



MANONMANIAM SUNDARANAR UNIVERSITY

TIRUNELVELI – 12

M.SC., DIETETICS AND FOOD MANAGEMENT

TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION,

CHENNAI – 600 005

FROM THE ACADEMIC YEAR 2023 – 2024 onwards

M.Sc. Dietetics and Food Management

INTRODUCTION:

Outcome-Based Education is incorporated into the curriculum based on the requirements of NAAC and UGC – Quality Mandate (2018). To fulfill these requirements, the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and Course Outcomes (COs) were framed for all programmes in alignment with the Vision, Mission and Educational Objectives of the University.

VISION AND MISSION OF THE UNIVERSITY:

VISION:

To provide quality education to reach the un-reached.

MISSION:

- To conduct research, teaching and outreach programmes to improve conditions of human living.
- To create an academic environment that glorify women and men of all races, caste, creed, cultures and all atmosphere that values intellectual curiosity, pursuit of knowledge , academic freedom and integrity.
- To offer a wide variety of campus educational and training programmes, including the use of information technology to individuals and groups.
- To develop partnership with industries and government so as to improve the quality of work place and to serve as catalyst for economic and cultural development.
- To provide quality / inclusive education especially for the rural and unreached segments of economically downtrodden students including women, socially oppressed and differently abled.

PREAMBLE:

The post graduate programme in this discipline has been designed to provide the students intensive and extensive theoretical and experiential learning. The programme allows flexibility in the choices based

credit systems. It is envisaged that the current of thrust areas, which students can select, based require trained professionals in areas such as Public Nutrition, Dietetics and Clinical Nutrition, Institutional Food Administration as well as Food Science and Quality Control.

MMSU

TANSICHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION	
Programme	M.Sc. DIETETICS AND FOOD MANAGEMENT
Programme Code	
Duration	2 years for PG
Programme Outcomes (Pos)	<p>PO1: Problem Solving Skill Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.</p> <p>PO2: Decision Making Skill Foster analytical and critical thinking abilities for data-based decision-making.</p> <p>PO3: Ethical Value Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.</p> <p>PO4: Communication Skill Ability to develop communication, managerial and interpersonal skills.</p> <p>PO5: Individual and Team Leadership Skill Capability to lead themselves and the team to achieve organizational goals.</p>

	<p>PO6: Employability Skill Inculcate contemporary business practices to enhance employability skills in the competitive environment.</p> <p>PO7: Entrepreneurial Skill Equip with skills and competencies to become an entrepreneur.</p> <p>PO8: Contribution to Society Succeed in career endeavors and contribute significantly to society.</p> <p>PO 9 Multicultural competence Possess knowledge of the values and beliefs of multiple cultures and a global perspective.</p> <p>PO 10: Moral and ethical awareness/reasoning Ability to embrace moral/ethical values in conducting one's life.</p>
<p>Programme Specific Outcomes (PSOs)</p>	<p>PSO1 – Placement To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.</p> <p>PSO 2 - Entrepreneur</p>

	<p>To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.</p> <p>PSO3 – Research and Development</p> <p>Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.</p> <p>PSO4 – Contribution to Business World</p> <p>To produce employable, ethical and innovative professionals to sustain in the dynamic business world.</p> <p>PSO 5 – Contribution to the Society</p> <p>To contribute to the development of the society by collaborating with stakeholders for mutual benefit.</p>
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Template for P.G., Programmes

Semester-I	Credit	Hours	Semester-II	Credit	Hours	Semester-III	Credit	Hours	Semester-IV	Credit	Hours
1.1. Core-I	5	6	2.1. Core-IV	5	6	3.1. Core-VII	5	6	4.1. Core-XI	5	6
1.2 Core-II	5	6	2.2 Core-V	5	6	3.2 Core-VII	5	6	4.2 Core-XII	5	6
1.3 Core – III	4	6	2.3 Core – VI	4	6	3.3 Core – IX	5	6	4.3 Project with viva voce	7	10
1.4 Core Practical	2	4	2.4 Discipline Centric Elective – III	3	4	3.4 Core – X	4	6	4.4 Elective - VI (Industry / Entrepreneurship) 20% Theory 80% Practical	3	4
1.5 Discipline Centric Elective -I	2	4	2.5 Generic Elective -IV:	3	4	3.5 Discipline Centric Elective - V	3	3	4.5 Skill Enhancement course / Professional Competency Skill	2	4
1.6 Generic Elective-II Practical	2	4	2.6 NME I	2	4	3.6 NME II	2	3	4.6 Extension Activity	1	
1.7 SKILL ENHANCEM ENT COURSE 1	-	-				3.7 Internship/ Industrial Activity	2	-			
	20	30		22	30		26	30		23	30
Total Credit Points -91											

**Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF)
Guideline Based Credits and Hours Distribution System
for all Post – Graduate Courses including Lab Hours
First Year – Semester – I**

Part	List of Courses	Credits	No. of Hours
	Core – I	5	6
	Core – II	5	6
	Core – III	4	6
	Core – I Practical	2	4
	Elective – I	2	4
	Elective – II practical	2	4
		20	30

Semester-II

Part	List of Courses	Credits	No. of Hours
	Core – IV	5	6
	Core – V	5	6
	Core – VI	4	6
	Elective – III	3	4
	Elective – IV	3	4
	Skill Enhancement Course [SEC] - I	2	4
		22	30

Second Year – Semester – III

Part	List of Courses	Credits	No. of Hours
	Core – VII	5	6
	Core – VIII	5	6
	Core – IX	5	6
	Core (Industry Module) – X	4	6
	Elective – V	3	3
	Skill Enhancement Course - II	2	3
	Internship / Industrial Activity [Credits]	2	-
		26	30

Semester-IV

Part	List of Courses	Credits	No. of Hours
	Core – XI	5	6
	Core – XII	5	6
	Project with VIVA VOCE	7	10
	Elective – VI (Industry Entrepreneurship)	3	4
	Skill Enhancement Course – III / Professional Competency Skill	2	4
	Extension Activity	1	-
		23	30

Total 91 Credits for PG Courses

M.Sc., DIETETICS AND FOOD MANAGEMENT**SEMESTER – I**

SEMESTER I							
Part	List of Courses	Credits	No. of Hours/ week	Total hours/ semester	Internal marks	External marks	Total marks
Core-1	Advanced Food science	5	6	90	25	75	100
Core -2	Advanced Human Physiology	5	6	90	25	75	100
Core-3	Macronutrients	4	6	90	25	75	100
Core I Practical	Advanced Food science practical	2	4	60	50	50	100
Elective - I	Food processing and technology/ Principles Of Menu Planning	2	4	60	25	75	100
Elective – II Practical	Food processing and technology practical	2	4	60	50	50	100
	Total	20	30	450	200	400	600

SEMESTER II							
Part	List of Courses	Credits	No. of Hours/ week	Total hours/ semester	Internal marks	External marks	Total marks
Core IV	Research Methods in Nutrition	5	6	90	25	75	100
Core V	Therapeutic Dietetics	5	6	90	25	75	100
Core VI	Therapeutic Dietetics-Practical	4	6	90	50	50	100
Elective III	Sports Nutrition	3	4	90	25	75	100
Elective IV	Functional Foods and Health	3	4	45	25	75	100
Skill Enhancement Course [SEC] - I NME	Nutrition in Special Conditions	2	4	45	25	75	100
	Total	22	30	450	175	425	600

SEMESTER III							
Part	List of Courses	Credits	No. of Hours/ week	Total hours/ semester	Internal marks	External marks	Total marks
CoreVII	Micronutrients	5	6	90	25	75	100
Core VIII	Food Microbiology	5	6	90	25	75	100
Core IX	Nutritional Biochemistry	5	6	90	25	75	100
CoreX(Industry Module)	Techniques in Food analysis	4	6	90	25	75	100
Elective V	Perspectives of Home Science	3	3	45	25	75	100
Skill Enhancement Course - II	Scientific Writing and Presentation Skills	2	3	45	25	75	100
	Internship / Industrial Activity	2	-	-	50	50	100
	Total	26	30	450	200	500	700

SEMESTER IV							
Part	List of Courses	Credits	No. of Hours/ week	Total hours/ semester	Internal marks	External marks	Total marks
CoreXI	Human Factors and Ergonomics	5	6	90	25	75	100
Core XII	Food Quality Control	5	6	90	25	75	100
Core XIII	Project Work with Viva voce	7	10	150	50	50	100
Elective VI	Hospital Administration	3	4	60	25	75	100
Skill Enhancement Course – III / Professional Competency Skill	Food Quality Control-Practical	2	4	60	25	75	100
Extension Activity		1	-	-	50	50	100
	Total	23	30	450	200	400	600

1.1 CORE -I-

ADVANCED FOOD SCIENCE

CREDIT: 4

SEMESTER :1

YEAR :1

HOURS PER WEEK :15

COURSE OBJECTIVES:

To enable the students

Gain knowledge on the source and properties of food

Familiarize students with changes occurring in various foodstuffs as a result of processing and cooking.

Enable students to use theoretical knowledge in various applications and food preparations.

COURSE OUTCOME:

On successful completion of the course, the students will be able to

CO No.	CO Statement
CO1	Overview the relationship between the chemical structure and the properties of the main components in food like starch, protein and lipids.
CO2	Understand the Composition and characteristics of various food commodities.
CO3	Explain the cooking quality of foods and apply food science knowledge in food industries
CO4	Identify and understand the nutrients and functions of foods in maintaining health
CO5	Analyze the proper use of food colors and food additives in safe food preparation.

UNIT I

Properties of food- Food nutrients, solids, solutions and colloids, Solutions-

Physical properties of solutions, classification of foods based on viscosity characteristics. Solutes-chemical properties, 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

Proteins-Structure and composition, Classification and properties of proteins; Effect of heat on physio-

MSSU

protein concentrates.

1

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

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.

Sugar and sugar products-Types of sugar, Types of granulated sugar, Physical and chemical properties, Sugar products -Types of honey, Jaggery, corn syrup, various forms of sugar used in cookery and Crystallization of sugar.

UNIT IV

Milk components- water, carbohydrate, milk fat, milk protein, minerals and other components in milk, Physiochemical properties of milk, 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-proteins in Egg, microscopic structure of egg, characteristics [color, size], Nutritional qualities, quality check, functional properties- foaming, factors affecting foam formation.

UNIT V

Food additives- Definition, different food additives and need for 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 the food industry.

