

**DEPARTMENT OF FOOD SCIENCE & NUTRITION (PG) PROGRAMME
SPECIFIC OUTCOMES (PSO)**

On the successful completion of the Postgraduate programme, the students will be able to

PSO1 Disciplinary Knowledge	demonstrate a comprehensive understanding of diverse fields of Food Science & Nutrition
PSO2 Communication Skills	develop communication skills to promote interpersonal competencies in the field of life sciences.
PSO 3 Problem Solving & Analytical Reasoning	apply problem-solving and analytical reasoning skills in diverse fields of Food Science & Nutrition.
PSO 4 Critical Thinking	foster scientific temper leading to critical thinking and research motivation in Food Science, Nutrition and Allied Sciences.
PSO 5 Research Skills	exhibit advanced research skills in different lab techniques and interpret experimental data, applicable to innovative methods and advanced research to draw logical conclusions.
PSO 6 Digital Literacy	demonstrate the skills of applying ICT and AI tools for professional purposes in the food industry or hospitals.
PSO 7 Professional competencies	utilize discipline-specific practices to enhance the managerial skills required to be an entrepreneur in the food industry or serve in various Hospitals and fitness centres.
PSO 8 Moral and Ethical Awareness/Reasoning	apply moral and ethical values while practicing food service managers, nutritionists, dieticians, hospital administrators and other professionals.
PSO 9 Multicultural Competence	discuss multicultural sensitivity and appreciate societal, Environmental, health, safety, and cultural issues related to food within local and global contexts.
PSO 10 Self-directed & Lifelong Learning	work independently, engage in personal and professional goals, and contribute significantly towards the health and well-being of the family, community and society.

Department of Food Science & Nutrition (PG)
Learning Outcome Based Curriculum Framework (LOCF) (w.e.f 2024-2025)

Sem	Category	Course Code	Course Title	Hours/ Wk.	Credits	Marks
1	CC	24PFN4501	Advanced Food Science	6	5	100
1	CC	24PFN4401	Advanced Human Physiology	6	4	80
1	CC	24PFN4503	Macronutrients	6	5	100
1	CC	24PFN4301	Advanced Food Science Lab	4	3	60
1	DSE	24XXXNNNN	<i>Discipline-Specific Elective - I</i>	4	3	60
1	GE	24XXXNNNN	<i>Generic Elective - I</i>	4	3	60
			Total	30	23	460
2	CC	24PFN4502	Research Methods in Nutrition	6	5	100
2	CC	24PFN4504	Advanced Dietetics	6	5	100
2	CC	24PFN4402	Nutritional Biochemistry	6	4	80
2	CC	24PFN4302	Advanced Dietetics Lab	4	3	60
2	DSE	24XXXNNNN	<i>Discipline Specific Elective - II</i>	4	3	60
2	GE	24XXXNNNN	<i>Generic Elective - II</i>	4	3	60
			Total	30	23	460
3	CC	24PFN5501	Micronutrients	6	5	100
3	CC	24PFN5401	Techniques in Food Analysis	6	4	80
3	CC	24PFN5403	Food Product Development	5	4	80
3	CC	24PFN5405	Entrepreneurial Development	5	4	80
3	CC	24PFN5301	Food Analysis Lab	4	3	60
3	DSE	24XXXNNNN	<i>Discipline Specific Elective - III</i>	4	3	60
3	IS	24PFN5233	Internship*	-	2	40
			Total	30	25	500
4	CC	24PFN5502	Public Health Nutrition	6	5	100
4	CC	24PFN5402	Advanced Food Service Management	6	4	80
4	CC	24PFN5404	Food Microbiology	5	4	80
4	CC	24PFN5302	Food Microbiology Lab	4	3	60
4	Project	24PFN5406	Project	5	4	80
4	DSE	24XXXNNNN	<i>Discipline Specific Elective - IV</i>	4	3	60
4	SEC	24PFN5244	Professional Competency Skill	-	2	40
			Total	30	25	500
			Grand Total	120	96	1920

* Internship - First Year Vacation (30 hrs)

MAPPING OF COURSES WITH PSOs

Courses	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
24PFN4501	3	3	2	2	2	2	2	2	2	2
24PFN4401	3	3	3	3	2	2	2	2	2	2
24PFN4503	3	3	2	2	2	1	1	2	2	1
24PFN4301	3	3	2	2	2	1	2	1	1	1
24PFN4303/ 24PFN4305	3	2	2	2	2	2	2	2	2	3
24PFN4502	3	3	3	2	2	2	2	2	2	2
24PFN4504	3	3	1	2	2	2	2	2	2	2
24PFN4402	3	3	1	2	2	1	2	2	2	2
24PFN4302	2	2	1	2	2	1	1	2	2	2
24PFN4304/ 24PFN4306	3	3	3	2	2	2	2	2	2	2
24PFN5501	3	3	2	2	1	1	1	2	1	2
24PFN5401	3	3	2	2	1	1	2	2	1	1
24PFN5403	3	3	3	2	2	2	2	1	1	1
24PFN5405	3	3	3	2	2	2	2	2	2	1
24PFN5301	3	3	2	2	2	1	2	2	2	2
24PFN5303/ 24PFN5305	3	3	2	2	2	1	1	1	1	1
24PFN5233	3	3	3	3	3	3	3	3	2	3
24PFN5502	3	3	3	3	2	2	2	2	2	1
24PFN5402	3	2	2	2	1	2	2	2	2	2
24PFN5404	3	3	3	2	1	1	1	2	2	2
24PFN5302	3	3	1	2	1	2	2	1	2	1
24PFN5406	3	3	3	3	3	3	3	3	2	2
24PFN5304/ 24PFN5306	3	2	2	2	3	2	2	2	2	3
24PFN5244	3	3	3	3	3	3	3	3	3	3
Average	2.9	2.8	2.2	2.2	1.9	1.7	1.9	1.9	1.8	1.8

Course Code	Name of the Course	Category	Hours/Wk.	Credits
PFN4501	Advanced Food Science	CC	6	5

The course aim at introduce the knowledge on the source and properties of food, and familiarize students with changes occurring in various foodstuffs as a result of processing and in various applications of food preparations.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: describe the various properties and classifications of food and starch.

CO2: overview the relationship between the chemical structure and the properties of the main components in food like protein and enzymes.

CO3: describe the knowledge gained on characteristics and properties of fats and sugar products during cooking.

CO4: analyze the factors affecting cooking quality of milk, milk products and egg.

CO5: analyze the proper use of food colors and food additives in safe food preparation.

Unit I

18 Hours

Properties of food- Food nutrients, solids, solutions and colloids, classification of foods based on viscosity characteristics. Food dispersion: Colloids- Types of colloid and properties of colloids and rheology of food dispersions; Structure, formation and stability of gels, sols, emulsion and foams.

Starch - Sources, Structure and composition of starch; Properties and characteristics of food starches; Modified food starches-Structure and composition, Effect of heat on food starch properties, gluten formation in wheat flour, influencing factors [gluten], gelatinization, gelation and retrogradation, dextrinization and factors affecting gelatinization.

Unit II

18 Hours

Proteins-Structure and composition, Classification and properties of proteins; Effect of heat on physio-chemical properties of proteins; Role of proteins in food products; Texturized vegetable protein, protein concentrates.

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 III

18 Hours

Fats and oil -Structure, composition and properties of fats and oil; storage of fat, characteristics [shortening, plasticity, flavor, retention of moisture, melting point, optical activity, color, specific gravity], Hydrogenation, winterization, flavor reversion, smoking point, Rancidity- Types, Mechanism and prevention; Role of fat/oil in food products; Fat substitutes.

Unit IV

18 Hours

Milk – composition, characteristics. Effect of physical and chemical factors on milk components [Effect of heat, protein, factors affecting coagulation, casein coagulation, minerals, Non-enzymatic browning], [Effects of acid], Effects of enzymes- renin, fermented and non-fermented milk products.

Egg- composition, structure, functional properties- foaming, factors affecting foam formation.

Unit V

18 Hours

Food additives- Definition, classification, application and permissible limits of food additives. Flavour compounds in vegetables, fruits and spices; Effect of processing on food flavours; Role of colours and flavours in food products.

Sweeteners - Properties, Artificial and Natural sweeteners and role of sweeteners in food industry.

Learning Resources Text Books:

1. Sri lakshmi B. (2015). Food Science. New Age International (P) Ltd. Publishers.
2. S.M. Reddy (2015). Basic Food science and technology. New Age International publishers. Avantina Sharma (2017).Text book of food science and Technology. CBS Publishers and distributes Ltd. 3rd Edition.
3. Athanasius A. (2018) . Handbook of Food and Nutrition, Bangalore press.
4. Serpil Sahin and Servet Gulum Sumnu. (2006). Physical properties of Foods. Springer publications

References:

1. Gerard L. Hasenhuettl , Richard W. Hartel. (2019).Food Emulsifiers and Their Applications. Springer publications. 3rd edition.
2. Vickie. A. Vaciavik. (2021). Essentials of Food science. Springer publications.5th edition.
3. Dr.M.Athanasius. (2015). Advanced text book of Food and Nutrition. volume-2.Bapco publications.

Websites/ e-Learning Resources:

1. www.fao.org
2. www.wfp.org
3. www.foodrisk.org
4. <http://www.fsis.usda.gov/>
5. <https://www.fda.gov/food>

CO – PSO Mapping

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	3	2	2	2	2	2	2	2
CO2	3	3	2	2	2	2	2	2	2	2
CO3	3	3	3	2	2	2	2	1	2	2
CO4	3	3	2	2	2	2	2	2	1	2
CO5	3	3	2	2	2	2	2	1	1	2
Average	3	3	2.4	2	2	2	2	1.6	1.6	2

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
PFN4401	Advanced Human Physiology	CC	6	4

This course helps the students to understand the structure and basic physiology of various organs of the body. The students will obtain better understanding of the principles of Foods and Nutrition through the study of physiology.

Course outcomes:

At the end of the course, students will be able to

CO1: develop insight of normal functioning of all the organ systems of the body and their interaction. Understand the current state of knowledge about the functional organization of Human Cell and Histology.

CO2: summarize the structural and functional organization of the Blood and Cardiac System

CO3: discuss the structural and functional organization of the Respiration, Immunity and Endocrine GIT and Urinary System

CO4: explain the structural and functional organization Digestive System and Reproductive System

CO5: describe the structural and functional organization of the Skin, Nervous and Excretory system

Unit I **18 Hours**

Cell- Structure and Function. Transportation across cell membrane. Cell theory and Cycle. Difference between Meiotic and Mitotic cell. Stem cells- types and functions.

TISSUE -Structure and Function.

Unit II **18 Hours**

Blood - Composition & Functions, Blood Group – ABO System & Rh factor. Blood Coagulation.

Heart - Structure & Function of Heart and Blood Vessels. Systemic & Pulmonary circulation Cardiac cycle and Conduction. Heart rate and Cardiac output. ECG. Blood pressure & their regulations.

Unit III

18 Hours

Respiratory system- Structure and function. Gas Laws pertaining to Gas Exchange (Meaning only)-Henry's Law of Partial Pressure, Boyle – Mariotte's Law of Volume and Pressure, Dalton's Law of Partial Pressure, Charle's Law of Ideal Gas Equation and Fick's Law of Diffusion. Mechanism of respiration. Circulation and Exchange of Respiratory Gases. Internal and External Respiration. Chloride shift. Definitions of Lung volumes and Lung capacities Ventilation and Artificial Respiration.

Immunity: Definition and types Innate and Acquire immunity.

Endocrine system- Hormones and its type. Syndromes resulting from hypo and hyperactivity of Pituitary, Thyroid, Adrenals and Pancreas.

Unit IV

18 Hours

Gastrointestinal system- Structure and function of GI tract and its accessory organs. Digestion and absorption of Carbohydrates, Proteins and Fats.

Reproductive system- Role of hormones in reproduction and Lactation. Menstrual Cycle and Menopause. In vitro (IV) fertilization Spermatogenesis.

Unit V

18 Hours

Nervous system - Structure and Function of Neuron. Afferent and Efferent Nerves. Conduction of Nerve Impulse- Synapses, Neurotransmitters, Summation and Action Potential. Sympathetic and Parasympathetic Nervous System. Cerebrospinal fluid (CSF) – composition and function. Blood-brain barrier (BBB). Electroencephalogram (EEG)

Excretory systems

Renal system: Organs in the Urinary System. Structure and functions of Nephron. Juxtaglomerular Cell. Mechanism of formation of urine, Role of the kidney to regulate Blood pressure, Water, Electrolytes and Acid-Base Balance. Skin Structure and Function. Regulation of temperature of the body.

Learning Resources Textbooks:

1. Sembulingam & Prema Sembulingam (2019), Essentials of Medical Physiology. Jaypee publications. Eighth edition.

References:

1. Guyton, A.G. and Hall, J.B. (2005): Text Book of Medical Physiology. W. B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore. 9th Edition.

2. Wilson, K.J.W and Waugh, A. (2003): Ross and Wilson Anatomy and Physiology in Health and Illness. Churchill Livingstone. 8th Edition.
3. Jain, A.K.: Textbook of Physiology. Avichal Publishing Co., New Delhi. Vol. I and II.
4. McArdle, W.D., Katch, F.I. and Katch V.L (2001): Exercise Physiology. Energy, Nutrition and Human Performance. Williams and Wilkins, Baltimore.4th Edition.

Websites/ Websites/ e-Learning Resources:

1. <https://youtu.be/MZDy0RvA52Y>-Osmosis
2. <https://youtu.be/TgcyiVQnVBs>-
3. <https://youtu.be/44B0ms3XPku>-

CO–PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	2	2	2	1	2	2	2	2
CO2	2	3	3	3	2	3	2	2	2	2
CO3	3	3	3	3	2	2	2	2	2	2
CO4	3	3	3	3	2	2	2	2	2	2
CO5	3	3	3	3	2	3	2	2	2	2
Average	2.8	3	2.8	2.8	2	2.2	2	2	2	2

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN4503	Macronutrients	CC	6	5

The course enables the students to learn about the essentials of nutrients in maintaining human health and comprehend the interaction between the diet and disease.

Course Outcomes:

At the end of the course, students will be able to

CO1: describe the essentials of energy requirements in growth and development of humans

CO2: gain knowledge on the importance of carbohydrates in maintaining human health and role of fibre in human nutrition

CO3: identify the methods of assessment of protein quality and the role of protein in health and disease

CO4: discuss the classification, function, food sources, requirements of lipids and fatty acids and its role in good health

CO5: describe the sources, function and requirements and distribution of water in the body

Unit I

18 Hours

Energy - Historical background, energy content of food, energy measurements – direct and indirect calorimetry, energy utilization in cells, basal metabolism, physical activity. Regulatory thermogenesis, energy requirements, variables which influence the energy requirements with reference to adults, infants, adolescents, ICMR, FAO and WHO requirements, energy balance and control of body weight, Energy utilization in cells- Role of Mitochondria, energy metabolism during physical activity, CED and Obesity, energy metabolism and vascular homeostasis energy requirements for strenuous physical activity – sports, expeditions. Nutritional adaptation in malnutrition.

Unit II

18 Hours

Carbohydrates-Classification, Therapeutic uses of carbohydrates sugars in parenteral nutrition. Glycemic index of foods and its uses. Toxic effects of fructose, xylitol and galactose. Sugar alternatives, Dietary fibre- Introduction, Types, Properties, RDA and Components of dietary fibre. Role of fibre in human nutrition.

