ETHIRAJ COLLEGE FOR WOMEN
(AUTONOMOUS)

CHENNAI

DEPARTMENT OF CLINICAL NUTRITION

AND DIETETICS

(SELF SUPPORTING)

PG

SYLLABUS FOR

MSC FOOD AND NUTRITION

2018-2021

COURSE PROFILE (2019-2020 MSC FOOD AND NUTRITION)

SEMESTER I

COURSE CODE	Title of the paper	Credits	Hours / Week	Total hours	L-T-P	CA	SA	Total
13SP18/1C/NUB	**Paper 1-**(Core 1) Nutritional Biochemistry	4	6	90	4-2-0	40	60	100
13SP18/1C/MT1	**Paper 2-**(Core 2) Medical Nutrition Therapy I	4	6	90	4-2-0	40	60	100
13SP18/1E/NTC	**Paper 3-** (Elective1) Nutraceuticals	3	5	75	3-2-0	40	60	100
13SP18/1E/PHY	**Paper 4-** (Elective2) Applied Physiology	3	5	75	3-2-0	40	60	100
13SP18/1C/PR1 *	**Practical 1-** (Core 3) Analytical Techniques in Nutrition	-	6	90	0-0-6	-	-	-
	Soft Skill 1 Personality Enrichment for Women	2	2	30		-	50	50
TOTAL		**C+E+S 8+6+2**	**28+2**					

***Practical examination (13SP18/1C/PR1) - Practical will be conducted in the second semester.**

SEMESTER II

COURSE CODE	Title of the paper	Credits	Hours/ Week	Total hours	L-T-P	CA	SA	Total
13SP18/2C/AFS	**Paper 1-**(Core 4) Advanced Food Science	4	5	75	3-2-0	40	60	100
13SP18/2C/SRM	**Paper 2-**(Core 5) Applied Statistics and Research Methodology	4	5	75	3-2-0	40	60	100
13SP18/2C/MT2	**Paper 3-**(Core 6) Medical Nutrition Therapy II	4	4	60	3-1-0	40	60	100
13SP18/2E/NSN	**Paper 4-** (Elective3) Nutrition in Special Needs	3	4	60	3-1-0	40	60	100
13SP18/2E/FPN	**Paper 5-** (Elective4) (Interdisciplinary) Food Preservation	3	4	60	4-0-0	40	60	100
13SP18/1C/PR1*	**Practical 1-**(Core 3) Analytical Techniques in Nutrition	4	-			40	60	100
13SP18/2C/PR2	**Practical 2-**(Core 7) Advanced Food Science Practical	4	6	90	0-0-6	40	60	100
	Soft Skill 2 The Communication skills in English/ French for Beginners/ German for Beginners	2	2	30		-	50	50
		C+E+S 20+6+2	**28+2**					

***Practical examination (13SP18/1C/PR1) - Practical will be conducted in the second semester.**

SEMESTER III

COURSE CODE	Title of the paper	Credits	Hours/ Week	Total hours	L-T-P	CA	SA	Total
13SP18/3C/CAL	**Paper 1-**(Core 8) Advanced Studies in Carbohydrates and Lipids	4	5	75	4-1-0	40	60	100
13SP18/3C/MIV	**Paper 2-**(Core 9) Advanced Studies in Minerals and Vitamins	4	5	75	4-1-0	40	60	100
13SP18/3C/CLB	**Paper 3-**(Core 10) Clinical Biochemistry	4	4	60	3-1-0	40	60	100
13SP18/3E/FDI	**Paper 4-**(Elective 5) Food and Drug Interaction	3	4	60	3-1-0	40	60	100
13SP18/3E/NPF	**Paper 5-**(Elective 6) (Interdisciplinary) Nutrition and Physical Fitness	3	4	60	4-0-0	40	60	100
13SP18/3C/PR3*	**Practical 3-**(Core 11) Innovative Food Product Development	-	6	75	0-0-6	-	-	-
13SP18/3S/CSS	**Soft skill 3** Computing skills	2	2	30	2-0-0	-	50	50
		C+E+S 12+6+2	**28+2**					
	Self study- Advanced paper for Registered Dietitian credential and competitive examinations	2	-	-	-	-	100	100
***Practical examination (13SP18/3C/PR3) - Practical will be conducted in the fourth semester.**								

SEMESTER IV

COURSE CODE	Title of the paper	Credits	Hours/ Week	Total hours	L-T-P	CA	SA	Total
13SP18/4C/EPR	**Paper 1-**(Core 12) Advanced Studies in Energy and Protein	4	6	90	4-2-0	40	60	100
13SP18/4C/PHN	**Paper 2-**(Core 13) Public Health Nutrition	4	6	90	4-2-0	40	60	100
13SP18/4C/PRO	**Paper 3-**(Core 14) Project	4	6	90	0-6-0	40	60	100
13SP18/4E/ FMI	**Paper 4-**(Elective 7) Food Microbiology	3	4	60	3-1-0	40	60	100
13SP18/3C/PR3*	**Practical 3-**(Core 11) Innovative Food Product Development	4	-			40	60	100
13SP18/4C/PR4	**Practical 4-**(Core 15) Public Health Nutrition Practical	4	6	90	0-0-6	40	60	100
13SP18/4S/SWS	**Soft skill 4** Scientific Writing and Presentation Skills	2	2	30	2-0-0	-	50	50
	Internship (1 month)	2	-			50	-	50
TOTAL		**C+E+S+I 20+3+2+2**	**28+2**					
***Practical examination (13SP18/3C/PR3) - Practical will be conducted in the fourth semester.**								

The above Course offered to the PG programme enriches the skills of employability, entrepreneurship & skill development which caters the needs of the students.