TEXT BOOKS:

1. Srilakshmi B. (2015). *Food Science*. New Age International (P) Ltd. Publishers.
2. S.M. Reddy (2015). *Basic Food Science and Technology*. New Age International Publishers.
3. Avantina Sharma (2017). *Textbook of Food Science and Technology*, 3rd Edition. CBS Publishers and Distributors Ltd.
4. Swaminathan (2018). *Handbook of Food and Nutrition*. Bangalore Press.
5. Serpil Sahin and Servet Gulum Sumnu (2006). *Physical Properties of Foods*. Springer Publications.
6. Gerard L. Hasenhuettl, Richard W. Hartel (2019). *Food Emulsifiers and Their Applications*, 3rd Edition. Springer Publications.
7. Vickie A. Vaculik (2021). *Essentials of Food Science*, 5th Edition. Springer Publications.
8. Dr. M. Swaminathan (2015). *Advanced Textbook of Food and Nutrition, Volume 2*. Bapco Publications.
9. Eskein (2012). *Biochemistry of Food*. Elsevier Publications.
10. Lyn O'Brien Nabors (2001). *Alternative Sweeteners*. Taylor and Francis Publications.
11. Janet D. Ward and Larry Ward (2006). *Principles of Food Science*, 4th Edition. Stem Publishers.

ELEARNING RESOURCES:

1

1. FAO (Food and Agriculture Organization of the United Nations) - www.fao.org
2. WFP (World Food Programme) - www.wfp.org
3. FoodRisk.org - www.foodrisk.org
4. USDA Food Safety and Inspection Service - <http://www.fsis.usda.gov/>
5. FDA (U.S. Food and Drug Administration) - <https://www.fda.gov/food>

Mapping CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	3	3	2	1	2
CO3	3	3	3	3	3	2
CO4	2	3	3	2	1	3
CO5	3	3	3	2	2	3
Average	2.8	3	2.8	2.2	2	2.4

PEDAGOGY:

Lecture, Case study, journal reviewing, Assignments, Group discussion, Power point presentation

1.2 CORE - II
ADVANCED HUMAN PHYSIOLOGY

CREDITS: 4

SEMESTER :I

YEAR :I

HOURS PER WEEK :15

Objectives:

This course will enable students to:

- Advance their understanding of some of the relevant issues and topics of human physiology.
 - Enable the students to understand the integrated function of the system
- Understand alterations of structure and function in various organs and systems in disease conditions.

COURSE OUTCOME:

On successful completion of the course, the student will be able to-

CO No.	CO STATEMENT
CO 1	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.
CO 2	Understand the structural and functional organization of Blood and Cardiac System
CO 3	Understand the structural and functional organization of Respiration, Immunity and Endocrine GIT and Urinary System
CO 4	Comprehend the structural and functional organization Digestive System and Reproductive System
CO 5	Understand the structural and functional organization of Skin, Nervous and Excretory system

UNIT I

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

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

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, Charles'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

Gastrointestinal System

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

Reproductive System

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

UNIT V

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.

TEXTBOOKS

1. K. Sembulingam & Prema Sembulingam (2019). *Essentials of Medical Physiology*. Jaypee Publications. Eighth edition.
2. Waugh A, Ross and Wilson (2018). *Anatomy and Physiology in Health and Illness*. Elsevier Publications. 13th edition.
3. CC Chatterjee (2020). *Human Physiology*. CBS Publishers. 13th edition.
4. Indu Khurana (2020). *Medical Physiology for Undergraduate Students*. Elsevier Publication. 2nd edition.
5. GK Pal (2019). *Textbook of Human Physiology*. Elsevier Publications. 3rd edition.

REFERENCES:

1. Guyton, A.G. and Hall, J.B. (2005). *Textbook 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.

5. Ganong, W.F. (1985). *Review of Medical Physiology*. Lange Medical Publication. 12th Edition.
6. Moran Campell E.J., Dickinson, C.J., Slater, J.D., Edwards. C.R.W. and Sikora, K. (1984). *Clinical Physiology*. ELBS, Blackwell Scientific Publications. 5th Edition.

E LEARNING CONTENT

<https://youtu.be/MZDv0RvA52Y>-Osmosis

<https://youtu.be/TgcviVOnVBs>- Respiratory system

<https://youtu.be/44B0ms3XPku>- nervous system

Mapping: (CO/PSO)

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	3	3	2	3
CO2	3	1	3	3	2	3
CO3	3	1	3	3	2	3
CO4	3	1	3	3	2	3
CO5	3	1	3	3	2	3

PEDAGOGY

Lecture, Power Point Presentation, Demonstration, Group Discussion, Assignment, Library Visits, Seminars and Oral & Written Revision

1.3 CORE: III MACRO NUTRIENTS

CREDITS:4

SEMESTER :1

YEAR :1

HOURS PER WEEK 15

OBJECTIVE:

To enable the students

- To understand the relationship between lipid, carbohydrate, protein and mineral metabolism.
- To learn about the therapeutic uses of carbohydrates protein and fat in prevention of non-communicable disease.
- To get insights in the inborn errors of metabolism

COURSE OUTCOMES:

After studying this paper, the students would know

CO No.	CO STATEMENT
CO1	The essentials of nutrients in growth and development of humans
CO2	The importance of major nutrients in maintaining human health and leading active lifestyle
CO3	The enhancement of nutritional quality of the diet.
CO4	Identify the various types & sources of food borne illness and methods of prevention.
CO5	The role of nutrients in health and diseases.

UNIT I:

ENERGY- Energy content of foods, physiological fuel value, Estimation of total energy requirements (BMR, REE and physical cost of activities) TEE, Energy balance, Basal metabolic rate, total energy requirements, BMR& RMR, Factors affecting BMR, Thermic effect of food. Changes in body weight and body composition with the changing energy balance, Regulation of food intake- role of hunger and satiety centers. Energy balance and obesity.

UNIT II:

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, Role of dietary fiber in health and disease. Role of carbohydrates in health and disease

UNIT III:

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:

LIPIDS—Concepts of visible and invisible fats, EFA, SFA, MUFA, PUFA, omega-6 to omega-3 ratios. – sources and physiological functions and their role in health and disease. Adipose tissue – Lipogenesis and Lipolysis, lipoproteins – types and health implication.

Storage of body fat, Effects of deficiency. Fat substitutes, Hypocholesterolaemic foods – garlic, fiber and plant proteins.

UNIT V:

WATER – Sources, Function, 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,

TEXT BOOKS:

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.
5. Shils, M. E., Olson, J. A., & Shike, M. (2000). *Modern nutrition in health and disease. Modern Nutrition in Health and Disease . Vol I and II*. Lea &Febiger Philadelphia, A Waverly Company. Eighth edition.
6. Mahan, L.K., & Stump, S.E. (2002). *Krause's Food Nutrition and Diet Therapy*. W.B. Saunder's company, Philadelphia. 10th edition.

REFERENCES:

- Guthire, H.A., (2001). *Introductory Nutrition*. C.V. Mosby Company, St. Louis. Tenth edition.
- Bogert, J.G.V., Briggs, D.H., & Calloway, (2000). *Nutrition and physical fitness*. W.B. Saunders Co., Philadelphia, London, Toronto. 11th edition.
- Brown, J.E., (2002). *Nutrition Now*. Wadsworth Thomson Learning New York. 3rd edition.
- Toteja, G. S. (2004). *Micronutrient profile of Indian population*. Indian Council of Medical Research Publication, New Delhi.
- Swaminathan, M., (2002). *Principles of Nutrition and Dietetics*. BAPPCO, 88, Mysore Road. Bangalore – 560 018.
- Jain, J.L., Jain, S., & Jain, N., (2005). *Fundamentals of Biochemistry*. S. CHAND & COMPANY Ltd. Ram nagar, New Delhi-110 055. 6th revised edition.

E- LEARNING RESOURCES:

www.nutrition.gov – Service of National agricultural library, USDA

www.nal.usdfa.gov/fnic - Food and nutrition information center

www.fantaproject.org- Fanta technical assistance for nutrition

<http://dietary-supplements.info.nih.gov> – Officer of dietary supplements, national institute of health.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	2	2	3	3	3	3
CO5	2	2	2	3	3	2
Average	2.6	2.6	2.8	3	3	2.8

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

1.4 Core I Practical
ADVANCED FOOD SCIENCE PRACTICAL

CREDIT: 3

SEMESTER :1

YEAR :1

HOURS PER WEEK:10

COURSE OBJECTIVES:

To enable the students

- 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 the cooking quality of foods
- Create appropriate food preparation and processing methods to ensure quality standards.

COURSE OUTCOME:

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Gain knowledge on sensory analysis and cereal cookery concept
CO2	Understand 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.

SENSORY METHOD

1. Analysis of taste sensitivity
2. Threshold test
3. Duo-Trio test
4. Multiple sample difference

STARCH

5. Microscopic structure and gelatinization
6. Factors affecting gelatinization
7. Sag test
8. Gluten formation

PULSES

9. Factors affecting cooking quality

FRUIT

10. Enzymatic browning
11. Pectin test
12. Firmness of gel

13. VEGETABLE

14. Various methods of cooking
15. Fat-soluble and water-soluble pigments

MILK

16. Detecting the presence of starch, soda, urea in milk sample
17. pH of milk sample
18. Effect of acid on milk
19. Maillard reaction

SUGAR

20. Relative sweetness of sugars: sucrose, maltose, lactose, fructose, dextrose, glucose, artificial sweeteners
21. Stages of sugar cookery
22. Effect of dextrose, jaggery, honey, and cream of tartar on sucrose

FATS AND OILS

23. Smoking point of various oils: Groundnut oil, coconut oil, Gingelly oil, Olive oil, Vanaspati, Ghee, Refined Sunflower oil, Rice bran oil

24. Cooking temperature and fat absorption: Groundnut oil, coconut oil, Gingelly oil, Refined Sunflower oil, Rice bran oil

PHYSICAL PROPERTIES

25. Thousand-grain weight
26. Thousand-grain volume
27. Hydration capacity
28. Hydration index
29. Swelling capacity
30. Specific gravity
31. Seed displacement test
32. Viscosity: Line spread test, Viscometer
33. Food Adulteration

TEXT BOOKS:

1. Srilakshmi B. (2015). Food Science, New Age International (P) Ltd.
2. Publishers.
3. Potter N. and Hotchkiss J.H. (1996). Food Science, Fifth ed., CBS Publishers and Distributors, New Delhi
4. Avantina sharma (2017). Textbook of Food Science and Technology. CBS Publishers and Distributors Ltd. 3rd Edition.
5. Reddy S M. (2015). Basic Food science and technology. New Age International publishers. 2ND edition.

REFERENCES:

1. Swaminathan A (1979) . Food Science And Experimental Foods, Ganesh And Company Madras. 3rd edition.
2. Bennion, Marion and O. Hughes (2001). Introductory Foods. Edi: Macmillian 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.