Unit III**18 Hours**

Protein-Historical review of protein metabolism, Amino acid patterns in protein & of animals and vegetable origin, critical study of methods of assessment of protein quality. Physiological functions of proteins. Essential Amino Acids, amino acid balance and imbalance, Role of protein in health and disease. Supplementation of individual amino acid.

Unit IV**18 Hours**

Lipids-Lipid-Introduction, Classification, Function, Food sources, Requirements, RDA, digestion, absorption, transport and storage. Lipids and gene expression. Dietary fat and coronary heart disease. Fatty acid- Types, Functions, Requirements, food sources and deficiency. Omega fatty acids – Role in good health, daily values, food sources, fortification and enrichment with omega fatty acids.

Unit V**18 Hours**

Water-Sources, Function and Requirement- Distribution of water in the body and Factors influencing distribution of body fluid. Exchange of water in the body. Water imbalance – dehydration- water intoxication, water and electrolyte mechanism – ADH.

Learning Resources:**Text Book(s):**

1. Satyanarayana, U., & Chakrapani, U. (2013). Biochemistry, Book and Allied Pvt. Ltd., Kolkata.
2. Wardlaw, G. M., Byrd-Bredbenner, C., Moe, G., Berning, J. R., & Kelley, D. S. (2013). Wardlaw's perspectives in nutrition. McGraw-Hill.
3. Williams, S. R. (2004). Nutrition and diet therapy. Nutrition and diet therapy.
- 4.Sizer, F., Whitney, E., & Webb, F. (2003). Nutrition Concepts and Controversy, Thomas Wadsworth, Australia. 9th edition.

References:

1. Guthrie, H.A., (2001). Introductory Nutrition. C.V. Mosby Company, St. Louis. Tenth edition.
2. Brown, J.E., (2002). Nutrition Now. Wadsworth Thomson Learning New York. 3rd edition.
3. Toteja, G. S. (2004). Micronutrient profile of Indian population. Indian Council of Medical Research Publication, New Delhi.

4. Athanasius, M., (2002). Principles of Nutrition and Dietetics. BAPPCO, 88, Mysore Road. Bangalore – 560 018.

Websites/ e-Learning Resources:

1. www.nal.usdfa.gov/fnic
2. www.fantaproject.org
3. <http://dietary-supplements.info.nih.gov>

CO – PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	2	2	1	1	1	2	2	1
CO2	3	3	2	2	2	1	2	2	2	2
CO3	3	3	2	2	2	1	2	2	2	2
CO4	3	3	2	2	1	1	1	1	1	1
CO5	3	3	2	2	2	2	1	2	1	1
Average	3	3	2	2	1.6	1.2	1.4	1.8	1.6	1.4

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN4301	Advanced Food Science Lab	Core Lab	4	3

The course enable the students to comprehend the knowledge gained on characteristics and properties of foods during cooking, apply the properties of food in various food processing and preparations, analyse the factors affecting cooking quality of foods and to create appropriate food preparation and processing methods to ensure quality standards.

COURSE OUTCOMES:

CO1: gain knowledge on sensory analysis and cereal cookery concept

CO2: describe the properties of various food.

CO3: analyze the cooking quality of foods and apply knowledge in food industries.

CO4: identify and understand the Physical characteristics.

CO5: revise appropriate food preparation and processing methods to ensure standards in food industry.

Unit I **12 Hours**

Sensory method – Analysis of taste sensitivity-Threshold test Duo –Trio test Multiple sample difference Starch Microscopic structure and gelatinization, Factors affecting **gelatinization** –sag test. Gluten formation

Unit II **12 Hours**

Pulse - Factors affecting cooking quality

Fruit - Enzymatic browning, Pectin test, Firmness of gel

Unit III **12 Hours**

Vegetables - Various methods of cooking fat-soluble and water-soluble pigment.

Milk - Detecting the presence of starch, soda, starch, and urea in milk samples. pH of milk sample. Effect of acid on milk Maillard reaction.

Unit IV **12 Hours**

Sugar - Relative sweetness of sugar- sucrose, maltose, lactose, fructose, dextrose, glucose, artificial sweeteners Stages of sugar cookery, Effect of dextrose, honey and cream of tartar on sucrose.

Fats and oil - Smoking point – Groundnut oil, coconut oil, Gingelly oil, Olive oil, Vanaspati,

Ghee, Refined Sunflower oil, Rice bran oil.

Cooking temperature and fat absorption- – Groundnut oil, coconut oil, Gingelly oil, Refined Sunflower oil, Rice bran oil.

Unit V

12 Hours

Physical properties – Thousand-grain weight. Thousand-grain volume, Hydration capacity, Hydration index, Swelling capacity, Specific gravity, Seed displacement test
Viscosity – Line spread test, Viscometer.

Adulteration

Learning Resources:

Text Books:

1. Srilakshmi B. (2015). Food Science, New Age International (P) Ltd. Publishers.
2. Potter N. and Hotchkiss J.H. (1996). Food Science, Fifth ed., CBS Publishers and Distributors, New Delhi

References:

1. Athanasius A (1979). Food Science and Experimental Foods, Ganesh and Company Madras. 3rd edition.
2. Bennion, Marion and O. Hughes (2001). Introductory Foods. Edi: Mac 18 Million N.Y. 1st edition.
3. Eskein. (2012). Biochemistry of Food. Elsevier publications
4. Desrosier, N.W. and James N. (2007). Technology of food preservation.AVI Publishers.
5. Manay, S. and Shadaksharamasamy, (2004). Food: Facts and Principles, New Age International Publishers, New Delhi. 1st edition.

Websites/ Websites/ e-Learning Resources:

1. <http://www.fao.org/3/V5030E/V5030E00.htm>
2. <https://fmtmagazine.in/fruits-vegetables-processing-technologies/>
3. www.fao.org www.wfp.org Learn Microbiology with Online Courses and Classes | edX

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	3	2	2	1	2	2	1	1
CO2	3	3	2	2	2	1	2	1	2	1
CO3	3	3	3	2	2	1	2	1	2	1
CO4	3	3	2	2	2	1	2	1	1	1
CO5	3	3	2	2	2	1	2	2	1	1
Average	3	3	2.4	2	2	1	2	1.4	1.4	1

Strong- 3 Medium- 2 Low - 1

CourseCode	Name of the Course	Category	Hours/Wk.	Credits
24PFN4303	Food Processing and Technology	DSE	4	3

The course aims to equip students with comprehensive knowledge and skills essential for sustainable food production and management. Through understanding the principles of food processing, students will learn to reduce wastage of perishable agricultural produce, enhance shelf life, and add value to agricultural products, thereby facilitating the diversification and commercialization of agriculture.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: discuss the concepts and principles of food processing and post-harvest technology.

CO2: explain various methods of cereal processing and its influence on the nutritional composition.

CO3: identify the suitable processing methods for Pulses and oil seeds for the better nutritional quality.

CO4: adopt the suitable processing methods to enhance the nutritional quality of fruits and vegetables.

CO5: describe various milk and meat processing methods, and its role on the nutritional composition of meat, poultry, fish, egg and milk.

Unit I

12 Hours

Processing of foods: Primary, secondary and tertiary processing, historical perspective, traditional technologies used in food processing. Effects of processing on components, properties and nutritional value of foods.

Post-harvest technology-Introduction to post-harvest technology of agricultural produce; Status of Production, Losses, Need, Scope and Importance. Post-Harvest Loss- Definition, Factors contributing to Post-harvest Loss; and Technologies and Practices to reduce Post-harvest Losses.

Unit II

12 Hours

Cereal Processing and Technology: Rice: parboiling, milling and pearling; Processing and milling of wheat, maize, barley, oats and rye. Millets: processing of millets; Cereal Products:

Flours and its quality; Processed products of rice, wheat and maize; By products utilization; breakfast cereals and extrusion; Effect of processing on nutritive value of cereals; changes in physiochemical properties of cereal starch and protein due to processing. Milling process: Complete milling process, break rolls, reduction rolls, milled products and their nutritive value and applications

Unit III

12 Hours

Pulse Processing and Technology: Dals, flours, protein concentrates, isolates and hydrolysates; Byproducts utilization; Effect of processing on nutritive value and physiochemical properties of pulses.

Nuts and Oil Seeds Processing and Technology: Nuts Processing methods, Oil seeds processing: Oil extraction methods and refining process; byproducts utilization; Effect of processing on nutritive value and physio-chemical properties of vegetable oils.

Unit IV

12 Hours

Vegetables Processing and Technology

Pigments: Classification, effects on processing of vegetables; Preliminary processing of vegetables; Vegetable products: Fermented and non-fermented and its shelf life; Vegetable waste utilization; Effect of processing on nutritive value and physiochemical properties of vegetable.

Fruits Processing and Technology:

Concept of maturity, ripening and senescence; Methods of fruit processing technologies: traditional and new methods. Fruit products: fermented and non-fermented; Effect of processing on nutritive value and physiochemical properties of fruits; Browning reactions: types and mechanism; prevention methods; Fruit waste utilization.

Unit V

12 Hours

Milk Processing and Technology: Milk types, composition, physiochemical properties; Milk processing- Separation, centrifugal process, natural creaming, pasteurization, sterilization, homogenization. Milk storage; Effects of processing on nutritive value and physicochemical properties of milk.

Egg Processing and Technology: Egg processing and storage; Effect of processing on nutritive value and physiochemical properties of eggs; changes in egg quality during storage and preservation methods.

Meat Processing and Technology: Meat processing and storage; Factors influencing meat quality; Ageing and tenderization of meat.

Poultry: Processing and storage of poultry meat; Preservation methods for poultry. **Fish:** Processing and storage; Preservation methods for fish. Effect of processing on nutritive value and physiochemical properties of meat, poultry and fish.

Learning Resources:

Text Books:

1. Shakuntala Manay N Shadak Cheraswamy M. (2004) Food Facts and Principles. New age publisher. 2nd edition.
2. Roday S. (2011). Food Science. Oxford publication. 1st edition.
3. B Srilakshmi (2015) Food science. New Age Publishers. 6th edition.
4. Fellows P. (2000). Food Processing Technology, 2nd Edition.
5. Wood head Publishing Limited and CRC Press LLC. 1st edition.

References

1. Rao cg. (2006). Essentials of food process engineering. PHI learning private ltd.
2. Janet D Ward and Larry Ward.(2006). Principles of Food Science, Stem Publishers. 4thedition.
3. Srivastava R P and Kumar S. (2006) Fruits and Vegetables Preservation- Principles and Practices. International Book Distributing Co. 3rd edition.

Websites/ Websites/ e-Learning Resources

1. <http://www.fao.org/3/V5030E/V5030E00.htm>
2. <https://fmtmagazine.in/fruits-vegetables-processing-technologies/>

CO - PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO 1	3	3	2	2	2	2	3	3	3	3
CO 2	3	2	3	3	3	3	3	2	3	3
CO 3	3	3	3	3	3	2	3	3	3	3
CO 4	3	3	3	3	2	3	3	2	3	3
CO 5	3	2	1	1	2	2	3	3	3	3
Average	3	2.6	2.4	2.4	2.4	2.4	3	2.6	3	3

Strong- 3 Medium– 2 Low – 1

CourseCode	Name of the Course	Category	Hours/Wk.	Credits
24PFN4305	Principles of Menu Planning	DSE	4	3

The course aims to gain knowledge on the importance of nutrition during life span and to do the computation of nutrient allowances during life span and also to enlighten on the dietary modifications.

Course Outcomes:

At the end of the course, students will be able to

CO1: remember and understand the basic concepts and Principles of Nutrition through different styles of life

CO2: analyze the various concepts of preschool and school-going children

CO3: apply the knowledge to understanding the practical problems faced by adolescents and adult

CO4: describe the practical problems faced during pregnancy and lactation

CO5: develop skills by gaining knowledge about nutritional and health concerns during geriatric and infancy

Unit I

12 Hours

Recommended Allowances: RDA for Indian basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. General concepts about growth and development through different stages of life.

Unit II

12 Hours

Preschool: Food habits and nutrient intake of preschool children. Dietary allowances and supplementary foods.

School going age: Nutritional status of school children, school lunch program, factors to be considered in planning a menu, food habits and nutritional requirement, packed lunch.

Unit III

12 Hours

Adolescence: Changes of growth characteristics of adolescents. Nutritional needs of the adolescents.

Adults: Nutrition for adults. Basis for requirement. Nutrition and work efficiency.

Unit IV

12 Hours

Nutrition in Pregnancy and Lactation: ICMR Nutrient allowances, Dietary guidelines. Common nutrition related problems of pregnancy and Lactation.

Unit V

12 Hours

Geriatric –Nutrition allowances – Dietary Guidelines – psycho-social and economic factors affecting eating behaviour.

Infant –Rate of growth, weight as the indicator, Nutrition allowances for the infants. Breast feeding. Weaning foods suitable for infants. Premature infant and their feeding infant formulas

Learning Resources:

Text Books

1. Srilakshmi B. (2018) Dietetics, New Age International (P) Ltd, Publishers
2. Athanasius M (1985) Advanced Text Book on Food and Nutrition. Vol.II.BAPPOO, No.88, Mysore Road, Bangalore.
3. Judith E Brown Nutrition Through the Life Cycle Paperback–Publisher: Cengage Learning, Inc; 4th ed. Edition 9 June 2010
4. Sumathi R Mudambi, 2012, 4th edition, Fundamentals of foods, nutrition and diet therapy,
5. Sara Abraham, Nutrition Through Life cycle, 2016, New Age International
6. (P) Ltd, Publishers

References

1. Whitney EN and Cataldo CB (1983) Understanding normal and clinical Nutrition. West Publishing Company, New York.
2. Krause MV and Mohan LK (1984) Food, Nutrition and Diet Therapy. W.B. Saunders company, Philadelphia.
3. Passmore R and East Wood MA (1987) Human Nutrition and Dietetics. English Language Book Society/Chrchill, Livingstone.
4. Robinson CH, Lawber MR, Chenoweth WL and Garwick AE (1986) Normal and Therapeutic Nutrition. Seventh Edition, Mc Millan Publishing company, New York.
5. Nix .S 2016, Williams“ Basic Nutrition & Diet Therapy, Fifteenth Edition, Elsevier.

E- Learning Resources

1. www.four-h.purdue.edu
2. www.ingenta.connect.com3.nal.usda.gov/fnic/lifecycle

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	2	2	1	2	2	1	1	1	2
CO2	3	2	3	2	2	2	2	2	2	2
CO3	3	2	2	2	2	1	2	1	1	2
CO4	2	2	2	2	3	1	1	1	1	2
CO5	3	2	2	3	2	1	2	2	1	2
Average	2.8	2	2.2	2	2.2	1.4	1.6	1.4	1.2	2

Strong- 3 Medium- 2 Low - 1

Course Code	Name of the Course	Category	Hours/Wk.	Credit s
24PFN4307	Recent concepts in Nutritional assessment	GE	4	3

This course aims to impart the knowledge about various nutritional assessment techniques and to understand the concept of nutritional status and its relationship to health.

Course Outcomes:

At the end of the course, students will be able to

CO1: acquire the knowledge of various aspects of assessment for children

CO2: identify the methods of anthropometric assessment designed for adults

CO3: analyse the biochemical examination in relation to the confirmatory process for test to medical nutrition therapy

CO4: emphasis the clinical examination method to identify deficiency disorders

CO5: apply the dietary assessment method in order to correct faulty lifestyle habits

Unit I

12 Hours

Anthropometric measurement of children- height, weight, MUAC, BMI, Growth chart-plotting of growth charts, growth monitoring and promotion. Comparison with norms and interpretation of the nutritional assessment data and its significance. Weight for age,height for age, weight for height, Z scores, standard deviations, percentiles.

