (P) Ltd, Chennai, 7 th edition, 2014.
3. Barbara Resnick, *Essentials of Clinical Geriatrics*, McGraw Hill Professional,2017.

Reference Books:

4. Dale Avers, *Guccione's Geriatric Physical Therapy*, Book Aid International,4th edition 2019
5. Jacobs M, *Psychodynamic Counselling in Action*, Sage publications, New Delhi, 4th edition 2010.
6. Trower, P, Jones, J, Dryden, W and Casey, A, *Cognitive Behavioural Counselling in Action*, Sage pub, New Delhi, 2nd edition, 2011.

Journals:

1. Journal of the Indian Academy of Geriatrics
2. Journal of Gerontology & Geriatric Research
3. Journal of Geriatric Psychiatry and Neurology

E-Resource:

1. https://samples.jbpub.com/9781284104479/Chapter_3.pdf
2. https://www.helpguide.org/home-pages/aging-issues.htm
3. https://www.bacp.co.uk/media/1968/bacp-counselling-older-people-systematic-review.pdf
4. https://www.brainkart.com/article/Nutrition-Related-Problems-Of-Elderly(Old-Age)_2611/
5. https://www.jyotinivas.org/pdf/e_content/sociology/3rd%20YearsAgeing%20%E2%80%93%20Role%20of%20NGO%E2%80%99S.pdf

Core XIV - Dietetic Internship in Hospital

Semester: III **Hours /week: 6**
Subject Code: HMNDC42 **Credits:** 5
Course outcomes:

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

CO1: Identify nutrition-related problems and determine and evaluate nutrition interventions.
CO2: Identify and describe the work of interprofessional teams and the roles of others with whom the registered dietician nutritionist collaborates in the delivery of food and nutrition services.
CO3: Interpret the relevance of food and nutrition for the disease.
CO4: Graduates will be prepared to pass the national registration examination for dietician.
CO5: Discuss the impact of health care policy and different health care delivery systems on food and nutrition services to the consultant.
CO6: Persuade the patients with appropriate online diet counselling techniques
Aspects to be covered in the Dietary Internship training programs

Dietary internship training:

1. Assessing the nutritional status and diet history of patients.
2. Planning diet sheets, preparing and providing guidance in the production of therapeuticdiet.
3. Supervising the preparation of diets.
4. Supervising the delivery of trays to the patient.
5. Getting feedback from patients regarding diets.
6. Understanding the layout of hospital dietary unit.
7. Acquiring practical knowledge in diet counselling.
8. Under taking 3 case studies at hospital situation.
9. Acquiring practical knowledge in Online Dietetic Counselling Techniques

Guidelines:

- It is compulsory for all the students to complete of the given institutional training Programme in a reputed institution for a period of 30 days.
- At the end of the course, each student has to submit a report of the training
- Internal marks will be awarded by the faculty of the department with whose guidance the report is prepared.

Text Books:

1. Srilakshmi, B**.,** *Dietetics*,New Age International (P) Ltd, Chennai.8th Edition, 2019.
2. Antia F.P. And Philip Abraham, *Clinical Nutrition and Dietetics*, Oxford University Press, 4th Edition.2002.
3. A.Joshi Shubhaangini *Nutrition and Dietetics,* 4th edition, McGraw Hill publication,New Delhi, 2015.

Reference Books:

4. L. Kathleen Mahan, Sylvia Escott-Stump and Janice L Raymond, *Krause's Food & the Nutrition Care Process,* Saunders Publishers, 15th edition, 2020.
5. Robinson, *Normal and Therapeutic Nutrition,* 17th edition, Oxford & LBM Publishing, Calcutta, Bombay, 1990.
6. Kathleen Mahan and Sylvia Escort- Stump, *Food, Nutrition and Diet Therapy,* W.B. Saunder's Company London, 14th Edition, 2016.

Journals:

1. Journal of Nutrition and Dietetics
2. American journal of Clinical Nutrition
3. Journal of Nutrition and Metabolism

E-Resources:

1. https://www.pdfdrive.com/nutrition-dietetics-practice-and-future-trends-e176409703.html
2. https://www.pdfdrive.com/oxford-handbook-of-nutrition-and-dietetics-e185402365.html
3. https://www.pdfdrive.com/krauses-food-the-nutrition-care-process-e175336715.html
4. https://www.pdfdrive.com/nutrition-dietetic-internship-handbook-2012-13-e24766595.html
5. https://www.pdfdrive.com/manual-of-dietetic-practice-e33501318.html

Dissertation
(For those who joined since 2021-22)

Semester: IV **Hours /week: 16**

Subject Code: HMND43PW **Credits: 5**

The dissertation is the final stage of the Master's degree and provides with the opportunity to gain the necessary skills and knowledge in research project. It should demonstrate that students are skilled in area of research, setting research objectives, authoritative literature, devising an appropriate research methodology, analyzing the data, conclusions and if appropriate making relevant recommendations and indications of areas for further research.

The students will be guided and supervise by a member of the teaching faculty of the Home Science department. After completing the dissertation the report is to be submitted to the external evaluation. The students will have to appear for viva voce to their thesis.