E-LEARNING RESOURCES

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

- www.fao.org www.wfp.org

[Learn Microbiology with Online Courses and Classes | edX](#)

Mapping of CO with PSO:

CO/PSO	PSO1	PSO2	PSO3	PSO 4	PSO 5	PSO 6
CO1	3	3	2	3	3	2
CO2	3	3	3	2	3	3
CO3	3	2	3	3	3	3
CO4	3	3	3	2	2	3
CO5	3	3	2	3	3	2
Average	3	2.8	2.6	2.8	2.8	2.6

PEDAGOGY

Experiments, Planning recipes , Group Discussion, Assignments, .

1.5 ELECTIVE GENERIC /DISCIPLINE CENTRIC II**FOOD PROCESSING AND TECHNOLOGY****CREDIT: 3****SEMESTER :1****YEAR :1****HOURS PER WEEK :10****COURSE OBJECTIVES:**

To enable the students:

1. Understand the science behind the processing of foods and its impact on the nutritional value of foodstuffs.
2. Acquire in-depth knowledge of the production of processed food products and waste utilization techniques.
3. Understand the changes in the physicochemical properties of foods due to processing conditions.
4. Understand the various parameters related to post-harvest technology.

COURSE OUTCOME:

On successful completion of the course, the students will be able to

CO No.	CO Statement
CO1	The concepts and principles of food processing.
CO2	The various processed food products from plant and animal sources.
CO3	The by-product utilization from food processing.
CO4	The systematic knowledge of basic and applied aspects in food processing and technology.
CO5	The various post-harvest technologies for different food products

UNIT-I

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.

Enzymes in Food Processing: Enzyme- Review of classification, enzyme inhibitors, enzymatic browning.

UNIT-II**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

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 physiochemical properties of vegetable oils.

UNIT-III**Vegetables Processing and Technology:**

Pigments: Classification, effects on processing of vegetables; Preliminary processing of vegetables;

Vegetable products: Fermented and nonfermented 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 nonfermented; Effect of processing on nutritive value and physiochemical properties of fruits;

Browning reactions: types and mechanism; prevention methods; Fruit waste utilization.

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

UNIT-IV**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.

UNIT-V

Introduction of 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.

TEXTBOOKS

1. Shakuntala Manay N Shadakhsaraswamy 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. Fellows P.(2000). Food Processing Technology, 2nd Edition.
4. Woodhead Publishing Limited and CRC Press LLC. 1st edition.
5. Avantina Sharma. (2017). Textbook of Food Science and Technology. CBS Publishers and Distributes Ltd. 3rd edition.

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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. 4th edition.
3. Srivastava R P and Kumar S. (2006) Fruits and Vegetables Preservation- Principles and Practices. International Book Distributing Co. 3rd edition.
4. W B Crusess.(2004). Commercial Unit and Vegetable Products.
5. W.V. Special Indian Edition , PubAgrobios India . 2nd edition.
6. Forsythe S J and Hayes P R (1998). Food Hygiene, Microbiology and HACCP. Gaiters burg Maryland Aspen.
7. Eskein .(2012). Biochemistry of Food. Elsevier publications. 1st edition.

ELEARNING RESOURCES:

- <http://www.fao.org/3/V5030E/V5030E00.htm> <https://fmtmagazine.in/fruits-vegetables-processing-technologies/> <https://www.actioncontrelafaim.org/wp-content/uploads/2018/01/technical>
- [paper_phl.pdf](#)

- <https://www.nutsforlife.com.au/resource/nuts-and-processing/> <https://www.fssai.gov.in/>

MAPPING (CO/PSO):

CO/PO	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	2	2	2
CO2	3	3	2	2	3	2
CO3	2	3	2	1	2	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	2.8	3	2.6	2.2	2.6	2.4

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

1.5 ABILITY ENHANCEMENT COURSE -SOFT SKILL 1 PRINCIPLES OF MENU PLANNING

UNIT-I: 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

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

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

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

UNIT-IV: NUTRITION IN PREGNANCY

ICMR Nutrient allowances, Dietary guidelines. Common nutrition-related problems of pregnancy and Lactation.

UNIT-V

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

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

REFERENCES

BOOKS

1. Nix .S 2016, Williams' Basic Nutrition & Diet Therapy, Fifteenth Edition, Elsevier.
2. Simon Langley-Evans, 2015 Nutrition, Health and Disease: A Lifespan Approach 2nd Edition, Wiley Blackwell.
3. Jacalyn J. McComb, Reid Norman, et al., The Active Female: Health Issues Throughout the Lifespan 2010, Human Press.

4. 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'

MSU

Lives), 2012, Springer.

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7. Davidson, S.R. and Passmore J.F., 1989, Human Nutrition and Dietetics, ELBS London.
8. Mahan, K.L., and Stump, S.E., 1996, Krauses Food, Nutrition and Diet therapy M.B. Saunders Co., USA.
9. Balasubramanian et al., 1998, Dietary guidelines for Indians, ICMR, New Delhi.
10. Passmore, AH and Adams, A.A., 1990, Clinical assessment of nutritional status – A working manual, Will and Wilson Publishing, London.
11. Bamji et al(1996), Textbook of Human Nutrition Oxford and IBH Publishing co. Pvt. Ltd. Delhi.
12. Shils.E.M, Shike .M, Ross. A.C, Cabellero.B and Cousins.R.J (2011) Modern Nutrition in Health and Disease, Eleventh Edition, Lippincott Williams and Wilkins, Philadelphia.
13. Mahan, K.L., and Stump, S.E., 1996, Krauses Food, Nutrition and Diet therapy M.B. Saunders Co., USA.

E- LEARNING RESOURCES

- ❖ www.four-h.purdue.edu
- ❖ www.ingenta.connect.com
- ❖ nal.usda.gov/fnic/lifecycle

MAPPING (CO/PSO):

CO/PO	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	2	2	2
CO2	3	3	2	2	3	2
CO3	2	3	2	1	2	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	2.8	3	2.6	2.2	2.6	2.4

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

1.6 ELECTIVE GENERIC /DISCIPLINE CENTRIC II PRACTICAL

MSU

FOOD PROCESSING AND TECHNOLOGY

1. Refrigeration and Freezing of fruits and vegetables.
2. Refrigeration and Freezing of meat and fish.
3. Sun and Oven drying of Fruits and Vegetables.
4. Preparation of Jam, Jelly, Syrup and Squash.
5. Preparation of pickles.
6. Visit a Canning and Bottling unit.
7. Visit a fish processing unit.
8. Visit a food packaging unit.

COURSE OUTCOMES:

On completion of the course, students will be able to

CO 1. To develop the skill to analyze the quality of sugar such as jam, jelly etc.

CO 2. To explain the fermentation process such as canning and bottling unit.

CO 3. To analyze technologies in food preservation.

CO 4. To discuss the preservation of foods by salt and acid.

CO 5. To evaluate the novel technologies in food preservation.

Mapping

Food Processing and Preservation Practical											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	1	2	3	3	2	3	3	2
3	3	3	3	3	2	3	3	2	3	3	2
4	3	3	3	3	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

1.7 SKILL ENHANCEMENT COURSE 1

Computer in Nutrition Research

Course objectives

1. Understand the basics of computers and their applications
2. Gain knowledge to use computers
3. Develop skills to apply computer-based technology in Food Science and Nutrition

Course Outcomes

1. The student will gain knowledge of computer applications.
2. The knowledge of Operating systems and MS Office will be enhanced
3. Acquire knowledge of computer networks.
4. To gain knowledge of computer networking systems and apply them in the field of food science, nutrition and research.

UNIT I

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, Recent software in food and Nutrition.

UNIT II

Operating Systems and MS Office Introduction to Operating Systems, Windows Applications MS Word, MS Excel. MS Access and MS PowerPoint

UNIT III

Nutrition software and websites, e-journals in Food Science and Nutrition, Use of SPSS.

UNIT IV

Application of Computers in Food Science and Nutrition -PowerPoint presentation, nutrient and diet calculations, nutrition education and counselling

Unit V

Research Problem: defining a research problem, selecting the problem, and technique involved in defining a problem. Thrust areas in research in Food Science.

REFERENCES

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.

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3. Andrew S. Tanenbaum (2009) IV Edition, Computer Networks, Pearson Education and Dorling Kindersley Publishers, Delhi.
4. 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.
5. Ralf Steinmetz and KlaraNahrstedt (2011) Multimedia- Computing, Communications and Applications, Pearson Education and Dorling Kindersley Publishers, Delhi

MAPPING (CO/PSO):

CO/PO	PSO 1	PSO2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	2	2	2
CO2	3	3	2	2	3	2
CO3	2	3	2	1	2	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	2.8	3	2.6	2.2	2.6	2.4

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

2.1 CORE: IV**RESEARCH METHODS IN NUTRITION****CREDIT: 5****SEMESTER:2****YEAR :1****HOURS: 6****OBJECTIVES:**

- To provide students understanding of the basic concepts, approaches and methods in conducting research.
- To explain the importance of research in food science and nutrition.
- To make students understand the types of tools applicable to the research problem and develop skills of preparing out line of research work and construct common data collection tools.

COURSE OUTCOME:

On successful completion of the course the student will be able to

CO No.	CO STATEMENT
CO 1	Demonstrate knowledge of the scientific method, purpose and approaches to research and Become a qualified researcher.
CO 2	Identify and selection of the research sampling and scales of measurement
CO 3	Understand the types of tools applicable to research problem and develop skills of preparing out line of research work and construct common data collection tools
CO 4	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
CO 5	Present research data in a scientific manner and Understand the key elements of a research report and various applications of computer in Nutrition research

Unit I: Foundation of Nutrition Research

- 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 for Research in Food Science and Nutrition

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- 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: Sampling and Sample Design

- 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
 - Stapel Scale

Unit III: 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: 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: Reporting the Findings and Computer Applications

Report Writing – Importance, Types, Mechanics, Guidelines and Precautions, End Notes- Bibliography, Appendices, Footnotes and Glossary of terms, Computer Applications in nutrition

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research -importance and uses3.Applicable Statistical Analysis Software- **Literature Searching-** PubMed, **Data Analysis-** Micro Soft Excel, SPSS, Minitab, **Plagiarism Checker** – Turnitin, Scribbr

TEXTBOOKS

- Kothari C R (2004). Research Methodology – Methods & Methodology. Delhi, New Age International Pvt Ltd. 2nd Ed
- Chawla,Deepak and NeenaSondhi (2018):Research Methodology- Concepts and Cases. Noida, Vikas Publishing House Pvt Ltd. 2nd Ed.
- Gupta, S P (2019). Statistical Methods. New Delhi. S Chand & Sons. 45th Ed.
- Copper, H.M. (2002). IntergratingResearch : A guide for literature reviews. California: Sage, 2nd Edition.
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- Anderson, David R and et.al.(2013) : Statistics for Business and Economics. Delhi, Cengage Learning India Pvt Ltd. 11th Ed.
- Bandarkar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of Social Research. Himalaya Publishing House, Mumbai.
- 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.
- Danial, Wayne W and Chad L Cross (2017): Biostatistics – Basic Concepts and Methodology For the Health Sciences – International Student Version. New Delhi, ArEmmInternational, 10th Ed.