Unit II

12 Hours

Anthropometric Measurement of adults- height, weight, BMI, waist circumference, waist: hip ratio, waist: height ratio, skinfold callipers, Broka’s index, ponderal index.

Unit III

12 Hours

Biochemical assessment – types, merits and demerits. Estimation of food and nutrient intake: Household food consumption data, adult consumption unit.

Unit IV

12 Hours

Clinical assessment and signs of nutrient deficiencies specially PEM (Kwashiorkor, marasmus), vitamin A deficiencies, Anaemia, Rickets, B-Complex deficiencies.

Unit V

12 Hours

RDA-24 Hours dietary recall 24 Hours record, Weighment method, food diaries, food frequency data, use of each of the above, information available through each individual, collection of data, estimation of intakes.

Learning Resources:

Text Books

1. Athanasius M (1985) Advanced Text Book on Food and Nutrition. Vol.II. BAPPOO,No.88, Mysore Road, Bangalore.
2. B Srilakshmi,2018, Nutrition Science: New Age International (P) Ltd, Publishers

References

1. Jelliffe, D. B.: Assessment of the Nutritional Status of the Community; World Health Organisation.
2. Sain, D. R. Lockwood, R., Scrimshaw, N. S.: Methods the Evaluation of the Impact of Food and Nutrition Programmes, United Nations University.
3. Beghin, I. Cap. M: Dujardan. B. : A Guide to Nutrition Status Assessment. W.H.O. Geneva
4. Gopaldas, t. Seshadri, S. : Nutrition Monitoring a Assessment: Oxford University Press.
5. Mason, J. B., Habicht, J. P.; Tabatabai. H. Valverde. U.: Nutritional Surveillance, W.H.O.

Websites/ e-Learning Resources

1. <https://www.studocu.com/row/document/university-of-lagos/molecular-biology/5-notes-on-nutritional-assessment/30094500>

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	2	2	2	2	1	2	1	1	1
CO2	3	3	2	2	2	1	2	1	1	2
CO3	2	2	2	2	2	2	2	2	2	2
CO4	3	2	2	2	2	2	2	1	2	1
CO5	2	3	2	2	2	1	1	2	2	2
Average	2.6	2.4	2	2	2	1.4	1.8	1.4	1.6	1.6

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN4309	Obstetrics and neonatal nutrition	GE	4	3

The course deals with the basic sciences relevant to obstetrics and gynecology. It provides effective and adequate care and diet to the obstetrical and neonatal diseases.

Course Outcomes:

At the end of the course, students will be able to

CO1: explain the biochemical and endocrine changes during pregnancy.

CO2: discuss the signs and symptoms along with complications.

CO3: outline the anatomy and physiology of foetus and the principles of diet and nutrient modifications for the growth and development of foetus

CO4: outline the importance of lactation in neo natal nutrition and awareness on the immunisation schedule.

CO5: compute the required RDA as per ICMR guidelines for Pregnancy, Lactation and infancy.

Unit I **12 Hours**

Pre-natal Period-Signs & symptoms, Biochemical and endocrine changes during pregnancy, complications – Food fads & taboos.

Unit II **12 Hours**

Foetal Growth and Development-Anatomy of foetus, foetal physiology and foetal circulation - Development, structure and function of placenta, umbilical cord and amniotic fluid-importance of micronutrients.

Unit III **12 Hours**

Postpartum Period-Risk in Labour- Still birth -Pre-mature- cord around the neck- Cross section.

Unit IV **12 Hours**

Neo natal nutrition-Lactation -Importance of breastfeeding- Infant Formula-identify normal and sick neonates – immunization schedule.

Unit V **12 Hours**

Nutritional and Food Requirements-ICMR guidelines for Pregnancy, Lactation and infancy - nutritional needs and diet plan.

Learning Resources:

Text Books:

1. Chatterjee CC (1988) Text Book of Medical Physiology. WB Saunder’s and Co. London.

References:

1. Srilakshmi B (2014) dietetics, 7thedition, New Age International (P) Ltd, Publishers
2. Guyton (1991) Human physiology and Mechanism of diseases. W.B Saunder’sand Co. London.

CO–PSO MAPPING

CO/PSO	PSO1	PSO 2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	2	3	2	3	2	2	2	2	2	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	2	3	3	3	2	2	2	2	2	2
CO4	2	3	3	3	2	2	3	2	2	2
CO5	3	3	3	3	2	3	3	2	2	2
Average	2.2	3	2.8	3	2	2.4	2.6	2	2	2

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credit s
24PFN 4502	Research methods innutrition	CC	6	5

This course aims to understand the basic concepts, approaches and importance of research in Food Science and Nutrition and to make students understand the types of tools applicable to research problem and develop skills.

Course Outcomes:

At the end of the course, students will be able to

CO1: demonstrate knowledge of the scientific method, purpose and approaches to research and become a qualified researcher.

CO2: identify and selection of the research sampling and scales of measurement

CO3: discuss the types of tools applicable to research problem and develop skills of preparing out line of research work and construct common data collection tools

CO4: assess the numerical data for providing statistical evidences to support the research results and interpretation of data with the use of tables and pictorial representations

CO5: present research data in a scientific manner and understand the key elements of the search report and various applications of computer in Nutrition research

Unit I

18 Hours

Meaning, Objectives and Classification of research- Designs-Exploratory Descriptive – Longitudinal and Cross sectional, Observation-Participant and Non-participant, Epidemiological Surveillance, Retrospective, *IN-VIVO*, *IN-VITRO* and Experimental – Pre-Experimental, Quasi-Experimental, True Experimental and Statistical Experimental designs. Need of Research in Food Science and Nutrition, Research Process- Selection and Formulation of Research Problem, Objectives of Research: Explanation, Control and Prediction, Hypothesis: Definition, Importance, Types and Errors – I & II, Deciding Variables

Unit II

18 Hours

Sampling Process and Characteristics of good Sampling- Classification of Sampling Techniques – Probability and Non-Probability Sampling, Preparation of Laboratory Food Samples, Sampling and Non- Sampling Errors. Measurements and Scaling –Fundamental

and Comparative Scales – Meaning and types, Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale. Non-comparative Scales– Meaning and types, Continuous Rating Scale, Itemized Rating Scale, Likert Scale. Semantic Differential Scale, Staple Scale.

Unit III

18 Hours

Data Collection and Preparation-Data Collection – Tools, Primary Data. Interviews – structured and unstructured. Case studies, Questionnaire Surveys – Pilot & KAP Laboratory Experiments. Secondary Data- Published Sources, Unpublished Sources Reliability and Validity of Tools– Meaning Data Preparation Process –Editing, Coding, Classification, Tabulation.

Unit IV

18 Hours

Statistical Methods-Parametric and non-parametric tests Difference and Applications Data Analysis Process-Descriptive Analysis-Graphical and Diagrammatic Presentations Central Tendency – Mean, Median & Mode Dispersion –Standard Deviation Statistical Inference – Tests of Hypothesis t – test ANOVA – One Way & Two-Way Chi-square test – Goodness of Fit & Test of Independence.

Unit V

18 Hours

Reporting the findings and Computer Application - Report writing, importance, types, mechanics, guidelines and Precautions Endnotes – Bibliography, Appendices, Footnotes and glossary terms. Computer applications in nutrition research –importance and uses Applicable Statistical Analysis Software-Literature Searching-PubMed, Data Analysis, Micro Soft Excel, SPSS, Minitab. Plagiarism Checker – Turnitin, Scribbr.

Learning Resources:

Text Books:

1. Kothari C R (2004). Research Methodology – Methods & Methodology. Delhi, New Age International Pvt Ltd. 2nd Ed
2. Chawla, Deepak and Neena Sondhi (2018): Research Methodology Concepts and Cases. Noida, Vikas Publishing House Pvt Ltd. 2nd Ed.
3. Copper, H.M. (2002). Integrating Research: A guide for literature reviews. California: Sage, 2nd Edition.
4. Kerlinger, Foundation of Educational Research Ingle P.O. Scientific Report Writing. Nagpur, Sarla P. Ingle.

References:

1. Ranjit Kumar (2011). Research Methodology: a step-by-step guide for beginners, SAGE Publications. 3rd edition.
2. Anderson, David R and et.al. (2013) : Statistics for Business and Economics. Delhi, Cengage Learning India Pvt Ltd. 11th Ed.
3. Bandarkar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of Social Research. Himalaya Publishing House, Mumbai.
4. Bell, Judith (2005): Doing your Research Project – A guide for first time researchers in education, health and social science. England, Open University Press. 4th Ed.
5. Danial, Wayne W and Chad L Cross (2017): Biostatistics – Basic Concepts and Methodology for the Health Sciences – International Student Version. New Delhi, AR Emm International, 10th Ed.

Websites/ e-Learning Resources:

1. SWAYAM, MOCC, E-PATHSALA, IGNOU

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	3	2	2	2	2	2	2	2
CO2	3	3	3	2	2	2	2	2	2	2
CO3	3	3	3	2	2	2	2	2	1	2
CO4	3	3	3	2	2	1	2	2	2	2
CO5	3	3	3	2	2	1	2	2	1	2
Average	3	3	3	2	2	1.6	2	2	1.6	2

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN4504	Advanced Dietetics	CC	6	5

This course aims to acquire knowledge regarding the effect of various diseases on nutritional status and nutrient requirement with the dietary management.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: enhance the knowledge in diet therapy

CO2: explain the current concepts of therapeutic diets and critically ill

CO3: implement the dietary principles on various disorders.

CO4: acquire the knowledge of diet counseling skills.

CO5: apply the dietary principles to manage the lifestyle disorders in the society

Unit I

18 Hours

Basic concepts of diet therapy – Therapeutic adaptations of Normal diet, Principles and classification of therapeutic diets. Routine Hospital diets – Regular, soft, fluid diet. Nutritional Management in critical care -Nutritional screening and nutritional Status assessment of critically ill, Nutritional requirement according to the critical condition Nutritional support systems: Enteral and parenteral nutrition support- Types, composition and complications.

Unit II

18 Hours

Medical Nutrition therapy for gastrointestinal and liver disorders--

Upper Gastrointestinal tract Diseases – Esophagitis, Gastro esophageal reflux disease [GERD]. Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers, and dumping syndrome. Lower gastrointestinal tract Diseases/Disorders- Common Symptoms of Intestinal dysfunction - constipation, diarrhoea, steatorrhea, Diseases of the large intestine- Diverticular disease, Irritable bowel syndrome, Inflammatory bowel disease Diseases of Small Intestine- Celiac disease, Tropical sprue, Diseases of the Liver- Hepatitis, Cirrhosis, Cholecystitis, Cholelithiasis and pancreatitis, Zollinger Ellison syndrome.

Unit III

18 Hours

Medical Nutrition therapy for Pulmonary Diseases- Effect of Malnutrition on pulmonary

system, effect of pulmonary disease on nutritional status, Chronic pulmonary diseases- Asthma, Cystic fibrosis, Chronic obstructive pulmonary disease and Pneumonia- Pathophysiology and dietary management.

Medical Nutrition therapy for Rheumatic disease- Etiology, Pathophysiology of Inflammation of Rheumatic diseases, Rheumatoid Arthritis, Osteoarthritis and Sjogren syndrome.

Nutritional management of physiological stress- Burns-Classification, Complications, Metabolic changes in protein and electrolytes and Dietary management. Dietary management of trauma and stress.

Unit IV

18 Hours

Nutritional Management on Weight imbalance-Weight Imbalance: prevalence and classification, Regulation of food intake and pathogenesis. Underweight -Etiology and Dietary management; Obesity- Etiology, classification, Energy balance, dietary modifications and Bariatric surgery- types and dietary modifications of pre and post bariatric surgery. Nutritional Management in metabolic disorders. Diabetes mellitus: Prevalence, Etiology, risk factors, complications and dietary modifications.

Unit V

18 Hours

Nutritional management of cardiovascular diseases-Etiology, risk factors, clinical features and dietary modifications of Dyslipidemias, Atherosclerosis, Hypertension, Ischemic heart disease, and Congestive cardiac failure.

Nutrition Management of Renal Disease-Etiology, Clinical and metabolic manifestations, diagnostic tests and dietary modifications of Glomerulonephritis, Nephrotic syndrome, Renal Failure: Acute and chronic, ESRD, Nephrolithiasis.

Nutritional management in cancer- Pathogenesis and progression, types, symptoms and dietary management.

Learning Resources:

Text books

1. Mahan L.K., Sylvia Escott-Stump. (2000). Krause's Food Nutrition and Diet Therapy. W.B. Saunders Company London. 10th edition.

2. B. Srilakshmi. (2007). Dietetics. K.K. Gupta For New Age International Pvt. Ltd. New Delhi Publisher.
3. Antia F.P. And Philip Abraham. (2001). Clinical Nutrition and Dietetics. Oxford Publishing Company.

References

1. Garrow J. S, James, WPT, Ralph A.(2000). Human Nutrition and Dietetics. Churchill Livingstone, NY. 10th edition.
2. Groff L James, Gropper S Sareen. (2000). Advanced Nutrition and Human Metabolism. West / Wadsworth, UK. 3rd edition.
3. Sue Rodwell Williams. (1993). Nutrition, Diet Therapy. W. B. Saunders Company London. 7th edition.

Websites/ e-Learning Resources:

1. www.nutrition.gov - Service of National Agricultural Library, USDA.
2. www.nal.usda.gov/fnic -Food and Nutrition information centre.
3. www.healthyeating.org. 4.www.eatrightpro.org.
4. <https://www.globalhealthlearning.org>.

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	2	2	2	2	2	2	2	2
CO2	3	3	2	2	2	2	2	2	2	2
CO3	3	3	1	2	2	1	2	1	1	1
CO4	3	3	2	2	2	2	2	2	2	2
CO5	3	3	2	2	2	2	2	2	2	2
Average	3	3	1.4	2	2	1.8	2	1.8	1.8	1.8

Strong- 3 Medium- 2 Low - 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN4402	Nutritional Biochemistry	CC	6	4

This course aims to understand the need for the study of biochemistry as the basis for nutritional sciences and awareness of metabolism of proximate principles and others.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: gain knowledge on metabolism and regulation of carbohydrates.

CO2: discuss the classification, structure, organization and metabolic pathway of protein.

CO3: describe the concept of metabolism of lipids and functions of lipoproteins.

CO4: discuss the role of enzymes and free radicals and their role in pathology.

CO5: explain the biological metabolism and functions of nucleic acid and understand recent concepts in biochemistry.

Unit I

18 Hours

Metabolism of Carbohydrates: Glycolysis, The Citric Acid Cycle, glycogenesis, glycogenolysis, gluconeogenesis, The Hexose Monophosphate Shunt and bioenergetics. Hormonal regulations of blood glucose homeostasis. Biological oxidation, Electron transport chain and Oxidative Phosphorylation.

Unit II

18 Hours

Protein and amino acid metabolism: Classification of amino acids, Oxidative Deamination, decarboxylation, transamination and transmethylation of amino acids, urea cycle, biosynthesis of non-essential amino acids, catabolism of essential amino acids. Protein biosynthesis.

Unit III

18 Hours

Metabolism of Lipids: Classification of fatty acids, Biosynthesis of fatty acids, beta-oxidation of fatty acids and ketone bodies. Essential fatty acids – types and functions. Metabolism of phospholipids, and cholesterol. Lipo proteins – classification and function.

Unit IV

18 Hours

Enzymes and free radicals: Enzymes –Definition, Types, mechanism of action, factors affecting enzyme activity, coenzyme, role of B vitamin as coenzyme. Free radicals –

definition, formation in biological systems. Antioxidants – definition, Role of antioxidants in prevention of degenerative disorders.

Unit V

18 Hours

Overview of intermediary metabolism of carbohydrates, proteins and lipids. Hormonal regulation of carbohydrate, protein and fat metabolism. Structural components and functions of nucleic acid, Structure of DNA, DNA Replication, RNA synthesis – types and functions and metabolism, translation. Recombinant DNA technology, Metabolism of Xenobiotics, Nutrigenomics.

Learning Resources:

Text Books

1. Jain, J.L., Jain, S., & Jain, N., (2005). Fundamentals of Biochemistry. S. CHAND & COMPANY Ltd. Ram nagar, New Delhi-110 055. 6th revised edition.
2. Bettelheim, F. A., Brown, W. H., Campbell, M. K., & Farrell, S. O. (2009). General, Organic & Biochemistry. Brooks/Cole Cengage Learning.
3. Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2005). Biochemistry. Lippincott Williams & Wilkins, 6th Edition, Wolters Kluwer, London.
4. Talwar, G. P., & Srivastava, L. M. (2002). Textbook of biochemistry and human biology. PHI Learning Pvt. Ltd..
5. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. Harpers Biochemistry. Macmillan worth publishers.

References

1. Marshall, W. J., Lapsley, M., Day, A., & Ayling, R. (2014). Clinical Biochemistry E-Book: Metabolic and Clinical Aspects. Elsevier Health Sciences.
2. Bender, D. A. (2003). Nutritional biochemistry of the vitamins. Cambridge University Press.
3. Albanese, A. (Ed.). (2012). Newer methods of nutritional biochemistry with applications and interpretations. Elsevier.
4. Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2005). Biochemistry. Lippincott Williams & Wilkins.
5. Lieberman, M., & Ricer, R. E. (2009). Lippincott's Illustrated Q&A Review of Biochemistry. Lippincott Williams & Wilkins.

Websites/ e-Learning Resources:

1. <https://www.udemy.com/share/1027yA/>
2. <https://www.classcentral.com/course/swayam-biochemistry-5229>
3. <https://www.classcentral.com/course/edx-biochemistry-biomolecules-methods-and-mechanisms-12585>
4. <https://www.classcentral.com/course/swayam-experimental-biochemistry-12909>

CO – PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	1	2	2	1	2	2	2	2
CO2	3	3	1	2	2	1	2	2	2	2
CO3	3	3	1	2	2	1	2	2	2	2
CO4	3	3	2	2	1	1	1	2	1	1
CO5	3	3	2	2	1	1	1	1	1	1
Average	3	3	1.4	2	1.6	1	1.6	1.8	1.5	1.6

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN4302	Advanced Dietetics lab	Core Lab	4	3

This course enables the students to acquire knowledge in planning diets for various disorders.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: evaluate various therapeutic diets

CO2: identify the requirements for disease conditions and critically ill patients

CO3: assess and plan the diets for various disease conditions.

CO4: create Knowledge in nutrient calculations and dietary principles.

CO5: design the personalized diets for different individuals in the society

1. Routine hospital diet: Regular diet, Clear liquid, Soft diet, Full liquid diet
2. Assessing requirements and planning diet for obese and underweight individual.
3. Planning and preparing diet for Diabetes Mellitus [IDDM and NIDDM].
4. Planning and preparation of diet for Atherosclerosis with Hypertension
5. Assessing and planning diets for the following conditions
6. Celiac disease
7. GERD
8. Peptic ulcer
9. Hepatitis
10. Cirrhosis
11. Planning and preparing diet for Pneumonia
12. Planning and preparing diet for Rheumatic arthritis
13. Planning and preparation of diet for Glomerulo nephritis
14. Planning and preparation of diet for cancer according to the condition
15. Planning and preparing diet for pre and post Bariatric surgery patients
16. Assessment and planning diet for post burn condition

Learning resources:

Text books:

1. Stump SE. (2012). Nutrition and diagnosis related care. Lippincott Williams and Wilkins. Canada.7th edition.
2. Width. M & Reinhardt.T. (2018). The Essential Pocket Guide for Clinical Nutrition. Wolters Kluwer Publishers. 2nd edition.
3. Whitney EN and Rolfes S R. (2002). Understanding Nutrition, 9th edition, West/Wordsworth.
4. Guthrie H. (2002). Introductory Nutrition. CV Mosby Co.St. Louis.

References

1. Gopalan C., Ram Sastri B.V. And Bala Subramaniam S.C. (2006). Nutritive Value of Indian Foods. Hydrabad, National Institute of Nutrition. Indian Council of Medical Research.
2. Clinical Dietetics Manual. (2018). Indian Dietetic Association. 2nd edition. Peggy Stanfield. Y. H. Hui. (2010). Nutrition and Diet therapy. Jones and Bartlett publishers.
3. William’s. (2012). Basic Nutrition and Diet therapy.14th Edition.

Websites/ e-Learning Resources:

1. www.nutrition.gov – Service of National agricultural library, USDA
2. www.nal.usda.gov/fnic - Food and Nutrition information centre.
3. www.healthyeating.org.

CO–PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	2	2	1	2	2	1	1	1	2	2
CO2	2	2	1	2	2	1	1	2	1	1
CO3	2	2	1	2	2	1	1	1	2	2
CO4	2	1	1	2	2	1	1	2	1	1
CO5	2	2	1	2	2	1	1	2	2	2
Average	2	1.8	1	2	2	1	1	1.6	1.6	1.6

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
23PFN4304	Nutrition for special condition	DSE	4	3

The course aims at enable the students to learn about the physiological modifications that occur during weather shifts and to treat common illnesses at home, various National nutritional emergencies and epidemic diseases. Also, comprehend the eating habits and selection of foods for specific conditions and to improve the ability to plan a menu.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: describe the concept, purpose and principles of diet therapy for children with special needs.

CO2: gain in-depth knowledge in various epidemics and planning a diet for the same.

CO3: identify and solve food related issues during natural disasters.

CO4: develop and deliver appropriate information, products, and services to people in space.

CO5: discuss the nutritional requirements for military person.

Unit I 12 Hours

Nutritional care for the children with special needs, Overview of the disability, food and nutritional needs and their modification. Attention deficit hyperactivity disorder – Autism, Cerebral palsy, Down’s syndrome.

Unit II 12 Hours

Epidemic diseases- Dengue, chikungunya and other epidemic conditions. Hypothyroidism and hyper thyroidism. Wilson’s Disease.

Unit III 12 Hours

Nutritional Emergency-Nutrition during emergency: Natural calamity – war, flood, fire famine, Physiological changes, Nutritional requirement in cold polar and hot environment, food supplements. Mountaineering, Current challenges and controversies in nutrition in emergencies.

Unit IV 12 Hours

Space Nutrition Physiological changes during space flight, Planning and serving the food, Classification of space food and Dehydrated foods use in space, essential quality and criteria required for space food.

Unit V

12 Hours

Military Nutrition-The history of Military nutrition, Nutrient Support in Military person, Dietary guidelines, the role of nutrient in injured person, Estimation of energy and protein metabolism in armed person. Nutrient supplements and ration developed in military.

Learning Resources:

Text Books

1. Bamji MS, Rao NP, and Reddy V. Text Book of Human Nutrition; Oxford & IBH Publishing Co. Pvt Ltd, 2009.
2. Gibney., “Public Health Nutrition”, Blackwell Publishing, 2004.
3. Khanna., “Textbook of Nutrition and Dietetics”, Phoenix Publisher, 2013.

References

1. Jacalyn J. McComb, Reid Norman, et al., The Active Female: Health Issues Throughout the Lifespan 2010, Human press.
2. Aleta L. Meyer and Thomas P. Gullotta., Physical Activity Across the Lifespan: Prevention and Treatment for Health and Well-Being (Issues in Children’s and Families’ Lives), 2012, Springer.
3. Srilakshmi B. “Dietetics” Seventh Edition, New Age International (P) Ltd, 2016.

Websites/ e-Learning Resources

1. <https://egyankosh.ac.in/handle/123456789/33312>

CO-PSO MAPPING

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO 1	3	3	3	2	2	1	1	1	1	1
CO 2	3	3	3	2	2	1	1	1	1	1
CO 3	3	3	3	2	2	1	2	2	1	2
CO 4	3	3	3	2	2	1	2	2	1	2
CO 5	3	3	3	2	2	1	2	2	1	2
Average	3	3	3	2	2	1	1.6	1.6	1	1.6

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
23PFN4306	Functional Foods & Nutraceuticals	DSE	4	3

The course aims at enables to gain knowledge on sources of functional foods and Nutraceuticals. It also helps to understand the role of functional foods, Nutraceuticals and dietary supplements in health and disease.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: describe the relation between Functional Foods, Nutraceuticals to Food and Drugs along the regulatory aspects

CO2: discuss to various functional food groups of plant origin

CO3: enable students understand the functional component of animal origin

CO4: discuss the role of prebiotic and probiotics in gut health

CO5: study about the herbs and flowers as a source of bio active compounds in treating certain diseases

Unit I

12 Hours

Introduction to Functional Foods and Nutraceuticals: Functional foods and Nutraceuticals – Definition and history. Teleology – definition, primary and secondary metabolites. Organisational Models for Nutraceuticals – a) Food Sources, b) Mechanism of Action: c) Chemical Nature. Consumer Marketing – Factors for marketing functional foods and nutraceuticals.

Unit II

12 Hours

Functional Components from Plant Sources: i) Nutrient Molecules: (Phospholipids, Vitamin K, Carbohydrate Derivatives- Dietary fiber – Types and sources, Physical and Physiological properties. Minerals – Zinc, Selenium. Ii) Non- Nutrient Molecules: Phenolic compounds (Phytoestrogens – Isoflavones, Lignans. Flavonoids – Quercetin, kempferol, Flavones – limonene. Flavols – Catechin), Phenolic acid – Ellagic acid, Caffeic acid), Phytosterols and phytostenols, Saponins, Tannins, Carotenoids (Lycopene, Beta-carotene, Lutein and zeaxanthin).

Unit III

12 Hours

Functional Components from Animal Sources: Major and minor components in cow's Milk and Human Milk. Proteins – lactalbumin, lactoglobulin, lactoferrin, immunoglobulins, Derived peptides – casein phosphor peptides, glycol-macro peptides, Lactose, Fat. Mineral – zinc, selenium, Calcium. Omega 3 and Omega 6 Fatty Acids & Structured Lipids.

Unit IV

12 Hours

Microbes as Functional Foods: General Functions of Intestinal Microflora. Prebiotics – Definition, role of prebiotic as functional ingredient, examples. Probiotics- Definition, role of probiotic as functional ingredient, examples. Symbiotics – Definition, functions, examples.

Unit V

12 Hours

Herbs and Flowers as Functional Foods: Action of Herbs and Efficacy on: a) Nervous System-Ginseng, St. John's wort, Ginkgo biloba. B) Heart and Circulatory System-Hawthorn plant. C) Immune System –Echinacea. D) Digestive System- Ginger, valerian root, fennel. E) Respiratory System-Licorice root, kava kava. F) Urinary System- Cranberry, Saw palmetto. G) Musculoskeletal System-Fever few.

Flowers – Medicinal values, nutritional importance, culinary uses, effect of cooking of Edible flowers – Drumstick, Neem, Agathi, Plantain. Ornamental edible flowers – Hibiscus, lotus, rose.

Learning Resources

Textbook(s):

1. Mary K Schmidl and Theodore P. Labuza, Essentials of Functional Foods, Culinary and Hospitality Industry Publications Services 2000.

Reference Books:

1. G. Mazza Functional Foods Biochemical Processing Aspects, Culinary and Hospitality Industry Publications 1998.
2. Israel Goldberg Functional Foods Designer Foods Pharma Food, Nutraceuticals, Culinary and Hospitality Industry Publications 2001.
3. Robert E C Wildman Handbook of Nutraceuticals and Functional Foods, Culinary and Hospitality Industry Publications 2001.

4. David H Watson Performance Functional Foods, Culinary and Hospitality Industry Publications 2001.

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	2	2	2	2	3	2	2	2
CO2	2	2	3	3	2	3	3	2	2	2
CO3	3	2	3	3	2	2	3	2	2	2
CO4	3	3	3	3	2	2	3	2	2	2
CO5	3	2	3	3	2	3	3	2	2	2
Average	3	2.7	3	2.5	2	1.7	2.3	1.8	1.5	1.8

Strong- 3 Medium- 2 Low - 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN4308	Food Preservation	GE	4	3

Food Preservation is one of the major streams of Food science that deals with the basic principles of food preservation methods including thermal and non-thermal processing methods and its role in extending the food product’s quality and shelf life.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: describe the basic methods of Food Preservation and its principles.

CO2: identify the best methods of storage of different foods based on their shelf life using low-temperature preservation methods.

CO3: apply the use of high temperatures to preserve food and identify the appropriate method to preserve different foods.

CO4: discuss the role of drying and dehydration methods on the quality of different food products.

CO5: describe the use of modern non-thermal processing methods in food preservation and managing food wastage.

Unit I **12 Hours**

Introduction to Food Preservation-Concept, the importance of food preservation., Common terms used in food preservation. Different methods and Principles of preservation.

Unit II **12 Hours**

Preservation by Low Temperature-Use of Cold and Refrigerated Storage, Use of Freezing temperatures: Slow and fast freezing of foods and Cryogenic freezing of foods, dehydro-freezing, Frozen storage and thawing of foods.

Unit III **12 Hours**

Preservation by High Temperature-Preservation of foods by high temperatures. Blanching, Pasteurization and Sterilization of foods. The general process of caning of foods.

Unit IV**12 Hours**

Preservation by Drying-Principles and application of drying and dehydration of foods different types of drying and dryers.

Unit V**12 Hours**

Preservation by Non-Thermal Processing Methods-Principles and Application of Non-Thermal Processing Methods – Irradiation, High-pressure processing, Pulse Electric Field processing & Pulse UV light processing technology, Cold Plasma technology.

Learning Resources:**Text Books**

1. Prakash Triveni (2010): Food Preservation, Aadi Publication, Delhi.
2. M. Shafiur Rahman (2007): Hand Book of Food Preservation, Marcel Dekker Inc, New York.
3. Mc Williams and Paine (2009): Modern Food Preservation, Surjeet Publications.
4. Karnal, Marcus and D.B. Lund (2003) “Physical Principles of Food Preservation”. Rutledge.
5. Van Garde, S. J. and Woodburn. M (2001) “Food Preservation and Safety Principles and Practice”. Surbhi Publications.

References

1. Xu, Z., Li, Y., Liu, Z., Soteyome, T., Li, X., & Liu, J. (2024). Current knowledge on cryogenic microorganisms and food safety in refrigerators. Trends in Food Science & Technology, 104382.
2. Sanjeet, K., & Mishra, S. (2023). Recent Developments in Food Preservation Techniques: A Review. TWIST, 18 (4), 287-296.