Mapping: (CO/PSO)

CO/PSO	PS O 1	PS O 2	PS O 3	PS O 4	PS O 5	PSO 6
CO1	1	3	2	2	3	2
CO2	1	1	1	0	2	1
CO3	3	3	3	3	3	2
CO4	1	3	3	0	3	1
CO5	3	2	3	0	0	1
Average	1.8	2.4	2.4	1	2.2	1.4

PEDAGOGY

Lecture, Power Point Presentation, Demonstration, Group Discussion, Assignment, Seminars and Oral & Written Revision

CORE V**THERAPEUTIC DIETETICS****Time/Hours: 6 Hours (Theory)****CODE:****Year I****Credits 5****Semester: II****LEARNING OBJECTIVES****This course will enable students to**

1. Understand the aetiology, physiologic & metabolic anomalies of acute and/ or chronic disease states and its effect on nutrient requirements.
2. Identify the crucial points of disease management through nutrition support.
3. Recommend appropriate nutrition therapy for various disease conditions.

COURSE OUTCOME**On successful completion of the course the student will be able to:**

CO	CO STATEMENT	KLEVEL
CO1	Explain pathophysiology, signs and symptoms and nutrition management of the upper and lower Gastrointestinal tract disease conditions.	K1,K2,K3
CO2	Enumerate the types, etiology, symptoms and complications and explain the dietary management of diseases of liver, Biliary and pancreatic diseases.	K1,K2,K3
CO3	Comprehend the nutrient requirement for each disease condition including Cardiovascular, Renal and Lung diseases.	K1,K2,K3
CO4	Demonstrate skill in calculating and classifying the degrees of obesity and proficiency in identifying diet therapy for weight management and related interventions.	K4,K5
CO5	Identify the indications, contraindications, and routes of delivery and develop a monitoring system for Enteral and Parenteral Nutrition support.	K5,K6
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6–Create		

THEORY

S.No.	CONTENT	HOURS
Unit I	<p>Medical Nutrition Therapy for Gastrointestinal Diseases</p> <p>a) Dietary management of Upper gastrointestinal diseases: Etiology, signs & symptoms, complications and dietary management for: Gastro-oesophageal reflux disease (GERD), Oesophagitis, Oral Cavity Cancer Stomach: Dyspepsia, Gastritis, Peptic & Duodenal Ulcer, Stomach Cancer, Gastric Surgery, Dumping Syndrome</p> <p>b) Dietary management of Lower gastrointestinal diseases: Etiology, signs & symptoms, complications and dietary management of Flatulence, Constipation, Diarrhea, Steatorrhea, Celiac Disease, Lactose Intolerance, Cow's Milk Protein Allergy, Inflammatory Bowel Disease (Ulcerative Colitis & Crohn's Disease), Irritable Bowel Syndrome, Diverticulosis & Diverticulitis, Short Bowel Syndrome (SBS), Ileostomy, Colostomy, Protein Losing Enteropathy</p>	20
Unit II	<p>Medical Nutrition Therapy for Liver, Biliary & Pancreatic Diseases</p> <p>a) Physiology, functions of Liver and Liver function tests. Dietary management of Acute & Chronic Hepatitis, Non-alcoholic Steatohepatitis (NASH), Stages & Progression of Liver Disease, Wilson's Disease, Hepatic Encephalopathy.</p> <p>b) Etiology, symptoms and dietary management of Cholelithiasis, Cholecystitis and cholecystectomy.</p> <p>c) Dietary management and diagnostic tests of Pancreatic disorders; Acute & Chronic Pancreatitis, Type 1 Diabetes, Type 2 Diabetes, Gestational Diabetes.</p>	15
Unit III	<p>Medical Nutrition Therapy for Cardiovascular, Renal & Lung Diseases</p> <p>a) Prevalence, Pathophysiology, risk factors, diagnostic tests and dietary management of cardiovascular diseases; Atherosclerosis, Hyperlipidemia, Hypertension, Angina pectoris, Myocardial infarction, congestive heart failure.</p> <p>b) Pathophysiology, classification, diagnostic tests, risk factors and dietary management of renal diseases: Glomerulonephritis, Nephrotic Syndrome, Nephrolithiasis, Acute Kidney Injury, Chronic Kidney Disease.</p> <p>c) Pathophysiology, risk factors and dietary management of lung diseases: Asthma, Chronic Obstructive Pulmonary Disease (COPD), Tuberculosis, Lung Cancer.</p>	20
Unit IV	<p>Medical Nutrition Therapy for Weight Management and Other Conditions</p> <p>a) Etiology, classification, clinical manifestation, energy balance, management of Obesity: Components & regulation of Body Weight, Types & causes of Obesity, Nutritional Management, Nutrition post Bariatric Surgery.</p> <p>b) Etiology, clinical manifestation and Dietary management of Underweight, Hyper- and Hypothyroidism.</p> <p>a) c) Classification, hydration calculation, dietary management in Burns, AIDS, Dysphagia, Stroke, Gout, Anemia, Fever.</p>	20

UnitV	Advanced Nutrition Intervention	15
	a) a) Assessment, calculation, formulation, and monitoring of Enteral Nutrition Support: Indications, Contraindications, Routes of access, Types of Enteral Formulas & its composition, Nutrient Delivery & Monitoring b) b) Assessment, calculation, formulation, and monitoring of Parenteral Nutrition Support: Indications, Contraindications, Routes of access, Calculation of Parenteral Nutrition, Nutrient Delivery & Monitoring	
		90

REFERENCES BOOKS

1. Mahan, L.K. & Escott-Stump, S. (2008). *Krause's Food & the Nutrition Care Therapy*, International Edition, 12th Edition, Saunders Elsevier Publication.
2. Shils, M.E., Olson, J.A., Shike, M., & Ross, A.C. (1999). *Modern Nutrition in Health and Disease*, 9th Edition, Williams and Wilkins.
3. Garrow, J.S., James, W.P.T., & Ralph, A. (2000). *Human Nutrition and Dietetics*, 10th Edition, Churchill Livingstone.
4. Sue Rodwell Williams (2013). *Nutrition, Diet Therapy*, 9th ed., WB Saunders Company, London.
5. Nix, S. (2013). *Williams' Basic Nutrition & Diet Therapy*, 14th Edition, Elsevier Publication.
6. Vinitha Krishnan (2013). *Nutrition Planning Aid for Practicing Dietitians*.

JOURNALS

1. Nutrition Update Series
2. World Review of Nutrition and Dietetics
3. Journal of the American Dietetic Association
4. American Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition
6. Nutrition Review

E-LEARNING RESOURCES

1. <https://www.espen.org>
2. <https://www.nutritioncare.org/home>
3. <https://www.idf.org>
4. <https://ispad.org>
5. <https://www.diabetes.org>
6. <https://www.eatright.org>

MAPPING OF CO WITH PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	S	M	S	S
CO2	S	S	S	M	S	S
CO3	S	S	S	M	S	S
CO4	S	S	S	M	S	S
CO5	S	S	S	M	S	S

CORE VI**THERAPEUTIC DIETETICS PRACTICAL****CODE:****Time/Hours: 6 hours****Credits 4****LEARNING OBJECTIVES****Year I Semester II**

1. Enable students to use, apply and interpret various methods of screening and assessment of nutritional status.
2. Understand commonly used tests for the diagnosis of various diseases.
3. Apply principles of diet therapy in planning and preparing foods for various disease conditions.
4. Evaluate and understand nutrition labels to make informed food choices for yourself and to educate patients.
5. Know the various nutritional supplements available and identify their appropriate usage.

COURSE OUTCOME**On successful completion of the course, the student will be able to:**

No.	COURSE OUTCOME STATEMENT	KLEVEL
CO1	<ul style="list-style-type: none"> - Recall and understand various methods of nutritional screening and use of assessment tools. - Select the appropriate screening methods and assessment tools for the purpose on hand. - Acquire the skill to accurately assess and interpret the nutritional status of the individual. 	K1,K2,K3
CO2	Apply dietetic principles in planning, preparing, and evaluating meals intended for various disease conditions.	K3,K5,K6
CO3	Apply dietetic principles in planning, preparing, and evaluating meals intended for patients requiring modification in consistency of food (e.g., stroke, gastrointestinal disease conditions).	K3,K5,K6
CO4	Analyze nutrition labels of nutritional supplements and determine their appropriate usage.	K4
CO5	Execute a market survey on nutraceuticals and nutrition supplements, analyse and prepare tube feeding formulas.	K5,K6
K1 -Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate;K6-Create		

CONTENT

CONTENT	HOURS
<p>Dietitian Skills Training – I (Steps Involved in Nutrition Assessment & Screening)</p> <p>a) Nutrition Screening & Assessment Tools: Malnutrition Universal Screening Tool (MUST), Nutrition Risk Screening (NRS-2002), Mini Nutritional Assessment (MNA), Subjective Global Assessment (SGA), Global Leadership Initiative for Malnutrition (GLIM) Criteria.</p> <p>b) Bedside Assessment Tools: Nutrition-Focused Physical Examination (NFPE), Anthropometric Assessment, Body Mass Index (BMI), Bioelectrical Impedance Analysis (BIA), Hand-grip Dynamometer, Skinfold Thickness, Biochemical Parameters & Their Relation to Disease Conditions.</p> <p>c) Problem, Etiology, Signs & Symptoms (PESS) Statement – Case Studies.</p>	25
<p>Preparation of Therapeutic Diets–I</p> <p>a) Planning, preparation and calculation of the nutritive value of sample diet for conditions such as - Typhoid, Jaundice, Hepatitis, Cirrhosis, Pancreatitis, Cholelithiasis, COVID-19.</p> <p>b) Planning, preparation, and calculation of nutritive value of sample diet for conditions such as Hyperlipidemia, Obesity, Hypertension, Stages of renal disease, Renal calculi.</p> <p>c) Carbohydrate Counting in Diabetes</p>	20
<p>Preparation of Therapeutic Diets–II (Preparation of Sample Menu)</p> <p>a) Planning and preparation of sample diet for Anaemia.</p> <p>b) Planning, preparation, and calculation of nutritive value of sample diet for Ulcerative Colitis, Crohn's Disease, Lactose Intolerance, Celiac Disease.</p> <p>c) Menu Planning for Dysphagia in Stroke, Constipation, and Diarrhea.</p>	15
<p>Dietitian Skills Training–II</p> <p>a) Construction of an Exchange List for Calorie, Carbohydrate and Potassium.</p> <p>b) Understanding Nutrition Labelling, Market Surveys and evaluation of food products.</p>	15
<p>Advanced Nutrition Intervention</p> <p>a) Familiarising and analysing the nutrition supplements available for various disease conditions.</p> <p>b) Planning and Preparation of tube feeds based on case study.</p>	15
	90

REFERENCES

BOOKS

1. Mahan, L.K. & Escott-Stump, S. (2008). *Krause's Food & the Nutrition Care Therapy*, International Edition, 12th Edition, Saunders Elsevier Publication.
2. Shils, M.E., Olson, J.A., Shike, M., & Ross, A.C. (1999). *Modern Nutrition in Health and Disease*, 9th Edition, Williams and Wilkins.
3. Garrow, J.S., James, W.P.T., & Ralph, A. (2000). *Human Nutrition and Dietetics*, 10th Edition, Churchill Livingstone.
4. Sue Rodwell Williams (2013). *Nutrition, Diet Therapy*, 9th ed., WB Saunders Company, London.
5. Nix, S. (2013). *Williams' Basic Nutrition & Diet Therapy*, 14th Edition, Elsevier Publication.
6. Vinitha Krishnan (2013). *Nutrition Planning Aid for Practicing Dietitians*.

JOURNALS:

1. Nutrition Update Series
2. World Review of Nutrition and Dietetics
3. Journal of the American Dietetic Association
4. American Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition
6. Nutrition Review

E-LEARNING RESOURCES

- ❖ <https://www.espen.org>
- ❖ <https://www.nutritioncare.org/home>
- ❖ <https://www.idf.org>
- ❖ <https://ispad.org>
- ❖ <https://www.diabetes.org>
- ❖ <https://www.eatright.org>

MAPPING OF CO WITH PSO

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	S	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	M	S	S
CO4	S	S	S	M	S	S
CO5	S	S	S	M	S	S

ELECTIVE III – SPORTS NUTRITION**Time/Hours: 4 Hours (Theory)****Year I****Credits 3****Semester: II****To enable the students to**

1. Learn the effects of exercise on the physiological and energy systems of the body.
2. Understand the link between exercise and the demand it places on the nutrients in the body
3. Translate nutrient goals of an athlete into appropriate diet plans that can enhance performance

COURSE OUTCOME**On successful completion of the course the student will be able to:**

CO	CO STATEMENT	K LEVEL
CO1	Recall the principles of exercise training, distinguish between various types of athletes and methods of body assessment, relate body composition to performance and identify suitable training and eating plans for weight management.	K1,K2,K3
CO2	Explain the structure of muscle fiber, the process of skeletal muscle contraction. Discuss muscular plasticity, cardio-pulmonary adaptation, and endocrinal response to exercise.	K2
CO3	Demonstrate the skill to choose foods and create meal plans before, during, and after exercise or competition which enhance performance.	K4,K6
CO4	Identify and include foods in daily eating plans that meet the enhanced micronutrient requirements of an athlete.	K3
CO5	Analyse hydration and electrolyte requirements of an athlete and evaluate dietary supplements for recommendation to athletes.	K3,K5
K1-Remember;K2-Understand;K3-Apply;K4 -Analyze;K5-Evaluate; K6–Create		

THEORY

S.No	CONTENT	No of hours
Unit I	<p>Exercise–Principles, Assessment and Weight Management</p> <p>a. Exercise – Principles, Assessment, and Weight Management</p> <p>b. Definition of Exercise, Types of exercise, Principles of Exercise training. Type of Athlete - Resistance, Endurance, and Power athlete.</p> <p>c. Assessment - Methods of assessment of Body Composition, Relationship between body composition and performance.</p> <p>d. Weight Management - Weight loss and weight gain as preparation for competition.</p>	15
Unit II	<p>Exercise Physiology and Energy Systems</p> <p>a. Muscle Physiology - Structure of skeletal muscle, muscle fiber types, muscular contraction, muscular adaptation to exercise. Cardiopulmonary response and adaptation to exercise. Exercise training and the endocrine system.</p> <p>b. Energy Systems for Exercise - Creatine Phosphate energy system, anaerobic glycolytic system, aerobic energy system - oxidative phosphorylation.</p>	15
Unit III	<p>Fuelling for exercise</p> <p>a. Carbohydrate - Utilization of carbohydrates during exercise, carbohydrate recommendations for athletes, guidelines for intake before, during, and after exercise; carbohydrate loading.</p> <p>b. Protein - Protein recommendations for athletes, timing of protein intake, effects of inadequate and excessive protein intake on performance and health, use of protein and amino acid supplements, consideration of protein intake for vegetarian athletes.</p> <p>c. Fat - Fat as a source of energy for exercise, fat loading, fat recommendations for athletes, effect of inadequate intake of fat on performance and health.</p>	15
Unit IV	<p>Role of Vitamins and Minerals</p> <p>a. Vitamins - Recommended intake of vitamins for athletes, influence of exercise on vitamin requirements, antioxidant function.</p> <p>b. Minerals - Recommended intake of minerals for athletes; importance of Calcium, Iron, Zinc, and Magnesium in an athlete's diet; female athletic triad.</p>	15
Unit V	<p>Role of Fluid, Electrolytes, and Nutritional Supplements</p> <p>a. Effect of exercise on fluid and electrolyte balance; hypohydration, hyperhydration, hyponatremia, maintenance of hydration before, during, and after exercise. Use of sports drinks.</p> <p>b. Definition of nutritional ergogenic aids and dietary supplements. Types of dietary supplements most frequently used by athletes, benefits and/or risks in the use of supplements, mechanism of action, and supplement protocol.</p>	15
		75

REFERENCE BOOKS

1. Bean A. (2000). *The Complex Guide to Sports Nutrition*. A&C Black Publishers, London.
2. Clark N. (2003). *Sports Nutrition Guidebook*. Human Kinetics, U.S.A.
3. Dunford M. and Doyle A.J. *Nutrition for Sport and Exercise*. Thomson Wadsworth, Australia.
4. Fink H.H., Mikesky A.E., Burgoon L.A. (2012). *Practical Applications in Sports Nutrition*. Jones and Bartlett Learning, U.S.A.
5. Bagchi D., Nair S., Sen C.K. (Eds.) (2013). *Nutrition and Enhanced Sports Performance - Muscle Building, Endurance and Strength*. Elsevier, Academic Press, UK, USA.
6. Srilakshmi B., Suganthi., Ashok C.K. (2016). *Exercise Physiology, Fitness and Sports Nutrition*. New Age International Private Limited.

E-LEARNING RESOURCES

- <http://www.aco.org.nz/pdf/nutrition-for-sports>
 - https://www.researchgate.net/publication/258630492_Sports_Nutrition_Book_2
- 013<http://themedicalbiochemistrypage.org>

MAPPING OF CO WITH PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	S	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	S	S	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

ELECTIVE IV**FUNCTIONAL FOODS AND HEALTH****LEARNING OBJECTIVES****To enable the students to**

1. Get an overview of the field of functional foods, nutraceuticals and natural health products.
2. Understand the functional food concept as related to ingredient efficacy and safety.
3. Get familiar with examples of bioactive ingredient-disease relationships.

COURSE OUTCOME

CO	CO STATEMENT	KLEVEL
CO1	Describe components of nutraceutical and functional foods. Distinguish between conventional foods vs. functional foods as well as Nutraceuticals vs. pharmaceuticals.	K1,K2,K3
CO2	Critically evaluate the health benefits of different types of Nutraceuticals	K2,K5
CO3	Distinguish between prebiotic and probiotic foods, their sources, health effects, and potential for risk reduction of diseases.	K4,K6
CO4	Discuss the therapeutic potential of functional foods based on the bioactive ingredients present in them.	K5
CO5	Recall the functional properties of Indian Super foods and recommend their appropriate usage	K2,K3
K1-Remember;K2-Understand;K3-Apply;K4-Analyze;K5-Evaluate; K6-Create		

THEORY

S.No	CONTENT	No of hours
Unit I	<p>Concept of functional foods and nutraceuticals</p> <p>a. Functional Food and Nutraceuticals - Definition, history, types, and classification.</p> <p>b. Benefits of functional foods and nutraceuticals.</p> <p>c. Criteria to discriminate between conventional and functional foods. Role of functional foods in health promotion and disease prevention. Market for functional foods and factors driving their growth.</p>	15
Unit II	<p>Probiotics</p> <p>a. Definition and important features of probiotic microorganisms. Health effects of probiotics.</p> <p>b. Probiotics in various foods: fermented milk products, non-milk products, and safety aspects of probiotics.</p>	15
Unit III	<p>Prebiotics</p> <p>a. Definition, sources, effect of processing, physiological effects, effects on human health, and potential applications in risk reduction of diseases.</p> <p>b. Food applications of non-digestible carbohydrates/oligosaccharides, dietary fiber, resistant starch, gums.</p>	15
Unit IV	<p>Functional Foods and Bioactive Ingredients for Risk Reduction of Diseases</p> <p>a. Bioactive compounds in foods - Polyphenols, flavonoids, catechins, isoflavones, tannins, phytoestrogens, phytosterols, glucosinolates, organosulfur compounds. Other components - phytates, protease.</p> <p>b. Definition, sources, effects on human health, and potential applications in risk reduction of diseases.</p>	15
Unit V	<p>Therapeutic potential of Indian Super foods</p> <p>a. Spices and Condiments</p> <p>b. Herbs and medicinal plants</p> <p>c. Millets and traditional rice varieties, spirulina, chlorella</p>	15
		75

REFERENCES BOOKS

1. Aluko, Rotimi. *Functional Foods and Nutraceuticals*. Springer-Verlag New York Inc., 2012.
2. Satinder Kaur Brar, Surinder Kaur, and Gurpreet Singh Dhillon. *Nutraceuticals Functional Foods*, 2014.
3. Robert E.C. Wildman, Robert Wildman, Taylor C. *Handbook of Nutraceuticals and Functional Foods*, Tshird Edition, Wallace, 2002.

E-LEARNING RESOURCES

- <http://www.aco.org.nz/pdf/nutrition-for-sports>
- https://www.researchgate.net/publication/258630492_Sports_Nutrition_Book_2013
- <http://themedicalbiochemistrypage.org>

MAPPING OF CO WITH PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	M	M	M	M	S	S
CO2	M	M	M	M	S	S
CO3	M	M	M	M	S	S
CO4	M	M	M	M	S	S
CO5	M	M	M	M	S	S

2.6 SKILL ENHANCEMENT COURSE -SOFT SKILL –NME - 1

NUTRITION IN SPECIAL CONDITIONS

CREDIT-2

SEMESTER-II

YEAR -I HOURS - 4

Course objective

- To acquire knowledge on physiological changes during extreme climatic changes.
- To understand the diet patterns and food choices in special condition
- To develop the skill of planning menus for military ration.