Websites / e-Learning Resources

1. <https://www.embibe.com/food-preservation/>
2. <https://agripathshala.com/lessons/principles-of-food-preservation>
3. www.onlinebiologynotes.com/food-preservation-from-microbial-spoilage-principles
4. https://www.researchgate.net/publication/347909697_FOOD_PRESERVATION

CO-PSO MAPPING

CO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	3	2	1	1	2	1	2	1	2	3
CO 2	3	2	3	3	2	3	2	3	2	3
CO 3	3	2	3	3	2	3	3	3	2	3
CO 4	3	3	1	2	3	1	3	2	3	3
CO 5	3	2	1	2	2	1	3	2	2	3
Average	3	2.5	1.8	2.2	2.1	1.8	2.6	2.2	2.1	3

Strong- 3 Medium- 2 Low - 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN4310	Nutrition in Mental Health	GE	4	3

The course aims at providing a wide knowledge on common mental illness and the way to manage through foods and specific function and effects of its components. This course also deals with the food addiction and stress management.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: discuss on food addiction and mental health problems in various age groups.

CO2: analyze the role of food in mental health.

CO3: identify the role of lipids for a healthy mind.

CO4: outline the different mental disorders and role of nutrients for prevention and management.

CO5: critique the stress and its effect on mental health.

Unit I **12 Hours**

Mental health problems and food addiction- Mental health problems in adults, children, adolescence, pregnancy and aging. Food addiction- Alcohol addiction, Caffeine addiction.

Unit II **12 Hours**

The role of food in mental health problem- The role of diet in relation to specific mental health problem, Nutritional factors affecting mental health; The inter sections of nutrition and the mind, Nutrition for the brain, Contents of meal affect the brain.

Unit III **12 Hours**

Role of lipids in mental health- EFA, anger & anxiety, violent behavior and EFA, effect of cholesterol in mental health and cholesterol lowering drugs and nutrients.

Unit IV **12 Hours**

Role of nutrients in mental disorders- Nutrients and autism- Role of lipids, proteins, carbohydrates, vitamins & minerals, Nutrients in attention deficit hyperactivity disorder- Role of lipids, carbohydrates, vitamins and minerals.

Unit V

12 Hours

Nutrition in stress- Stress and food cravings, glucocorticoids and the brain, Essential fatty acids and the brain, Nutrition and stress and the developing fetus.

Learning Resources:

Text Book(s):

1. Felice Jacka, Brain Changer: The Good Mental Health Diet, Macmillan PublishersAus., 26-Feb-2019 – Health & Fitness

References:

1. Patrick Holford, Optimum Nutrition for the Mind, ReadHowYouWant.com, 21-Apr-2009 –Health & Fitness
2. Ruth Leyse-Wallace, Nutrition and Mental Health, CRC Press, 29-Jan-2013 – Medical Shlomo Yehuda, David
3. Mostofsky, Nutrients, Stress and Medical Disorders, Springer Science & Business Media, 2006 – Medical

CO-PSO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO 1	3	2	1	2	2	2	1	2	2	2
CO 2	3	2	1	2	2	2	1	2	2	1
CO 3	3	2	1	2	2	2	2	1	2	2
CO 4	3	2	1	2	2	1	1	2	2	1
CO 5	3	2	1	2	2	1	1	2	2	1
Average	3	2	1	2	2	1.6	1.2	1.8	2	1.4

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5501	Micronutrients	CC	6	5

The course enables the students to learn the functions, deficiency symptoms, food sources and requirements of the different micro nutrients and to gain insight about recent concept and findings in field of nutrition and application of the same to prevent disease.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: gain knowledge on functions, deficiency symptoms, food sources and requirements of macro minerals.

CO2: discuss the functions, deficiency symptoms, food sources and requirements of microminerals and trace minerals.

CO3: gain insight about the functions, deficiency symptoms, food sources and recent research of fat-soluble vitamins.

CO4: acquire knowledge of the physiological and metabolic functions of vitamins and recent research of water-soluble vitamins.

CO5: analyse the recent advances in the field of micronutrient and research for the welfare of the community.

Unit I

18 Hours

Macro-minerals- Distribution in the body; functions, effects of deficiency, food sources, requirement and recent research of macro minerals- Calcium, Phosphorous, Magnesium, Potassium, Sodium and Chloride.

Unit II

18 Hours

Microminerals- Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of micro minerals and trace minerals. Micro minerals- iron, zinc, fluoride, copper, iodine and manganese. Trace Minerals- Selenium, cobalt, chromium, silicon, boron and nickel. Selenium and Vitamin E relationship, Chromium and glucose tolerance factor.

Unit III

18 Hours

Fat soluble vitamins- Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of fat-soluble vitamins A, D, E and K.

Unit IV

18 Hours

Water soluble vitamins- Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of water-soluble vitamins – Water soluble vitamins: vitamin C, thiamine, riboflavin, niacin, pantothenic acid, biotin, folic acid, vitamin B₁₂, vitamin B₆, choline and inositol.

Unit V

18 Hours

Immuno-nutrients and Antioxidants- Definition, classification and function of functional food and nutraceuticals. Anti-nutrients present in various food groups – Cereals, legumes and nuts and oilseeds. Food and drug interaction.

Learning Resources:

Text Books

1. Guthrie, H.A. (2001) – “Introductory Nutrition”, Tenth edition, C.V. Mosby Company, St. Louis.
2. Bogert, J.G.V., Briggs, D.H, Calloway, (2000). “Nutrition and physical fitness”, 11th edition W.B. Saunders Co., Philadelphia, London, Toronto.
3. Wardlaw, G.M and Kessel, M, (2002) “Perspective in Nutrition”, 5th edition, Mc GrawHill, New York, New Delhi.
4. Willium, S. R. (2000), “Nutrition and Diet Therapy”, Mosby Co., St. Louis.
5. Sizer, F.S and Whitney E. R. (2003), “Nutrition , Concepts and Controversies” 9th edition, Thomas Wadsworth, Australia.

References

1. Brown, J.E. (2002), “Nutrition Now”, 3rd edition, Wadsworth Thomson Learning New York.
2. Maurice, E. Shils, James A. Olson, Moshe Shike, (2000), “Modern Nutrition in Health and Disease”, 8th Edition, Vol I and II, Lea & Febiger Philadelphia, A Waverly Company.
3. Mahan L.K. and Stamp, S.E (2000), “Krause’s Food Nutrition and Diet Therapy”, 11th edition, W.B. saunder’s Company, Philadelphia.

Websites/ e-learning resources:

1. <https://www.udemy.com/share/1027yA/>
2. WHO | The e-learning platform Nutrition Knowledge Hub launch WFP Nutrition’s LearningPlatform – UN World Food Programme Nutrition Online Courses | Coursera
3. E-Learning Programs (nestlenutrition-institute.org)
4. WFP Nutrition’s Learning Platform | Humanitarian Library

CO – PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	2	2	1	1	1	2	2	2
CO2	3	3	2	2	1	1	1	2	1	1
CO3	3	3	2	2	1	1	1	1	2	2
CO4	3	3	2	2	1	1	1	2	1	1
CO5	3	3	2	3	2	2	1	2	1	2
Average	3	3	2	2.2	1.2	1.2	1	1.8	1.4	1.6

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5401	Techniques in Food analysis	Core	6	4

Food analysis is a diverse and interdisciplinary field of research that has a significant health, societal and economic impact. It aims to characterize food products in terms of chemical composition, traceability, safety, quality, sensory perception and nutritional value. Food analysis approaches are used by industry, government/control agencies and academia.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: apply statistically valid sampling techniques to food materials having widely diverse properties and volumes.

CO2: evaluate the principles and methods for the physical and rheological analyses of foods. Evaluation of test methods.

CO3: analyze the basic principles and method for the proximate analysis of food.

CO4: demonstrate competency in the use of standard techniques of food analysis and the treatment of experimental data.

CO5: identify modern instrumental methods to analyze chemical and physical properties of foods.

Unit I 18 Hours

Food Sampling and evaluation-Concepts of food analysis; Sampling, purpose, Types of sampling, factors considering for sampling, Sampling as per FSSA 2006 and sampling procedures for liquid, powdered and granular materials.

Unit II 18 Hours

Physical and rheological properties of food analysis-Determination of pH, titrable acidity, bulk density; total dissolved solids using refractometer; viscosity of food using viscometer; texture analysis and different types of texture analyzing equipments.

Unit III 18 Hours

Proximate analysis of food-Different methods of determination of moisture; ash content of food- wet and dry ashing, protein and amino acids in foods; determination of total fat in food; determination of total carbohydrates, starch, dietary fiber and simple sugars in foods.

Unit IV

18 Hours

Spectrophotometric analysis of food-Basic Principles- analysis of food additives-IR Spectroscopy in online determination of components in foods; AAS and ICP-AES in mineral elements and toxic metals analysis; antioxidant assay; use of fluorimeter in vitamin assay.

Unit V

18 Hours

Separation techniques-Basic Principles, application of electrophoresis, chromatography, immunoassay techniques in food analysis and other separation techniques.

Learning Resources:

Textbook(s):

1. Fung, D.Y.C. and Matthews, R. (1991): Instrumental Methods for Quality Assurance in Foods, Marcel Dekker, Inc. New York.

References:

1. Skoog, D.A., Holler, F.H. and Nieman (1998): Principles of Instrumental Analysis Saunders College Publishing, Philadelphia.
2. Gruenwedel, D.W.; Whitaker, J.R. (editors) (1984): Food Analysis Principles and techniques, Volumes 1 to 8, Marcel Dekker, Inc., New York.
3. Herschdoerfer, S.M. (ed) (1968 – 1987): Quality Control in the Food Industry, Vols. 1 to 4, Academic Press, London.
4. Pomeranz, Y. and MeLoan, C.E. (1996): Food Analysis: Theory and Practice; 3rd Edition, CBS Publishers and Distributors, New Delhi.
5. Wilson and John Walker, Principles and Techniques of Biochemistry and Molecular Biology (2010), Keith Wilson and John Walker, Cambridge University Press.

CO – PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	3	2	1	1	2	1	1	1
CO2	3	3	2	2	1	1	2	2	2	1
CO3	3	3	3	2	1	1	1	1	1	1
CO4	3	3	2	2	1	1	1	1	2	1
CO5	3	3	2	2	1	1	2	2	1	1
Average	3	3	2.4	2	1	1	1.6	1.6	1.4	1.4

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5403	Food Product Development	CC	5	4

This course aims at enable the students to understand the various aspects of food product development, develop products that meet consumer requirements and help to formulate products that are nutritionally and commercially viable.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: apply a product development process to generate ideas, design, develop and evaluate new products and their markets.

CO2: demonstrate skill in the application of standard methods for the measurement and evaluation of sensory differences

CO3: evaluate and analyze the different food packaging material. **CO4:** review the appropriate product labeling to adhere to standards **CO5:** gain knowledge on pricing and marketing of food product

Unit I

15 Hours

Introduction to new food product development-Definition, significance of product development, food needs and consumer preferences, market survey and designing a questionnaire to find consumer needs for a product. Steps involved in product development, formulation of nutritious food products and standardization, Factors that influence new product development success, Intellectual Property Rights and patenting of foods.

Unit II

15 Hours

Sensory evaluation of the product-Assessing the sensory characteristics of food – colour, texture, aroma, odor and taste. Sensory evaluation of foods – Laboratory set up, equipment, panel selection and training, judging quality. Subjective evaluation techniques – Difference tests: paired comparison test, duo-trio test, triangle test. Rating tests – Ranking single sample, two samples and multiple samples. Objective tests to assess the sensory properties of foods.

Unit III**15 Hours**

Essentials of food packaging -Importance, definition, principles design requirement and basic FSSAI laws governing food packaging-Selection criteria and types of packaging material – metal, glass, paper, plastic, edible wooden. Packages with special features – Boil-in-bag package, plastic-shrink package, cryo-vac film, microwave oven packaging, aseptic packaging and distribution packaging.

Unit IV**15 Hours**

Product labeling and regulation-Definition, purpose, importance, Function. Nutritional information and laws governing product Labeling. Types of Labeling – smart labels, barcode labels, radioactive labels, antimicrobial labels, security labels and other specialized food labels. Standards and regulations for nutrition harming and Nutrition claims in food labels.

Unit V**15 Hours**

Quality control, pricing and marketing- Analyzing the product stability, evaluation of shelf life, determining the changes in sensory attributes due to environmental conditions. Pricing a product. Methods of pricing-cost plus pricing, Demand pricing, Competitive pricing, mark up pricing, Principles of pricing, determining the selling price and profit margin, price bundling, promotional pricing and quantity discounts. Advertising and marketing strategies-Basic techniques, Food advertising regulations. Marketing mix “four P’s”

Learning Resources:**Text books:**

1. Reddy S M. (2003) Basic food science and technology, new age publisher, 1st edition.
2. Subbulakshmi G and Udipi A Shobha (2017). Food processing and preservation. new age publisher. 1st edition.
3. Manay S And Shadaksha ramasamy (2009) Food: Facts and Principles. NewAge International (P) Publishers New Delhi. 1st edition.
4. Avantina Sharma.(2017)Textbook of food science and Technology. CBSOU Publisheres and distributes ltd. 3rd edition

References:

1. Lyon D H and Francombe M A and Hasdell T A Lawson (2002) Guidelines for Sensory Analysis in Food Products Development and Quality Control. Chepman and Hall London. 1st edition.

2. Fuller G W. (1994). New Food Product Development from Concept to Market Place. RC Press New York. 2nd edition
3. Man, C. M. D., and Jones, A. A. (1994) Shelf Life Evaluation of Foods. Blackie Academic and Professional London. 2nd edition.
4. Frewer, L., and Van TrijpH (2007). Understanding consumers of food products. Florida USACRC Press. 1st edition.

Websites/ e-learning resources:

1. <https://www.fssai.gov.in/>
2. <https://nzfst.org.nz/resources/foodproductdevelopmenthttps://nzfst.org.nz/resources/foodproductdevelopment/Chapter-3-1-2.htm>
3. <https://www.fssai.gov.in/>
4. <https://theintactone.com/2019/07/23/im-u3-topic-3-packaging-and-labelling/>

CO – PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	3	3	2	2	2	1	1	1
CO2	3	3	3	2	2	2	2	2	2	2
CO3	3	3	3	2	2	2	2	2	1	1
CO4	3	3	3	3	2	2	2	1	1	1
CO5	3	3	3	2	2	2	2	1	1	1
Average	3	3	3	2.4	2	2	2	1.4	1.2	1.2

Strong- 3 Medium- 2 Low - 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5405	Entrepreneurial Development	CC	5	4

This course will enable the students to acquire knowledge about various entrepreneurial development agencies, adopt key steps in the elaboration of business ideas and understand major steps involved in setting up a small-scale unit.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: describe the basic concepts in entrepreneurship.

CO2: explain business idea generation techniques; evaluate parameters to assess opportunities and constraints for new business ideas and device a business plan. Discuss ownerships and SHG

CO3: explain financial, working capital and marketing management.

CO4: identify and include Major steps involved in setting up a Small-Scale Unit. Elaborate Export Marketing procedures & formalities and learn about Patents & IPRs

CO5: analyse Legislation process and explain the Labor Laws Application

Unit I 15 Hours

Entrepreneurship–Basic concepts -Entrepreneurship–Definition, Importance, Challenges and its relevance in career growth Startups India – Incubation Centre – Digital entrepreneurship & Social entrepreneurship, Entrepreneur-Meaning and Characteristics.