COURSE OUTCOME

- Asses the physiological condition during the special conditions
- Design a space food and military ration
- Understand different techniques for maintaining health in extreme conditions
- Comprehend the dietary requirements of various climatic conditions
- Plan a balanced diet for polar, hot and sea voyage conditions

UNIT I Space Nutrition

Physiological changes during space flight, types of space food, essential quality and criteria required for space food

UNIT II Nutrition in extreme condition

Physiological changes, Nutritional requirements in cold polar and hot environments, foodsupplements.

UNIT III Sea voyage

Stress in daily life aboard, Legal background for catering, cause of malnutrition in sea voyage, Limitations in food choice and diet pattern.

UNIT IV Military Nutrition

Dietary guidelines, Food choices, nutrient supplements and rations developed in t h e military

UNIT V Nutrition in Emergencies and Disasters

Natural and manmade disasters result in emergencies. Nutritional problems in emergencies in vulnerable groups (Macro and micronutrient deficiencies, Infection).

REFERENCES

- Jacalyn J. McComb, Reid Norman, et al., The Active Female: Health Issues Throughout the Lifespan 2010, Human press.

- 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.
- Antia, F.P., 1992, Clinical Dietetics and Nutrition Oxford University Press, New Delhi. Corinne, R.H., 1996, Normal and therapeutic nutrition, Macmillan Co., New York.

Mapping of Co with PSO:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO5	PSO6
CO1	3	3	2	3	1	2
CO2	2	3	3	3	1	2
CO3	3	3	3	3	1	3
CO4	2	3	3	3	1	2
CO5	3	3	3	3	1	3
Average	2.6	3	2.8	3	1	2.4

PEDAGOGY

Lecture, journal reviewing, Assignments, Power point presentations, video

MICRONUTRIENTS

CREDITS: 4

COURSE OBJECTIVES

1. To enable the students to learn the functions, deficiency symptoms, food sources and requirements of the different micronutrients.
2. To gain knowledge of nutrient requirements and management of micronutrients during various stages of life and diseases
3. To gain insight into recent concepts and findings in the field of nutrition and the application of the same to prevent diseases

COURSE OUTCOMES:

On completion of the course the students will be able to...

CO No.	CO Statement
CO1	Evaluate the specific role of functional foods and nutraceuticals in prevention of degenerative disease.
CO2	Understand the importance of micronutrients in growth and development of humans.
CO3	Analyse the importance of diet in maintaining human health to combat nutrient deficiency in the community

CO4	Gain in-depth knowledge of the physiological and metabolic functions of vitamins and minerals and their implications
CO5	Analyse the recent advances in the field of micronutrients and research for the welfare of the community

UNIT I:

15 hours

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

UNIT II:

15 hours

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:

15 hours

Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of Fat-Soluble Vitamins A, D, E and K

UNIT IV:

15 hours

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:

15 hours

RECENT CONCEPTS IN NUTRITION:

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

- Food and drug interaction.

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) “Pererspective in Nutrition”, 5th edition, Mc Graw Hill, 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.

REFERENCE BOOK

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.
4. Toteja, G.S and Singh P (2004), “ Micronutrient Profile of Indian Population”, ICMR Publication, New Delhi.
5. M. Swaminathan (2002), “ Principles of Nutrition and Dietetics”, BAPPCO, 88, Mysore RoadBangalore – 560 018.

E-LEARNING RESOURCES:

<https://www.udemy.com/share/1027yA/>

[WHO | The e-learning platform Nutrition Knowledge Hub launchWFP Nutrition's Learning Platform - UN World Food ProgrammeNutrition Online Courses | Coursera](#)

[E-Learning Programs \(nestlenutrition-institute.org\)](http://nestlenutrition-institute.org)

[WFP Nutrition's Learning Platform | Humanitarian Library](#)

Mapping: (CO/PSO)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	3
CO2	3	3	3	3	2	3
CO3	3	3	3	3	2	3
CO4	3	3	3	3	2	3
CO5	3	3	3	3	2	3
Average	3	3	3	3	2	3

PEDAGOGY (TEACHING METHODOLOGY):

Group Discussion, Case study, seminar, journal reviewing, Assignments, Power point presentations.

FOOD MICROBIOLOGY

This course will enable the student to:

- Gain deeper knowledge of the role of microorganisms in humans and the environment.
- Understand the importance of microorganisms in food spoilage and to learn advanced techniques used in food preservation.
- Understand the latest procedures adopted in various food operations to prevent food-borne disorders and the legal aspects involved in these areas.

Unit I

Introduction to Food Microbiology

Food Microbiology – Basic Concept and History of Food Microbiology. Role of Microbiology in Biotechnology Role of Microorganisms in Fermented Foods. Indicators of food safety and quality: Microbiological criteria of foods and their significance.

Unit II

Factors Affecting Food Safety

Physical Hazards, Biological, Hazards, Chemical Hazards, Microorganisms in Foods, Bacteria, Fungi, Yeasts, Moulds, Viruses, Parasites, Recent Concerns of Food Safety Prions, Concern of Genetically Modified Foods. Concern of Dioxin-Contaminated Foods. HACCP system and food safety used in controlling microbiological hazards.

Unit III

Microbiology of Air, Water, Soil and Food

Sources of food contamination

Factors Affecting the Growth of Microorganisms:

- Nutrition
- Oxygen
- Temperature
- Moisture Requirement

Concept of Water Activity, Osmotic Pressure, Hydrogen Ion Concentration (pH), and light.

Control and Destruction of Microorganisms.

Unit IV: Factors Responsible for Food Spoilage

- Microbiology of Air, Water, and Soil.
- Sources of food contamination.
- Factors Affecting the Growth of Microorganisms – Nutrition, Oxygen, Temperature, Moisture Requirement.
- The concept of Water Activity, Osmotic Pressure, Hydrogen Ion Concentration (pH), and light.
- Control and Destruction of Microorganisms.

Unit V: Foodborne Infections and Diseases

- Foodborne Diseases – types, definition – intoxication, infection.

- Foodborne Intoxications – Staphylococcal Poisoning, Bacillus Cereus Poisoning, Botulism.
- Foodborne Infections – Salmonellosis, Shigellosis (Bacillary dysentery), Vibrio Parahaemolyticus Gastroenteritis, Enteropathogenic E. coli Diarrhoea, Hepatitis A, and Shellfish Poisoning.
- Foodborne Diseases Due to Naturally Occurring Toxicants – Lathyrism, Veno-occlusive Disease (VOD), Epidemic Dropsy.

REFERENCE:

1. Atlas, M.Ronald (1995) Principles of Microbiology, 1st Edition, Mosby-Year Book, inco, Missouri, U.S.A.
2. Frazier, W.C. (1998) Food Microbiology, McGrawHill Inc, 4th Edition.
3. Roday, S. (1999) Food Hygiene and Sanitation, 1st Edition, Tata Mc Graw Hill, New Delhi.
4. Joshua A.K. 2000 Microbiology. Popular Book Depot, Madras.
5. Adams & Moss 2000, Food Microbiology, Panima Publishing Corporation, New Delhi.
6. Anandhanarayan. R & C.K.J. Panicker, 2003, Textbook of Microbiology, Orient Longman publications, Chennai.

COURSE OUTCOMES

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

- _ CO1 Trace the history of food microbiology, and the basic concept of Food Microbiology, Food Safety, Food Spoilage, and Food Hazards.
- _ CO2 Identify the different types of microbes and sources of microbial spoilage and contamination of food.
- _ CO3 Analyze the role of microbes in food spoilage, biotechnology and fermented foods, indicators of food safety and quality.
- _ CO4 Deduct different microbes and recommend the various measures to prevent the spoilage.
- _ CO5 Propose the latest procedures adopted in various food operations to prevent food-borne disorders and legal aspects involved in these areas.

Mapping

Core–Food Microbiology and Safety											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated(3); Moderately Correlated (2); Weakly Correlated (1); No Correlation(0)

NUTRITIONAL BIOCHEMISTRY

LEARNING OBJECTIVES (LOs)

- To augment the biochemistry knowledge acquired at the undergraduate level.
- Understand the mechanisms adopted by the human body for regulation of metabolic pathways.
- Get an insight into interrelationships between various metabolic pathways and become proficient in specialization in nutrition.
- Understand the integration of cellular-level metabolic events into nutritional disorders and imbalances.

Unit I: Carbohydrates

- Structure and properties of carbohydrates.
- Monosaccharides: glucose, fructose, galactose.
- Disaccharides: maltose, lactose, sucrose.
- Polysaccharides: starch and glycogen.

- Carbohydrate metabolism: Glycolysis, Gluconeogenesis, Glycogenesis, TCA cycle.

Unit II: Protein

- Structure and properties of proteins.
- Deamination, transamination, decarboxylation, urea cycle.
- Nutritional classification of proteins, determination of nutritive value (PER, Digestibility coefficient, BV, NPR, NPU, Chemical score, nitrogen balance), supplementation of proteins.
- Fluid, electrolyte, and acid-base balance.

Unit III: Lipids

- Properties of lipids.
- Iodine, saponification, and peroxide value.
- Lipid metabolism: β -oxidation of fatty acids.

Unit IV: Vitamins & Minerals

- Vitamins: Structure, biochemical properties, functions, and sources.
- Minerals: Structure, biochemical properties, functions, and sources.

Unit V: Enzymes & Co-enzymes

- Enzymes: Definition, classification, factors influencing enzyme action.
- Co-enzymes: Definition, types, structure, and function.
- Structure and function of DNA: Transcription and replication.
- Structure and function of RNA: mRNA, rRNA, tRNA.

REFERENCES

1. Arumugam (1994). *Elements of Biochemistry*. Saras publication.
2. Ambika Shanmugam (1998). *Fundamentals of Biochemistry*. Karthik Offset Printers.
3. Reghuramulu N., Madhavan Nair, and K. Kalyanasundaram S. (1983). *A Manual of Laboratory Techniques*. NIN, ICMR.
4. Plummer D.T. (1987). *An Introduction to Practical Biochemistry*. McGraw-Hill Book Co.
5. Cantrow A. and Trumper C. (1975). *Clinical Bio-Chemistry*. M.W.B. Saunders Co.
6. Swaminathan M. (1986). *Bio-Chemistry for Medical Teachers*. Harold Valley, Clinical Bio-Chemistry.

COURSE OUTCOMES (COs)

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

- CO1 Classify the biomolecules and illustrate the structure of primary metabolites.
- CO2 Identify the properties of biomolecules.

- CO3 Analyze the mechanisms adopted by the human body for the regulation of metabolic pathways.
- CO4 Assess the biosynthesis and metabolic pathways of macronutrients and the role of biomolecules in metabolism.
- CO5 Predict interrelationships between various structures and functions to become proficient for specialization in nutrition.