Unit II 15 Hours

Business Idea and Self-Help Groups-Business Idea Generation Techniques– Identification of Business Opportunities, Ownership partnership, sole proprietorship, franchise, cottage industries, self-employment, SHG–Meaning, Importance and Government Assistance.

Unit III 15 Hours

Financial and Marketing Management-Financial Management – Books of Accounts, Financial Statements, Working Capital Management – Factors and sources, Break – Even Analysis Marketing Management – Marketing Mix- Product, Promotion, Place & Price.

Unit IV

15 Hours

Setting up a Small – Scale Unit-Major steps involved in setting up a Small-Scale Unit
 Financial support from financial Institutes – National level –NBMSME, KVIC, DC- MSME, NSIC, NSTEDB, EDI, NI-MSME, NIESBUD, IIE, NABARD
 State level – DIC, SFC, SIDC, SIADB, SIDBI, Export Marketing- procedures & formalities
 Inventory Management & TQM Basic concepts Patents & IPRs.

Unit V

15 Hours

Legislation Formalities-Legislation – Licensing, Registration, Municipal Laws, Business Ethics Labor Laws Application, Consumer Complaints and Redressal Tax – GST and its implication.

Learning Resources:

References:

1. Saravana vel, (2005), Entrepreneurial Development, Ess Pee Key Publishing House, Chennai
2. Vasant Desai, (2004), Project Management, Himalaya Publishing House.
3. S.Saini and S.K., Dhameja, (2011), Entrepreneurship and Small Business Rawart New Delhi.

Websites/ E-Learning Resources

1. <http://www.ddegjust.ac.in/studymaterial/mba/cp-401.pdf>
2. <https://ecestudy.files.wordpress.com/2015/02/theories-of-entrepreneurship.pdf>
3. <http://www.bimkadapa.in/materials/ED-5-UNITS-PDF.pdf>

CO-PSO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6	PSO7	PSO8	PSO9	PSO10
CO 1	3	3	3	2	2	2	2	2	2	1
CO 2	3	3	3	2	2	2	2	2	2	1
CO 3	3	3	3	2	2	2	2	2	2	1
CO 4	3	3	3	1	1	1	2	2	2	1
CO 5	2	2	2	1	2	2	1	1	1	1
Average	2.8	2.8	3	1.6	1.8	1.8	1.8	1.8	1.8	1

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5301	Food Analysis Lab	CL	5	4

This course enable students to learn the techniques of estimating the quantity of different nutrients present in food and to enable the students to get practical experience in the laboratory and develop the skills to undertake research work.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: understand safety rules for the laboratory and demonstrate various instruments used for food analysis.

CO2: acquire skills to prepare and standardize various solutions to conduct experiments for food analysis

CO 3: acquire skills in ashing of foods and prepare ash solution to analyse mineral contents in food.

CO4: demonstrate quantitative analysis of various nutrients in foods i.e. crude fibre moisture, Vit –C, calcium, phosphorus, iron, etc.

CO5: demonstrate experiments to check estimation of protein, fat content and Pigment Analysis.

Unit I **15 hours**

Introduction to Laboratory Practices

Instrumental Techniques – Autoclave Hot Air Oven pH Meter

Electronic Weighing Balance Centrifuges Hot Plate Spectrophotometer Water Bath Muffle Furnace, Viscometer, IR Moisture Analyzer Colorimeter

Unit II **15 Hours**

Preparation and Standardization of Solution

UNIT III **15 Hours**

Ashing of Food (Thermogravimetric Method) and Preparation of Ash Solution

Unit IV **15 Hours**

Food Analysis Experiments – Estimation of – Moisture Content – Thermogravimetric Analysis –Air Oven Method and Infrared Radiation (IR) Moisture Analyzer Method.

Crude Fibre–Gravimetric Method Iodine Number of oils – Wij’s Method

Acid Number of oils – Titrimetric Method Peroxide Value of oils – Titrimetric Method

Ascorbic Acid – 2, 6- Dichloro- indophenol Titrimetric Method, Calcium –Precipitation

Titrimetric Method, Iron – Wong’s Method Phosphorus–Colorimetric Method

Unit V

15 Hours

Demonstration Experiments - Estimation of protein content in food by Kjeldahl method

Estimation of fat content in food by Soxhlet method Pigment Analysis by Paper

Chromatography Techniques.

Learning Resources:

Text Books:

1. S. Suzanne Nielsen (2017). Food Analysis. Springer International Publishing. Fifth Edition.
2. Otles, S. (2005). “Methods of Analysis of Food Components and Additives CRC Press, USA.

References:

1. Ranganna, S. (2001). “Handbook of Analysis and Quality Control for Fruit and Vegetable Products”. Tata-McGraw- Hill, India. 2nd edition.
2. Sadasivam, S and Manickam, A (1997). “Biochemical Methods”. New Age International Publishers, New Delhi. 2nd Edition.
3. Jayaram, I, (1996), “Laboratory Manual in Biochemistry”, New Age International Publishers, New Delhi. Fifth ed.

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	2	2	2	2	2	2	2	2
CO2	3	3	2	2	2	1	2	2	2	2
CO3	3	3	3	2	2	2	2	2	2	1
CO4	3	3	2	2	2	1	2	1	1	1
CO5	3	3	2	2	2	1	2	2	2	2
Average	3	3	2	2	2	1.4	2	1.8	1.8	1.6

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5303	Diet and Nutrition Counseling	DSE	4	3

This course aims to understand and apply the counseling skills, techniques with the ethics in establishing rapport with patients and to create awareness among the patients to use the computer and mobile applications.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: impart the roles and responsibilities of dietician

CO2: acquire the knowledge in ethical aspects and implementing in diet counseling

CO3: learn the systematic approaches in diet counseling

CO4: apply different methods /aids of nutrition education.

CO5: upgrade the advancement technologies in diet counseling

Unit I

12 Hours

Introduction to Dietitian and IDA-Dietician–Definition and Educational qualification Types of Dieticians–Clinical, academic, research, specific, food service, public/ Community, industrial, consultant, sports, business etc. Qualities, Role and responsibilities of Dietician. IDA–Objectives, membership; Registered Dietician– eligibility for R.D. exam.

Unit II

12 Hours

Diet Counseling/Nutrition Care Process (NCP)-Diet Counseling/Nutrition Care Process (NCP)–Definition, importance, purposes and ethical principles. Steps in Diet counseling Process; Documentation–SOAP Counseling Skills for a Dietitian; Tools of Dietitian; Guidelines for effective Counseling

Unit III

12 Hours

Counseling Approaches-Counseling Approaches–Meaning, developing a counseling approach, Different Counseling Approaches–Psycho analytical, behavioural, humanistic, Patient centered GALIDRAA approaches etc.

Unit IV

12 Hours

Nutrition Education-Nutrition Education–Meaning and importance, Teaching Methods and aids used for Nutrition Education in the Community Teaching Methods – Lecture, Group discussion, Role Play, Story telling, Demonstrations, Nutrition Exhibition, Marathon race etc. Teaching Aids–Posters, pictures, models, charts, flashcards etc. Teaching Materials for patients–Models. pamphlets, leaflets, booklets etc.

Unit V

12 Hours

Use of Modern Technology in Diet Counseling-Use of Computers in Diet Counseling and Nutrition Education, Use of Computer Applications and Mobile Applications in Diet Counseling and Nutrition Education; Computer and mobile applications available for Diet Counseling. Prerequisites for setting up a Diet Counseling Center.

Learning Resources:

Text books:

1. Mahan L.K., Sylvia Escott-Stump. (2000). Krause’s Food Nutrition and Diet Therapy. W.B. Saunders Company London. 10th edition.
2. Srilakshmi, B. “Dietetics”, 8th edition, 2018, New Age International Publishes, New Delhi.
3. IDA, Clinical Dietetics Manual, 2018, 2nd edition Elite Publishing House New Delhi

References

1. Corinne H. Robinson, Marilyn R. Lawler, “Normal & Therapeutic Nutrition” 17th edition 1986
2. Shubangini A Joshi, “Nutrition & Dietetics” 5th edition, 2022, McGraw hill Education India Pvt. Ltd.
3. Judy Gable “Counselling Skills for Dietitians” 2nd edition, 2007, Black Well Publishing Ltd, Oxford, UK.

Websites/ e-Learning Resources:

1. <https://idaindia.com/>

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	2	2	2	2	1	2	1	1
CO2	3	3	2	2	2	1	1	2	1	1
CO3	3	3	2	2	1	1	1	1	1	1
CO4	3	3	1	2	1	2	1	1	1	1
CO5	2	2	1	2	2	1	1	1	1	1
Average	2.8	2.8	1.6	2	1.6	1.4	1	1.4	1	1

Strong- 3 Medium- 2 Low - 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5305	Food Biotechnology	DSE	4	3

This course enables the students to understand the techniques of genetic engineering, cloning and cell culture in Food Biotechnology, and comprehend the role and safety of nanomaterials in food, and role of Biotechnology in food industries.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: discuss the role of genetically modified foods and its production by Biotechnology and genetic engineering.

CO2: describe the techniques of genetic engineering in food science and technology.

CO3: discuss the role of nanomaterials for the development of food packaging and applications in food safety.

CO4: identify the use of enzyme technology with respect to food processing industry.

CO5: utilize the wastes released from the food industries.

Unit I

12 Hours

Prospects of Biotechnology: Definition, scope and applications. Genetically modified foods – Definition, examples of GM foods and its production, advantages and disadvantages, ethical and legal concerns – safety aspects of foods produced by biotechnology and genetic engineering.

Unit II

12 Hours

Genetic Engineering, cloning and cell culture: Fundamentals of molecular biology and genetics. Gene cloning – steps and technique involved in gene cloning. Plant and animal cell culture techniques, transgenic plants, application of genetic engineering in food science and technology. Current developments in biotechnology-CRISPR cas 9 based genome editing in food science.

Unit III

12 Hours

Food Nanotechnology: Nanomaterials - Definition - History – Properties. Food Nanotechnology: Current developments and future prospects; Nanotechnology and applications in food safety; Nanotechnology for food: delivery system; Nanostructured

encapsulation systems: food antimicrobials. Barrier Packaging – Antimicrobial Packaging- Antimycotic Packaging- Bio-based Packaging- Bio-degradable Packaging- Active Packaging – Smart Packaging.

Unit IV

12 Hours

Enzyme technology: Industrial enzymes (with respect to food processing industry), immobilization of enzymes, immobilized plant cells for production of food flavors and colours, immobilized enzymes in food processing, development of novel sweeteners, Production of food additives and supplements.

Unit V

12 Hours

Role of Biotechnology in Food Industries: Types, sources and characteristics of industrial wastes, waste disposal – physical, chemical and biological treatment, management of waste byproducts from sugar, fruits and vegetable, meat, fish, oil and fat, dairy and cereal industry; utilization of food industry wastes; Recovery of useful materials from effluents by different systems.

Learning Resources:

Text Books:

1. Dubey, R.C, Text book biotechnology S.Chand and Co Ltd,New Delhi, 2001. Gupta, P.K, Elements of biotechnology, Rostogi and Co, Meerut, 1996.
2. Satyanarayana, U, (2017). Biotechnology, Books and Allied (P) Ltd., Kolkata.

References:

1. Primrose, S.B (2001), Molecular Biotechnology, second edition, Panima Publishing Corporation, New Delhi.
2. Fischer, A and F. Kampers (2011). Nanotechnology in the Agri-Food Sector: Implications for the Future - Wiley-VCH.
3. Herzaka, A. and R.G. (1981), Food industry wastes, disposal and recovery, Applied Science Publishers, London.
4. Lawrence K.W. and Wang, MUS (1992), Handbook of Industrial waste treatment, Marcel Dekker, Inc. New York
5. WHO (1990): Strategies for assessing the safety of foods by biotechnology, Report of joint FAO/WHO consultation –Geneva.

Websites/ E-Learning Resources:

1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9642946/>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8929161/>

CO – PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	2	2	2	1	1	1	2	2
CO2	3	3	2	2	2	1	1	1	1	2
CO3	3	3	2	2	2	1	1	1	1	2
CO4	3	3	2	2	2	1	1	2	1	1
CO5	3	3	2	2	1	1	1	2	1	1
Average	3	3	2	2	1.8	1	1	1.4	1.2	1.6

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5233	Internship	IS		2

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: explain the nature of the internship and its fundamental ideas in relation to food science and nutrition.

CO2: acquire technological expertise in their specialized fields of study.

CO3: exhibit qualities like keen observational abilities, teamwork, and interpersonal skills developed through site visits.

CO4: implement the project or develop the field assignment using the knowledge has learned in the course.

CO5: set the stage for future recruitment by potential employers

CO – PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	3	2	3	3	3	3	2	3
CO2	3	3	3	2	3	2	2	3	2	3
CO3	3	3	3	3	3	2	2	3	2	3
CO4	3	3	3	3	3	3	3	3	2	3
CO5	3	3	3	3	3	3	3	3	2	3
Average	3	3	3	2.6	3	2.6	2.6	3	2	3

Strong- 3 Medium– 2 Low – 1

CourseCode	Name of the Course	Category	Hours/Wk.	Credit s
24PFN5502	Public Health Nutrition	CC	5	4

This course enables students to develop a holistic knowledge base on the importance of understanding the nutrition problems and their prevention and to understand the nutritional problems during emergencies / disasters as well as the strategies to tackle them. Also, develop skills in preparation of communication aids and planning nutrition education programme for the community.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: Describe the role of nutrition in national development

CO2: Acquire skill in assessment of nutritional status of community.

CO3: Gain depth knowledge on Strategies for Improving nutrition status and healthstatus of the community.

CO4: Evaluate the role of organizations in combating malnutrition.

CO5: Discuss the nutrition education for the community welfare

Unit I

15 Hours

Concept of Public Nutrition-Nutrition and Health in National Development. Relationship between health and nutrition, National Health Care Delivery System, Determinants of Health Status, Indicators of Health. Nutritional deficiency disorders in India -Prevalence, Aetiology, Symptoms, Current status and Recent updates- PEM, VADD, IDD, Anemia. Nutrition and infection. Role of public nutritionists in the health care delivery system.

Unit II

15 Hours

Assessment of Nutritional Status-Direct methods: Direct methods of Nutritional assessment, Nutritional anthropometry, biochemical, clinical and dietary assessment and Growth charts - plotting of growth charts, growth monitoring and promotion (GMP). Indirect methods: Demography, population dynamics and vital health statistics and their health implications. Food balance sheets, recent nutritional assessment methods- MUST, SGA, SOAP. Indicators of health and nutrition. Causes of Malnutrition- Vicious cycle of malnutrition. Basic concepts of Nutritional Surveillance- Millennium Development Goals (MDG)

Unit III

15 Hours

Strategies for improving nutrition status and health status of the community Immunization: Awareness, types of vaccines, Importance and schedule of Immunization. Measures to overcome malnutrition in India.

Food Security -Concepts, Meaning and significance, Food security act. Food fortification and Food enrichment, Genetic improvement of foods, National nutrition policy and action plan.

Nutrition intervention programmes - Mid day Meal Programme, Balwadi Feeding Programme. Public Distribution System (PDS), Antyodaya Anna Yojana (AAY), Annapurna Scheme, Food for Work Programme, Special Nutrition Programme, Nutrition Intervention Schemes and programmes operating in India- Control programmes - Vitamin A, Anemia, Goiter, Malnutrition. Environmental sanitation and health.

Unit IV

15 Hours

Organizations to combat mal nutrition and nutrition during emergencies and special conditions.

International organizations concerned with food and nutrition FAO, WHO, UNICEF, CARE, AFPRO, CWS, CRS, World Bank.

National organization – NIN, CFTRI, ICMR, ICAR, CFTRI, CHEB, NIPCCD, DFRL, NGOs.

Nutritional deficiency diseases in emergencies- Major and micro nutrient. Control of communicable diseases in emergencies- Factors responsible for spread of communicable disease, mode of transmission and prevention of chicken pox, malaria, swine flu, tuberculosis, COVID- 19 and AIDS. Nutritional requirement for space mission, sea voyage and army.

Unit V

15 Hours

Nutrition Education and Extension of Better Nutrition. Nutrition education for the community –Objectives, Definition and Importance of nutrition education to the community, Principles of planning, executing and evaluating nutrition education programmes.

Development and Use of AV aids in Public Nutrition Education. - Charts, flip chart, posters, flannel board, models, OHP.

Learning Resources:

Text Books:

1. Park, K.(2013).Text Book of Preventive and Social medicine. M/s. Banarsidas Bhano Publishers, Jabalpur. 22nd Edition.
2. Srilakshmi, B (2017). Nutrition Science. New Age International Publishers. Multi Colour. 6th Edition.

References:

1. MuthuVK (2014). A Short Book of Public Health, Jaypee Brothers Medical Publishers. 2nd edition
2. Dr. Srridhar Rao B (2018). Principles of Community Medicine, AITBS Publishers India. 6th edition.
3. Scott M. Smith, Sara R. Zwart and Martina Heer (2014). Human Adaptation to Space Flight: The role of nutrition. NASA Publication.
4. Owen, A.Y. and Frackle, R.T., (2002). Nutrition in the Community. The Art of Delivering Services. Times Mirror/Mosby. 2nd Edition.
5. Carolyn D. Berdanier Johanna T. Dwyer David Heber (2014). Handbook of Nutrition and Food, CRC Press, New York. Third Edition.

Websites/ Websites/ e-Learning Resources

1. <http://egyankosh.ac.in/bitstream/123456789/33312/1/Unit-18.pdf>
2. https://www.seafarerswelfare.org/assets/documents/ship/SHIPHealthyFood_A5_20151209_LR.pdf

CO–PSO MAPPING

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	2	1	2	2	2	1	2	1
CO2	2	3	3	3	2	3	2	2	1	2
CO3	3	3	3	3	2	2	2	2	2	1
CO4	3	3	3	3	3	2	2	2	2	2
CO5	3	3	3	3	2	3	2	1	1	1
Average	2.8	3	2.8	2.6	2.2	2.4	2	1.6	1.6	1.4

Strong- 3 Medium– 2 Low – 1

CourseCode	Name of the Course	Category	Hours/Wk.	Credits
24PFN5402	Advanced Food ServiceManagement	CC	6	4

The course aims to gain knowledge and develop skills in menu planning, purchasing and storage policies, and quality control in a food service establishment, to acquire knowledge about safety hygiene and sanitation issues of a food service establishment, to make students familiar with standard operating procedures, potential hazards in food production food safety regulations.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: describe the management, approaches to food service management

CO2: acquire skills in recipe standardization, purchase, storage, and food production

CO3: acquire knowledge in methods of food service system

CO4: apply hygiene and sanitary practices to prevent accidents and pest control

CO5: implement the ideas in setting up and planning food service unit.

Unit I

18 Hours

History, development of food service system, menu planning-History and development, recent trends, types of food service establishments, commercial establishments, non-commercial establishments, understanding management, approaches to food service management. Menu planning – importance, definition, need use and function Knowledge and skills required for planning menu. Types of menu and its applications. Steps in menu planning and its evaluation, construction of menu, characteristics of a good menu, displaying a menu and evaluation of menu.

Unit II

18 Hours

Purchase And Storage, Quality and Food Production-Mode of purchasing, centralized purchasing, group purchasing, methods of purchasing, identifying needs and amounts to buy, minimum stock level, maximum stock level, receiving and inspecting deliveries. Storage

space, dry storage, low temperature storage, store room management. Production control, use of standardized recipes, developing a program for recipe standardization, safeguard in food production, quality control in food preparation and cooking.

Unit III

18 Hours

Food management: delivery and service styles -Methods of delivery service system- centralized delivery system, decentralized delivery system, conventional food service system, commissary food service system – ready prepared food service system, assembly service system. Different types of service in food service establishments- table and counter service, self-service, tray service, types of service in a restaurant, silver service, plate service cafeteria service, and buffet service. Specialized forms of service, hospital tray service, airline tray service, rail service, home delivery, catering and banquet, floor/room service, lounge service

Unit IV

18 Hours

Personnel Management, Workplace Safety-Definition of leadership, components approach, qualities, leadership styles recruitment, selection and induction, Employee facilities and benefits, laws governing employees, work productivity improvement measures, Training and development. Hygiene and sanitary practices, types of accidents, precautions to prevent accidents, Garbage and refuse sanitation- inside and outside storage, Pest control- pests, signs of infestation and Integrated Pest Management (IPM) Laws governing food service establishment.

Unit V

18 Hours

Setting up and planning food service unit- Layout and design – Phases of planning layout- developing a prospectus, determining work centers equipment, Factors influencing layout design, Architectural features, evaluation of plan, Energy and time management. Planning- steps and types of planning, Preparing a planning guide, Registration of unit, Application for a license, Rules regarding grading of hotels and restaurants, Loan facilities for startup.

Learning Resources:

Textbooks:

1. Bessie B and West Le Wood (1986) Food Service in Institutions (6th Ed.) Macmillan Publishing Co.

2. Mohini Sethi, (2008) Institutional Food Management, New age publications, New Delhi.
3. Payne-Palacio, Monica Theis, (2011) Food Service Management: Principles and Practices, Prentice Hall
4. Sudhir Andrews (1997), Food and Beverage Service- Training Manual, 23rd Reprint, Tata McGraw Hill Publishing Co.

References

1. Mohinder Chand, Managing Hospitality Operations, 2009, 1st Edition, Anmol Publications Pvt. Ltd. New Delhi.
2. Goel S.L, Health Care System and Hospital Administration, 2009, Vol.7, Deep and Deep Publications Pvt. Ltd.
3. Kalkar S.A, Hospital Information Systems, 2010, Published by Asoke K. Ghosh, PHI Learning Pvt. Ltd.
4. Shring Y, P. Effective Food Service Management, Anmol publications Pvt Ltd, New Delhi, 2001.

Websites/ E-Learning Resources

1. <https://seafoodacademy.org/pdfs/haccp-training-folder-contents- v2.pdf>
2. <https://psu.pb.unizin.org/hmd329/chapter/ch4/>
3. <https://www.plantautomation-technology.com/articles/types-of-food-processing-equipment>

CO-PSO MAPPING

CO/PSO	PSO1	PSO 2	PSO 3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	2	2	1	1	1	2	1	1	1
CO2	2	3	3	2	2	2	1	2	2	2
CO3	2	1	2	2	1	2	2	3	2	3
CO4	3	2	1	2	1	2	1	3	3	2
CO5	3	2	3	3	2	1	2	1	1	2
Average	2.6	2	2.2	2.2	1.4	1.6	1.6	2	1.8	2

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5404	Food Microbiology	CC	5	4

This course aims to understand the practical skill in handling microscope and preparation of culture media to gain knowledge of principles of various techniques of isolation and determination of microorganisms in food to acquire practical skill in production of fermented foods.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: outline the importance of microbiology, its history and classification.

CO2: discuss the determination of microorganisms and their products in food.

CO3: identify the conditions and biology of microbial growth.

CO4: compile the conditions for prevalence of food borne and parasitic diseases.

CO5: explain the beneficial role of microorganisms in fermented foods and in food processing.

Unit I

15 Hours

Overview of Basic Microbiology: Importance and significance of microorganisms in food science. Introduction to Microbiology – Scope of microbiology – Ancient Microbiology Refutation of a biogenesis: discovery of penicillin: discovery of vaccination: proposal of one gene one enzyme hypothesis – Major contribution of scientists– Leeuwenhoek, Edward Jenner, Alexander – Flemming, Joshep Lister, Robert Koch, Louis Pasteur, Hargobind Khorana. Modern Microbiology – Landmark achievements in 20th century – Microbial Taxonomy – Definition and 74systematic, Nomenclatural rules and identification. Haeckel’s three kingdom classification, Whittaker’s five kingdom approach Woese domain system. Major characteristics used in taxonomy – morphological, physiological and metabolic, genetic and molecular taxonomy. Berkey’s Classification of bacteria.

Unit II

15 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, etc.; Analytical methods for microbial metabolites- microbial toxins and metabolites.

Unit III**15 Hours**

Biology of Microorganisms: Differences between prokaryotic and eukaryotic cell. Biology of bacteria – cell structure, size, shape, arrangement membrane, cell wall, cytoplasmic inclusions, mesosomes, flagella and motility, slime, capsule, pili, chemotaxis, endospore – biology of fungi, structure, physiology and classification – biology of yeast – reproduction virus (bacteriophages) structure, life cycle (lytic and lysogenic) – biology of algae – Mycoplasma – prions.

Unit IV**15 Hours**

Food borne diseases: Bacterial food borne diseases (Staphylococcal intoxication, Botulism, Salmonellosis, Shigellosis, Enteropathogenic Escherichia Coli Diarrhoea, Clostridium Perfringens gastroenteritis, Bacillus cereus Gastroenteritics) Food Borne Viral Pathogens (Norwalk virus, Norovirus, Reovirus, Rotavirus, Astrovirus, Adenovirus, Parvovirus, Hepatitis A Virus) Food Borne Animal Parasites Protozoa – Giardiasis, Amebiasis, Toxoplasmosis, Sarcocystosis, Cryptosporidiosis. Cysticercosis/Taeniasis. Roundworm – Trichinosis, Anisakiasis. Mycotoxins: Aflatoxicosis, Deoxynivalenol Mycotoxicosis, Ergotism.

Unit V**15 Hours**

Microorganisms and Food Preparation Fermentation process-kinetics of fermentation process. Prebiotics- Probiotics and single cell proteins. Dairy products (cheese and yoghurt) and traditional Indian fermented foods and their health benefits. Fermented Beverages- wine, beer, toddy and vodka. Natural Toxins in Food: Natural toxins of importance in food- Toxins of plant and animal origin; Microbial toxins (e.g. Algal toxins, bacterial toxins and fungal toxins). Natural occurrence, toxicity and significance. Food poisoning; Mycotoxicosis of significance. Determination of toxicants in foods and their management.

Learning Resources:

Text Books:

1. Frazier W.C and Westhoff D.C.(2013), Food Microbiology, Tata McGraw Hill Publishing Co., Ltd. New Delhi.
2. Annak.Joshua, (2001). Microbiology, Popular Book Depot.Chennai-15.
3. Crueger W and Crueger A (2003) Biotechnology: A textbook of Industrial Microbiology 2nd Edition,Panima Publishing Corpoartion,New Delhi.

References:

1. Guttierrez-Lopez GF and Barbosa-Canovas GV (Eds) (2003) Food Science and Food Biotechmolgy CRC press,USA.
2. Halford NG (2003) „Genetically Modified Crops“ Imperial College Press, UK
Modern Food Micro-Biology by James M. Jay, (2000), 6th edition, An Aspen Publication,Maryland, USA.
3. Food Microbioogy: Fundamentals and frontiers by M.P. Doyle, L.R. Beucha and Thoma

Website/E-Learning resources:

1. Top Microbiology Courses – Learn Microbiology Online |
2. CourseraLearn Microbiology with Online Courses and Classes | edX
3. Online studies in Microbiology – DistanceLearningPortal.comMicrobiology 4.Free Online Courses and MOOCs | MOOC List (mooc-list.com)

CO-PSO MAPPING

CO/PSO	PSO1	PSO 2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO 1	3	3	3	2	1	1	2	2	2	2
CO 2	3	3	3	2	1	1	1	1	2	2
CO 3	3	3	3	2	2	2	2	1	1	1
CO 4	3	3	3	2	1	2	1	2	2	2
CO 5	3	3	3	2	1	1	1	2	1	1
Average	3	3	3	2	1.2	1.4	1.4	1.6	1.6	1.6

Strong- 3 Medium– 2 Low – 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN 5302	Food Microbiology Lab	CL	4	3

This course aims to understand the practical skill in handling microscope and preparation of culture media, to gain knowledge of principles of various techniques of isolation and determination of microorganisms in foods to acquire practical skill in production of fermented foods.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: Gain knowledge in handling of microscope and develop basic skill in cultivation of bacteria with different culture media

CO2: Discuss the various techniques of staining and hanging drop method to understand the morphology of microorganism.

CO3: Evaluate and isolate microorganism from different sources like air, water and food.

CO4: Describe and determine the viable count of microorganism from food samples.

CO5: Describe the concept of food fermentation and isolation of organism from fermented food.

Unit I **12 Hours**

General microbiology and Cleaning and sterilization of glass wares.

Handling of hot air oven and autoclave.

Uses and study of microscopes.

Unit II **12 Hours**

Preparation of culture media and their sterilization.

Cultivation of bacteria Pour plate method. Spread plate method. Streak plate method

Unit III **12 Hours**

Study of Morphology of microorganism Staining of bacteria - Simple staining. Gram staining.

Microscopic test for bacterial motility by hanging drop method.

Unit IV

12 Hours

Isolation of micro-organisms from different sources,
Air (Petri plate exposure method) Microbial testing of water.
Determination of microbiological quality of milk

Unit V

12 Hours

Determination of viable count of microorganisms,
Introduction to colony counter Total plate count,
Yeast and mold count

Activity

Production and Microbiological examination of fermented food (Any two) Fermented fruits and vegetables Fermented dairy product.
Wine production Pickle fermentation Fermented cereal and legume-based product.
Production of edible mushroom.

Learning Resources:

Text Books:

1. Frazier W.C and Westhoff D.C.(2013), Food Microbiology, Tata McGraw Hill Publishing Co., Ltd. New Delhi.
2. Annak.Joshua, (2001). Microbiology, Popular Book Depot.Chennai-15.
3. Ray, B. (2001) Fundamental Food Microbiology, 2nd Ed, CRC press, Boca Raton. Joshi VK&Pandey(2004).Biotechnology:food,fermentation,microbiology,biochemistry and technology, vol I &II, Educational publishers and distributors, New Delhi.
4. Crueger W and Crueger A (2003) Biotechnology: A textbook of Industrial Microbiology 2nd Edition, Anima Publishing Corporation Delhi.

References:

1. Guttierrez-Lopez GF and Barbosa-Canovas GV (Eds) (2003) Food Science and Food Bio-technology CRC press, USA.
2. Halford NG (2003) „Genetically Modified Crops“ Imperial College Press, UK
Modern Food Micro-Biology by James M. Jay, (2000), 6th edition, An Aspen Publication, Maryland, USA.
3. Food Microbiology: Fundamentals and frontiers by M.P. Doyle, L.R. Beuchat and Thoma J. Montville, (2001), 2nd edition, ASM press, USA.

4. Micheal Pelczar MJ, Chan ECS, Krieg N. (2001) Microbiology. 5th ed. Tata McGraw-Hill Publishing Co. Ltd.
5. Prescott LM, Harley JP, Klein D A.(2008) Microbiology. 6th ed. WMC Brown.