Mapping

Core–Nutritional Biochemistry											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

StronglyCorrelated (3);ModeratelyCorrelated (2);WeaklyCorrelated (1);No Correlation(0)

TECHNIQUES IN FOOD ANALYSIS

CREDITS:4

OBJECTIVES:

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

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

COURSE OUTCOME:

On successful completion of the course the student will be able to-

CO No.	CO STATEMENT
CO 1	Understand safety rules for the laboratory and demonstrate various instruments used for food analysis.
CO 2	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.
CO 4	Demonstrate quantitative analysis of various nutrients in foods i.e. crude fibre, moisture, Vit -C, calcium, phosphorus, iron, etc.
CO 5	Demonstrate experiments to check estimation of protein, fat content and Pigment Analysis

Unit – I (15 HRS)

1. Introduction to Laboratory Practices

2. 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 – 2

(8 HRS)

Preparation and Standardization of Solution

Unit – 3

(12 HRS)

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

Unit – 4

(25 HRS)

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- Dichloroindophenol Titrimetric Method
- Calcium -Precipitation Titrimetric Method
- Iron – Wong’s Method
- Phosphorus–Colorimetric Method

Unit – 5

(15 HRS)

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

TEXT BOOKS AND REFERENCES:

- S. Suzanne Nielsen (2017). Food Analysis Laboratory Manual. Springer International Publishing. Third Edition.

- S. Suzanne Nielsen (2017). Food Analysis. Springer International Publishing. Fifth Edition.
- Otlés, S. (2005). “Methods of Analysis of Food Components and Additives” CRC Press, USA.
- Ranganna, S. (2001). “Handbook of Analysis and Quality Control for Fruit and Vegetable Products”. Tata-McGraw- Hill, India. 2nd edition.
- Sadasivam, S and Manickam, A (1997). “Biochemical Methods”. New Age International Publishers, New Delhi. 2nd Edition.
- Jayaram, I, (1996), “Laboratory Manual in Biochemistry”, New Age International Publishers, New Delhi. Fifth ed.
- Raghuramulu, N, Nair K.M & Kalayanasundaram, S.A, (1983), “Manual of Laboratory Techniques”, National Institute of Nutrition, ICMR.

Mapping: (CO/PSO)

CO/PSO	PSO	PSO	PSO	PSO	PSO	PSO
	1	2	3	4	5	6
CO1	3	2	3	0	3	2
CO2	2	3	3	0	3	1
CO3	2	3	3	0	3	1
CO4	3	3	3	1	3	3
CO5	3	3	3	1	3	3
Average	2.6	2.8	3	2	3	2

PEDAGOGY

Demonstration, Experiments, Activities as assignment, Group Discussion, Observation and Interpretation

PERSPECTIVES OF HOME SCIENCE

OBJECTIVES:

To enable students to have a sound knowledge in various branches of Home Science for strengthening the extension and research base.

SPECIFIC OBJECTIVES OF LEARNING:

On successful completion of these units, students are expected :

- To describe the importance of each branch of Home Science
- To understand the essence of each subject
- To prepare them for UGC NET, SLET and ASRB

COURSE OUTCOME:

On successful completion of the course the student will be able to-

CO No.	COSTATEMENT
CO 1	Understand the concept of Extension Education and its importance
CO 2	Comprehend the key aspects of human growth and development and realize the importance of mastering developmental tasks of each life span stage
CO 3	Understand the basic concepts of Textile and Clothing
CO 4	List personal goals and values, set living standards
CO 5	Understand the meaning of Guidance and Counselling and Career perspectives in Home Science

UNIT – I Extension Education

- a. Meaning, Definition, objectives, characteristics, principles
- b. Extension teaching methods- types and methods
- c. Qualities of a good Extension Worker
- d. Communication, Innovation and Social change

UNIT – II Human Development

- a. Growth, Development, Maturation and Learning
- b. Principles and Developmental stages &Task
- c. Parental Disciplinary Techniques – merits and demerits
- d. Early Childhood Education – Objectives. Types of Nursery Schools.
- e. Exceptional children – Deaf, Blindness, Physical Impairment, Mental Retarded and Giftedness. Rehabilitation.

UNIT – III Textiles and Clothing

- a. Classification and General properties textile fibres.
- b. Processing and manufacture of Cotton, Silk, Wool and Rayon fibres.
- c. Yarn: Classification.
- d. Fabric construction - woven, non-woven and knitted fabric
- e. Clothing: selection for the family.

UNIT – IV Family Resource Management

- a. Home Management – Meaning, objectives and process
- b. Resources - Classification and characteristics
- c. Time, Money and Energy management
- d. Decision making - Steps and Methods of resolving conflicts
- e. Work simplification - Importance of work simplification. Mundel's classes of Change
- f. Principles and Elements of Interior design, Various colours and colour schemes.

UNIT – V-Guidance and Counselling

- a. Meaning, nature, types and scope of guidance and counselling
- b. Various steps and techniques of Guidance and counselling
- c. Need and importance of educational guidance.

TEXTBOOKS:

1. Jha, J.K. (2002). Encyclopedia of Teaching of Home Science, Vol.I,II and III . New Delhi: Anmol Publications.
2. Suriakanthi.A., (2002). Child Development - An Introduction Gandhigram: Kavitha Publications.
3. Srilakshmi.B. (2015). Food Science. New Delhi. New Age International Pvt.Ltd. Premlata Mullick (2016), 4TH edition, Kalyani Publishers.

REFERENCES:

1. Serene and Ahlawat Santos Shekhar (2013), Textbook of Home Science Extension Education.
2. Tami James Moore and Sylvia M.Asay (2008), Family Resource Management, Sage Publications.
3. Diane E. Papalia (2004), 9th edition, Human Development, McGraw Hill India.
4. Rani K. Sudha and Srivastava Sushila, Textbook of Human Development: A lifespan development approach, S. Chand & Co Ltd.

Mapping: (CO/PSO)

CO/PS	PS	PS	PS	PS	PS	PS
O	O	O	O	O	O	O
	1	2	3	4	5	6

CO1	3	1	3	3	1	3
CO2	3	2	3	3	2	3
CO3	3	2	3	3	1	3
CO4	3	2	3	3	1	3
CO5	3	1	3	3	1	3
Average	3	1.6	3	3	1.2	3

PEDAGOGY

Lecture, Power Point Presentation, Demonstration, Group Discussion, Assignment, Library Visits, Seminars and Oral & Written Revision

SCIENTIFIC WRITING AND PRESENTATION SKILLS

CREDITS:2

COURSE OBJECTIVES

- To gain knowledge in scientific writing and presentation skills.
- To understand the principles for oral presentations.
- To gain in-depth knowledge on research paper publication.

COURSE OUTLINE

UNIT I: Scientific Writing

- Abstract, full paper, clinical update, manuscripts.
- Process of copyediting journals.

UNIT II: Presentation Skills

- Thematic, poster, oral presentations.
- Principles to be followed for presentation.

UNIT III: COMPUTER APPLICATION FOR RESEARCH

- Use of Internet in Research – Websites, search engines, E-journal and E-Library (INFLIBNET, SHODHGANGA).
- Plagiarism – Citation and acknowledgement – reproducibility and accountability.
- Softwares available in the market for plagiarism.

UNIT IV: DATA ANALYSIS AND INTERPRETATION

- Data Analysis Techniques: Quantitative and qualitative data analysis techniques.
- Results Interpretation: Skills in interpreting research findings and communicating implications.

UNIT V: REPORT WRITING

- Writing Process: Stages including prewriting, drafting, revising, and editing to produce coherent and well-structured research.
- Citation and Referencing: Learning and applying appropriate citation styles, such as APA format.

RECOMMENDED TEXTBOOKS

1. Best JW and Kahn JV, *Research in Education*, 7th Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
2. Campbell WG, *Form and Style in Thesis Writing*, Houghton Mifflin Company, Boston.

REFERENCE BOOKS

1. Koul L, *Methodology of Educational Research*, 3rd edition, Vikas Publishing House Pvt. Ltd., New Delhi.
2. John W. Best and James V. Kahn, *Research in Education*, 7th Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
3. Elhance DN, Veena and Elhance, and Agarwal BM, *Fundamentals of Statistics*, 48th Edition, Kitab Mahal, Allahabad, 2005.
4. Sadhu AN, Amarjit Singh, *Research Methodology in Social Sciences*, Himalaya Publishing House, Gurugram, Mumbai, 1992.

JOURNALS

1. Journal of academic writing.

Course Outcome

CONo	CO STATEMENT
CO1	Develop a framework for scientific writing.

CO2	Describe, Compare and Interpret various means for poster, oral presentation and copy editing.
CO3	Evaluate the use of websites, search engine, E-journals and E-library for research
CO4	Propose the authenticity of the research article using plagiarism checking software.

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	1	3	1
CO2	3	3	3	3	1	2
CO3	3	3	3	3	1	1
CO4	3	3	3	3	1	1
AVERAGE	3	3	3	2.5	1.5	1.25

KEY: Strongly Correlated-3 Moderately Correlated-2 Weakly Correlated-1 No Correlation-0

FIELDWORK (INTERNSHIP TRAINING IN HOSPITAL - ONE MONTH)

- The Dietetic Internship aims to provide high-quality education and a diverse range of supervised practice experiences to prepare interns to become effective entry-level dietitian-nutritionists.
- Upon completion of the internship, interns are required to submit a summary report to the department.
- Additionally, each student will undergo an individual viva voce examination as part of the assessment process.
- This statement outlines the educational goals of the Dietetic Internship, the requirement for a summary report submission, and the viva voce examination as an assessment component for each

student.

COURSE OUTCOMES

CO1: Analyze the objectives and benefits of internship training in a hospital setting.

CO2: Gain practical experience and observe clinical practices during hospital internships.

CO3: Accelerate progress towards career goals through internship experiences.

CO4: Develop professional skills, enhance personal character, and expand career opportunities.

CO5: Understand how internships are a way to show commitment to professionalism, self-improvement, and excellence.

Mapping

Internship Training											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	1	2	3	3	2	3	3	2
3	3	3	3	3	2	3	3	2	3	3	2
4	3	3	3	3	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated(3); Moderately Correlated(2); Weakly Correlated(1); No Correlation(0)

FIELDWORK /STUDY TOUR REPORT

- Students are expected to attend their assigned fieldwork locations and complete assignments by the due dates specified in the schedule provided by the department.
- The fieldwork /study tour is a credit-bearing course that primarily involves academic activities conducted through group study and travel outside the campus.
- A summary report of the study tour experience must be submitted to the department upon completion.
- This description outlines the expectations and structure of the fieldwork /study tour, emphasizing the academic nature and reporting requirements associated with the course.

COURSE OUTCOMES

CO1: Students will observe and analyze theories used to identify solutions for specific projects or case reports.

CO2: Understand how field reports facilitate the development of data collection techniques.

CO3: Develop observation skills to understand how theoretical knowledge applies to real-world situations.