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO 1	3	3	2	2	2	2	2	1	2	1
CO 2	3	3	1	2	1	2	2	2	2	1
CO 3	3	3	3	2	2	2	2	1	1	1
CO 4	3	3	3	1	1	2	2	2	2	1
CO 5	3	3	3	1	1	2	2	1	1	1
Average	3	3	2.4	1.6	1.4	2	2	1.4	1.6	1

Strong- 3 Medium- 2 Low - 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5406	Project	Project	5	4

The main objective of this course is to acquaint the student with various techniques used in contemporary research in Food Science and Nutrition or allied areas.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: specify the research topic

CO2: conduct bench work.

CO3: prepare the research report and its oral demonstrations.

CO4: integrate theoretical understanding of methods with real-world implementation

CO5: encourage learning throughout life

CO-PSO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO7	PSO8	PSO9	PSO10
CO 1	3	3	3	3	3	3	3	3	2	2
CO 2	3	3	3	3	3	3	3	3	2	2
CO 3	3	3	3	3	3	3	3	3	2	2
CO 4	3	3	3	3	3	3	3	3	2	2
CO 5	3	3	3	3	3	3	3	3	2	2
Average	3	3	3	3	3	3	3	3	2	2

Strong- 3 Medium- 2 Low - 1

CourseCode	Name of the Course	Category	Hours/Wk.	Credits
24PFN5304	Computer in Nutrition Research	DSE	4	3

The course enables the students to understand the basics of computer and its applications, and to make students to gain knowledge to use computers and develop skills to apply computer-based technology in Food science and Nutrition.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: explain the history, types, parts and recent software for computers

CO2: demonstrate the applications related to MS Office for a broad spectrum of nutritional sciences.

CO3: identify and utilize the various sources of software, websites, journals concerning the nutritional sciences.

CO4: adopt the computer applications in the food science and nutrition research

CO5: identify the appropriate ICT and AI tools for a better understanding of the concepts of Food Science & Nutrition

Unit I

12 Hours

Introduction to Computers-History of Development of Computers, Main Frame, Minis, Micros and Super Computer Systems, Binary numbers, Bits, Bytes, CPU, Input and Output Devices.

Unit II

12 Hours

Operating Systems and MS Office-Introduction to Operating Systems, Windows Applications – MS Word, MS Excel. MS Access, MS PowerPoint, MS Office add-on-Plugins – Grammarly, Mendeley, Endnote, Zotero.

Unit III

12 Hours

E-Resources-National Digital Library, Inflibnet, Sodhganga, E-pathsala, SWAYAM, NPTEL, websites for virtual labs and E-books, Nutrition software and websites, e- journals in Food Science and Nutrition.

Unit IV**12 Hours**

Application of Computers in Nutrition Research-Response Surface Methodology, SPSS, Origin, Sigma plot, Prism, nutrient and diet calculations, nutrition education and counseling.

Unit V**12 Hours**

Use of ICT and AI in Food Science and Nutrition-Learning Management Systems

– Google Classroom, Edmodo, Moodle, Coursera, Blackboard, Application of AI in Food Industries, AI tools in Research – Chat GPT, GEMINI, Jenni AI, Heuristia, Open Read, Explain Paper.

Learning Resources:**Text Books:**

1. Balagurusamy. E (2008) Computing Fundamentals and C Programming, Tata McGraw Hill Education Private Limited, New Delhi.
2. Bansal.S.K. (2004) Text Book of Information Technology, APH, Publishing Corporation.

References:

1. Andrew S. Tanenbaum (2009) IV Edition, Computer Networks, Pearson Education and Dorling Kindersley Publishers, Delhi.
2. James F. Kurose and Keith W Ross (2008) III Edition, Computer Networking. A Top-Down Approach Featuring the Internet, Pearson Education and Dorling Kindersley Publishers, Delhi.
3. Ralf Steinmetz and Klara NaHourstedt (2011) Multimedia- Computing, Communications and Applications, Pearson Education and Dorling Kindersley Publishers, Delhi.

Websites/ Websites/ E-Learning Resources

1. <https://ndl.iitkgp.ac.in/>
2. <https://inflibnet.ac.in/>
3. <https://shodhganga.inflibnet.ac.in/>
4. <https://epathshala.nic.in/>

CO-PSO MAPPING

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO 1	3	2	3	2	2	3	2	2	2	3
CO 2	3	2	2	2	3	3	1	3	2	3
CO 3	3	2	2	2	2	3	1	2	2	3
CO 4	3	2	2	2	3	3	2	2	1	3
CO 5	3	2	3	3	3	3	3	1	2	3
Average	3	2	2.4	2.2	2.6	3	1.8	2	1.8	3

Strong- 3 Medium- 2 Low - 1

CourseCode	Name of the Course	Category	Hours/Wk.	Credits
24PFN5306	Food Packaging	DSE	4	3

The course titled “Food Packaging” deals with the introduction to packaging materials and their properties, packaging systems and methods, packaging aspects of fresh and processed foods, packaging design, and environmental issues related to packaging.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: discuss the basics and importance of food packaging.

CO2: interpret the food packaging systems and packaging materials.

CO3: apply the knowledge for testing different packaging materials.

CO4: identify advanced food packaging techniques to enhance food quality.

CO5: apply the various regulations and guidelines for food packaging and labeling.

Unit I

12 Hours

Introduction to Food Packaging-Packaging terminology- definition. Functions of food Packaging, Packaging environment, levels of packaging. Characteristics of food stuff that influences packaging selection.

Unit II

12 Hours

Food Packaging Materials-Glass containers, Plastic packaging polymers (Polyethylene, PET, PVC, Polypropylene, Polystyrene & Nylon), Paper and paper board, Metal containers: Tin and Aluminum, two piece and three piece can-types, barrier properties, Manufacture process, applications.

Unit III

12 Hours

Testing Methods for Packaging Materials-Testing methods for flexible materials, rigid materials and semi rigid materials; WVTR, GTR, thickness, bursting strength, tensile strength, tearing strength, impact strength, puncture resistance, surface oil absorption test,heat seal strength impact strength, transport worthiness tests- drop test, vibration test, compression strength, rolling test.

Unit IV**12 Hours**

Advanced Techniques of Food Packaging -CAP and MAP, Shrink and Cling packaging, Vacuum packaging, Active Packaging, and Intelligent Packaging, Retort packaging- retort pouches, biodegradable packaging materials – biopolymer- based edible film. Packaging of finished goods- Form Fill Seal (FFS) and multilayer system.

Unit V**12 Hours**

Packaging Labeling and Regulations-Food labeling – Regulations for labeling, Purpose of labels, , Critical elements of food label, types of labels, , bar code, nutrition labeling, health claims, mandatory labeling provisions. Safety aspects of packaging materials; sources of toxic materials and migration of toxins into food materials; Disposal and recycle of packaging waste.

Learning Resources:**Text Books**

1. Han Jung H., “Innovations in Food Packaging”, 2nd Edition, Academic Press, USA2013.
2. Dong Sun Lee, Kit L. Yam and Luciano Piergiovanni, “Food Packaging Science andTechnology”, CRC Press, USA, 2008.

References

1. Richard Coles and Mark J. Kirwan, “Food and Beverage Packaging Technology”, 2ndEdition, Blackwell Publishing Asia Pty Ltd, CRC Press, USA, 2011.
2. Robertson Gordon L., “Food Packaging: Principles and Practice”, 3rd Edition, MarcelDekker Inc, USA, 2012.

Websites/ Websites/ e-Learning Resources

1. <https://polymerinnovationblog.com/wp-content/uploads/2017/02/Food-Packaging-Technology.pdf>
2. <https://www.hzu.edu.in/agriculture/Food-Packaging-Technology.pdf>
3. <https://www.frontiersin.org/articles/10.3389/fsufs.2021.630393/full>

CO-PSO MAPPING

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
CO 1	3	2	2	1	1	3	3	3	2	3
CO 2	3	2	1	2	3	2	3	2	2	3
CO 3	3	3	3	3	3	1	3	1	2	3
CO 4	3	2	3	3	3	2	3	2	2	3
CO 5	3	3	3	3	3	1	3	1	2	3
Average	3	2.4	2.4	2.4	2.6	1.8	3	1.8	2	3

Strong- 3 Medium- 2 Low - 1

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PFN5244	Professional Competency Skill	SEC	-	2

The Post Graduate degree programmes in Food and Nutrition will provide for purpose-driven education, research and outreach in terms of developing competency among the graduates to face the challenges of the competitive food processing sector. The present food market demand drivers include the need to supply both globally and locally adequate quantities of safe, healthy and diversified food from production to consumption, which calls for skilled, knowledgeable and practice-ready food scientists. The fast-paced growth of the food processing sector throws immense challenges in terms of nutrition, health and wellbeing of the increasing population groups who demand for novel foods in terms of quality, shelf life and functionality. Towards this end, competency in food and nutrition at the post graduate level is an important contributor to building the capacity of individuals to think and act effectively when developing and implementing strategies for combating malnutrition and other degenerative diseases.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: relate knowledge to pursue higher studies.

CO2: formulate innovative ideas in Food industries

CO3: prepare for competitive exams with confidence

CO4: impart knowledge and skills necessary to work in R&D laboratories, food industries, health sectors and at the community level.

CO5: synergies a new generation of post graduates with professional competence to face the challenges of the Food Processing, Quality Control, Food Safety, and Nutritional Sciences.

Department of Food Science & Nutrition (PG)

Value Added Courses

w.e.f. 2024-2025

Sem	Course Code	Course Title	Hours/ Wk.	Credits
2	24PFN422V	Value Added Products fromMillets	2	2
3	24 PFN 521V	Nutrition and Immunity	2	2

Course Code	Name of the Course	Category	Hours/Wk.	Credits
24PSN422V	Value Added Products from Millets	VAC	2	2

This course aims to obtain knowledge on millets their nutritive value and health benefits along with different product developments by incorporating millets. After learning this course, the students develop skills in formulation of traditional recipes, bakery products, ready to eat stuffs and instant food mixes using various millets.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: identify different millets and know its composition and nutritive value.

CO2: experiment the traditional food preparations with addition of millets

CO3: utilize millets in bakery products.

CO4: demonstrate various Ready to eat preparations with millets.

CO5: analyze the sensory attributes of Instant food mixes.

Unit I:

6 Hours

Introduction to Millets: Definition, types, Composition & Nutritive value: finger millet (*Eleusine coracana*), kodo millet (*Paspalum scrobiculatum*), little millet (*Panicum sumatrense*), foxtail millet (*Setaria italica*), proso millet (*Panicum miliaceum*) and barnyard millet (*Echinochloa frumentaceae*)

Unit II:

6 Hours

Traditional recipes: Breakfast food: Idli, Dosa, Idiappam, Rotti, Pittu, Upma, Adai, Porridge, Khakra, Paniyaram and Chappathi.

Snacks: Vadai, Pakoda, Ribbon pakoda, Omapodi, Murukku, Thattu vadai, Hot kolu Sweets: Halwa, sweat kolukattai, Adhirasam, Kesari, Nutritious ball and Kheer.

kattai and Vadagam.

Unit III:

6 Hours

Bakery and Pasta products: Bakery products - Incorporation of millet flour in the preparation of Bread, cookies, Changes in the sensory attributes.

Pasta products - Methods of extrusion for vermicelli, noodles, macaroni, Sensory attributes.

Unit IV:

6 Hours

Flaked and Popped products: Ready-To-Eat Value added products from millet flakes - aval uppma, kitchadi, payasam, masala flakes, boli, sweet balls, lemon bath, tamarind bath and tomato bath. Value added products from popped small millets - uppma, bhelpoori, masala corn, cheeian.

Unit V:

6 Hours

Instant Food Mixes: Method of preparation Instant Foods (adai, pittu, idiyapam, kali, roti, and kesari), Sensory attributes.

Learning Resources:

Text Book(s)

1. Dayakar Rao B, Sangappa, Vishala A.D, Arlene Christina G.D and Tonapi V.A. 2016. Technologies of Millet Value Added Products. Centre of Excellence on Sorghum, ICAR- Indian institute of Millets Research. Rajendranagar, Hyderabad,

References

1. Karuppasamy Packiyam, Kanchana S, Hemalatha 2015. Development and Standardization of Value - Added Products from Millets. Scholars' Press, India.
2. Dayakar Rao B, Sangappa, Venkatesh Bhat, Vilas A Tonapi. 2018. Nutricereals for Nutritional Security., ICAR- Indian institute of Millets Research. Rajendranagar, Hyderabad, India. pp 1 – 15.

Websites/ e-Learning Resources

1. https://www.fssai.gov.in/upload/uploadfiles/files/Guidance_Notes_Version_2_Millets_29_01_2020.pdf

CO-PO MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	2	2	1	2	1	2	1	2
CO2	3	3	3	2	1	2	1	2	1	2
CO3	3	3	3	2	1	2	1	2	1	2
CO4	3	3	3	2	1	2	1	1	1	2
CO5	3	3	3	2	1	2	1	1	1	2
Average	3	2.6	2.8	2	1	2	1	1.6	1	2

Strong- 3 Medium– 2 Low – 1

CourseCode	Name of the Course	Category	Hours/Wk.	Credits
24PFN521V	Nutrition and Immunity	VAC	2	2

This course aims to impart insight knowledge on the role of nutrients in the immune system, understanding the basics of the gut-brain connection and inter relationship between nutrition and infection.

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: understand the basic concept of nutrition and its role in immune system

CO2: gain knowledge on the immunological aspects

CO3: discuss the effects of nutrition on immune system

CO4: impart knowledge on gut-brain axis function

CO5: gain an in-depth knowledge on the concepts of nutrition and infection

Unit I **6 Hours**

Nutrition and Immunity: Definition, nutrition and health, macronutrients and micronutrients, antioxidants, phytochemicals and probiotics, role of nutrition in immune system.

Unit II **6 Hours**

Immune system: Immunity: definition and types, physiology and functions of immune system, Immune system of the gut, Immune mechanisms in stress, auto immunity and hypersensitivity.

Unit III **6 Hours**

Effects of nutrition on immunity: Immuno-nutrition, Role of individual nutrients in the inflammatory response and functions, effects of under nutrition on immunity, dietary factors which alter the immune response.

Unit IV: **6 Hours**

Gut-Brain connection: Understanding the basics of the gut-brain connection, nutrition and modifications of gut-brain axis function.

Unit V

6 Hours

Nutrition and infection: Introduction to infection, Relationship between nutrition and infection. Definition of immunization, Introduction to food borne illness.

Learning Resources:

Text Books

1. Anjana Agarwal, 2013, Textbook of Human Nutrition, Udipi, Jaypee brothers Medical Publishers.

References

1. Gibson, G.R. and M.B. Roberfoid (1999), Calonic microbiota, Nutrition and Health. Kulwer Academic Publishers, Dordecht.
2. Chandra, R.K. and Newberne , P.M., Nutrition immunity and infection. Plenum Pres 1982.

Websites/ E-Learning Resources

1. <https://epgp.inflibnet.ac.in/>

CO-PO MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	2	1	1	1	1	1	1	2
CO2	2	1	1	1	1	1	1	1	1	1
CO3	2	1	2	1	1	1	1	1	1	1
CO4	2	1	2	1	1	1	1	1	1	1
CO5	2	1	1	1	1	1	1	1	1	1
Average	2.2	1	1.6	1	1	1	1	1	1	1.2

Strong- 3 Medium– 2 Low – 1