CO4: Apply methods to observe professional practices that challenge or refine existing theories.

CO5: Students will prioritize their observations, order their experiences, make decisions, and set their own focus areas during the study tour.

Mapping

Field Work											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	1	2	3	3	2	3	3	2
3	3	3	3	3	2	3	3	2	3	3	2
4	3	3	3	3	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated(3);Moderately Correlated(2);Weakly Correlated(1);No Correlation(0)

Semester IV

HUMAN FACTORS AND ERGONOMICS

LEARNING OBJECTIVES (LOs)

- To become aware of the role of ergonomics in work effectiveness and efficiency.
- To understand the environmental factors contributing to productivity, safety, control, and well-being of individuals performing the work.

UNIT-I

Introduction to Ergonomics - Definition, History and evolution. Scope of Ergonomics in home and other occupations, Nature of work in household and other occupations, Human Body and Work: Physiology of Neuro-muscular function in relation to occupational ergonomics; Physiological factors in muscle work; Physical work capacity; Energy requirement for muscular work; Energy expenditure for different activities; Endurance and muscular strength.

UNIT-II

Job Analysis - Significance of job analysis for occupational ergonomics, Fundamental elements of job analysis. Anthropometry in relation to occupational ergonomics. Postures - Definition and Scope.

UNIT-III

Application of Ergonomic Principles in: Tool Evaluation and Design; Work Station Evaluation and Design; Maintenance of Postures. Identifying types of postures assumed during work, analysis and interpretation, Effect of wrong postures on cardiovascular and muscular skeletal system, Correct techniques of lifting and carrying weights.

UNIT-IV

Physiological Aspects of Work, Structure and Function of the muscles, Biochemistry of muscle work. Physiological factors involved in muscular work. Carbohydrates, fats and protein, Oxygen, Cardio-Vascular and Respiratory system, Thermo-regulatory system, Endurance and muscular strength, Skill, Maximal work, Speed, Factors affecting physiological reactions doing work, Workload and posture.

UNIT-V

Cardio-Respiratory Fitness - Anthropometric measurements and Physical Fitness Index, Body composition - body fat %, Body surface area, lean body mass by skin fold method and Somatotyping. Maximum aerobic capacity using modified Harvard test (Queens college test), Determination of workload using heart rate and oxygen consumption - Treadmill, step stool, Heart rate and oxygen consumption, Pulse rate, Time and motion study. Energy cost. Assessment of Physical work capacity (PWC).

References

1. Astrand P.O. and Radahl K.: Textbook of Work Physiology, McGraw Hill, New Delhi
2. Davies D.R. and Shakleton V.J.: Physiology of work, Motunen & Co. Ltd.
3. Osborne David: Ergonomics at work, John Wiley and Sons, New York.
4. Dul Jan and Weedmester Bernard: Ergonomics for Beginners, Taylor and Francis, London.
5. Wilson J.R. and Corlett N.: Evaluation of Human Work. A Practical Ergonomics Methodology. Taylor and Francis, London.
6. Pheasant Stephan: Body space, Anthropometry, Ergonomics and the Designs at work, Taylor & Francis, London.

COURSE OUTCOMES:

On completion of the course, students will be able to

- CO1. Explain the psychology of human behavior as it relates to workplace safety.
- CO2. Identify ergonomic hazards; recommend appropriate controls.
- CO3. Relate the human and workplace factors that contribute to ergonomic hazards.
- CO4. Explain and apply human factors engineering concepts in both evaluation of existing systems and design of new systems.
- CO5. Acknowledge the impact of workplace design and environment on productivity.

Mapping

Core–Human Factors and Ergonomics											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1

5	3	3	3	3	1	3	3	2	3	3	2
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StronglyCorrelated (3);ModeratelyCorrelated (2);WeaklyCorrelated (1);No Correlation(0)

MSU

FOOD QUALITY CONTROL

LEARNING OBJECTIVES (LOs)

- Provide adequate theoretical background and understanding of sensory evaluation of food.
- Enable students to use various sensory methods for evaluating variety of foods.
- Enable students to analyze and interpret sensory evaluation data.

Unit I

General principles of quality control – quality attributes - size, shape, colour, consistency, viscosity, texture, taste and flavour. Methods of evaluation of food quality – sensory, objective technique, microbiological methods of quality evaluation. General testing conditions – quantitative difference tests – designing of questionnaire (or) evaluation of scorecard.

Unit II

Food contaminants: Naturally occurring toxicants, anti-nutritional factors in foods. Environmental contaminants: Biological contaminants, Pesticide residues, veterinary drug residues and heavy metals.

Unit III

Direct Additive: Preservatives, Nitrate, Nitrite, and N-nitroso compounds. Indirect Additives, Anti-microbial and veterinary drugs, pesticides, poly halogenated aromatic hydrocarbons, polycyclic aromatic hydrocarbons. Other organic residues, packing materials, heavy metals, Radio nuclides in foods.

Unit IV

Common adulterants – tests to detect adulterants, Government and trade standards for quality – food laws and regulations – PFA, FPO and APEDA- BIS standards – Agmark standard – International Standards for export. HACCP – Food safety system.

Unit V

Laws and regulations for setting up a processing unit. FSSAI rules and regulations, FSSAI License, Registration, FSSAI in Food safety and Standards.

REFERENCES

1. Giridarilal Sidappa, G.S., and Tandon, G.L. (1979) Preservation of fruits and vegetables, ICAR, New Delhi.
2. FPO (1955), Quality Control.
3. Horace, D. Graham, 1980, The safety of foods, 2nd Edn, AVI publishing Co. Inc, Westport.
4. Julie Miller Jones, 1992, Food Safety, Eagan Press.
5. Lewis M.J. 1987, Physical properties of food and processing system, Ellis Harwood Ltd., England.
6. Picgott, J.R., 1984, Sensory Analysis of Foods, Elsevier Applied Science Publisher, New York.

COURSE OUTCOMES:**On completion of the course, students will be able to**

CO1. Explain safety and quality management systems that ensure integrity through the food chain.

CO2. Discuss the practical applications of Laboratory Information Management Systems in the food industry.

CO3. Understand the quality management standards, philosophies, and frameworks.

CO4. Understand risk management strategies employed in the food industry.

CO5. Understand the key regulatory issues that ensure food safety and quality.

Mapping

Core- FoodQualityControl											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1
5	3	3	3	3	1	3	3	2	3	3	2

Strongly Correlated (3);Moderately Correlated (2);Weakly Correlated (1);No Correlation(0)

PROJECT & VIVA-VOCE:

Students are encouraged to work on individual projects to gain acquaintance with real-life problem-solving and hands-on experience. The outcomes of the projects will be submitted as reports, and viva-voce sessions shall be conducted individually for each student.

COURSE OUTCOMES:

CO1: The project provides students with the opportunity to experience real research.

CO2: Students will enhance their problem-solving skills.

CO3: Students will gain a better understanding of research methods.

CO4: Students will develop a deeper understanding of the discipline through research.

CO5: Students will gain insights into career and educational pathways.

Mapping

Project Viva Voce											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	2	3	3	3	2	3	3	3	3	3	3
2	3	3	3	2	2	3	3	2	3	3	2
3	3	2	3	3	2	3	3	2	3	3	2
4	3	3	3	1	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated(3); Moderately Correlated(2); Weakly Correlated(1); No Correlation(0)

HOSPITAL ADMINISTRATION

LEARNING OBJECTIVES (LOs)

This course will prepare the students to:

- To provide improve of an organization

UNIT – I: Introduction: Management – Definition, Principles, Functions and Role, Management as science, art and profession, contribution of Taylor, Henry Fayol and Elton mayo in the area of management

UNIT – II: Planning and Decision Making: Planning: Definition importance of planning, steps in planning, types of planning, Limitation of planning, Types of plans – Objectives, Hierarchy of objectives, MBO – Process, Benefits. Problems & Limitations, Policies & Procedures – Characteristics of sound policy & procedures Decision Making process, Making effective decision.

UNIT – III: Organizing: Organization structure – Role, Features of good organization structure, Departmentation, bases of departmentation, Span of management, centralization & Decentralization – Factors determining degree of

decentralization

UNIT – IV: Directing: Motivation – definition, Importance, Motivation Theories –Maslow, Herzberg, McGregor’s motivation theories. Job enrichment, Job enlargement, Job rotation, Job satisfaction. Leadership – Definition, Qualities of a leader, Leadership styles-power orientation, Managerial Grid, Tridimensional Grid Communication – Communication process, oral, written & Nonverbal communication, Formal & Informal communication, barriers in communication, making communication effective.

UNIT – V: Controlling: Definition, Importance of control, steps in controlling, essentials of effective control system, Management by exception, Benefits of management by exception.

REFERENCES:

1. L.M.Prasad, Principles & Techniques of Management, Sultan Chand & Sons.
2. Dinkar & Tagore, Business Management
3. Koontz Z & ‘O’ Donnel, Essentials of Management
4. Tripathi & Reddy, Principles of Management.

COURSE OUTCOMES:

- Recognize the principles of authority, leadership, behaviour of individual and team
- Translate management and organizational behaviour theories into practice that will result in organizational effectiveness, efficiency, and human resource development.
- Understand themselves and other people at work and will be able to learn how to create effective work groups at workplaces and become effective employees in all domains of managerial work they do in the future.

Mapping

Core–Hospital Management											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	3	2	3	3	2	3	3	2
3	3	3	3	3	1	3	3	2	3	3	2
4	3	3	3	3	2	3	3	1	3	3	1

5	3	3	3	3	1	3	3	2	3	3	2
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StronglyCorrelated (3);ModeratelyCorrelated (2);WeaklyCorrelated (1);No Correlation(0)

FOOD QUALITY CONTROL - PRACTICAL

1. Qualitative tests for the detection of adulterants
2. Test for assessment of purity of water
3. Test for assessment of quality of milk and milk products
4. Test for assessment of quality of cereals/millets
5. Test for assessment of quality of pulses
6. Test for assessment of quality of fats and oils
7. Test for assessment of quality of meat/fish products
8. Test for assessment of quality of canned/bottled fruits and vegetables

COURSE OUTCOMES:

CO1: Explain safety and quality management systems that ensure integrity throughout the food chain.

CO2: Discuss the practical applications of Laboratory Information Management Systems in the food industry.CO3: Understand the quality management standards, philosophies, and frameworks.

CO4: Demonstrate proficiency in conducting tests for assessment of food

quality.CO5: Understand the key regulatory issues that ensure food safety and quality.

Mapping

Food Quality Control Practical:											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	3	3	3	3	2	3	3	3	3	3	3
2	3	3	3	1	2	3	3	2	3	3	2
3	3	3	3	3	2	3	3	2	3	3	2
4	3	3	3	3	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated(3); Moderately Correlated(2); Weakly Correlated(1); No Correlation(0)