SEMESTER I

MEDICAL NUTRITION THERAPY - I

TOTAL HOURS: 90 hours **COURSE CODE: 13SP18/1C/MT1**

CREDITS: 4 **L-T-P: 4-2-0**

COURSE OBJECTIVES

- To impart knowledge on pathophysiology of diseases.
- To introduce the current protocol and guidelines of nutrition care process
- To study the various feeding methods for patients.
- To enable them to learn the evidence based dietary and behavioral therapy for eating disorders, infections, gastrointestinal and liver disorders and pancreas and gall bladder diseases.

COURSE OUTLINE

UNIT I: Food service in hospitals: Layout and design of dietary kitchen and service. Centralized & decentralized service and Tray service
Routine diets in hospitals
Use of RDA and Guidelines for planning balanced diets
Nutritional support for critically ill patients: Enteral and Parenteral feeds- types, indication and contraindications and calculation of requirements for different therapeutic conditions, Commercial and home formulas (15 HOURS)

UNIT II: Pediatric Nutrition- Assessment of infant development through anthropometry. Problems of infants–VLBW, LBW, SGA babies, premature babies, stunting, and wasting;
Weaning, Commercial baby foods- Types and available infant formulas in market(Assignment)
Nutrition in eating disorders – etiology, types, diagnostic criteria, nutritional assessment, psychological management, nutritional care and nutrition education (15 HOURS)

UNIT III: Nutrition and infection:
Fever – Etiology, patho-physiology Classification, nutritional implication metabolism, dietary considerations in influenza, typhoid, tuberculosis, Malaria, Dengue, Leptospirosis and swine flu.
Diet in HIV & AIDS – Etiology, classification, manifestation and stages of HIV infection, opportunistic infections, medical management, medical nutrition therapy, complications and nutritional implications
Diet in Food intolerance and Allergy –definition, immunological aspects, classification, manifestation, common food allergies, diagnosis and dietetic treatment
Diet in Respiratory diseases: Etiology, Patho-physiology, nutritional implication and dietary considerations in Pneumonia, COPD and Chronic Bronchitis. (25 HOURS)

UNIT IV: Nutrition in Gastro intestinal disorders

Diet in diseases of the esophagus, stomach and duodenum: Etiology, diagnostic tests, symptoms, clinical findings, treatment and dietary modification in esophagitis, GERD, hiatus hernia, gastritis and peptic ulcer.

Diet in diseases of the small intestine and colon: Etiology, types, symptoms, clinical findings, dietary considerations and nutritional consequences of drug therapy in adults and children in diarrhea, constipation, Crohn's disease, diverticulosis, ulcerative colitis and malabsorption syndrome-lactose intolerance, gluten enteropathy, tropical sprue.

Diet in diseases of the Liver, Gall Bladder and Pancreas: Etiology, pathophysiology, types, symptoms, clinical findings, nutritional implications and dietary considerations in Hepatitis, Alcoholic liver disease, Cirrhosis, Hepatic encephalopathy, Cholecystitis – acute and chronic, Cholelithiasis and Pancreatitis- acute and chronic. (25 HOURS)

UNIT V Nutrition Care Process (NCP):

NCP: Assessment, Planning, intervention and evaluation; Role of dietitian in health care; Diet Counseling- Importance and steps in diet counseling; Need for Nutrition Education. (10 HOURS)

RECOMMENDED TEXTBOOKS

3. Mahan LK, Stump SE and Raymond JL, *Krause's Food and Nutrition Care Process*, 13th Edition, Elsevier Saunders, Missouri, 2012
4. Kane K and Prelack K, Advanced Medical Nutrition Therapy , First Edition, jones and Barlett learning, Burlington, 2019

REFERENCE BOOKS

3. Verma P, *Food ,Nutrition & Dietetics*, 1st edition, CBS publishers & distributors PVT Ltd, New Delhi, 2015
4. Edelstein S, *Lifecycle Nutrition- An evidence based approach*, 2nd edition, Jones & Bartlett learning publications, 2015,
5. Elia M, Ljunggvist O, Stratton RJ, Lanham SA, *Clinical Nutrition (The Nutrition Society Textbook)*, 2nd edition, Wiley Blackwell Publishers, 2013
6. Stump SE, *Nutrition and diagnosis related care*, 7th edition, Lippincott Williams and Wilkins, Canada, 2012
7. Srilakshmi B, *Dietetics*, sixth edition, New age Publishing Press, New Delhi, 2011.
8. **Skipper A, Advanced Medical Nutrition Therapy Practice,** Jones and Barlett Learning, MA, 2008
9. Marian M et al., *Clinical Nutrition for surgical patients*, Jones and Bartlett Publishers, Canada, 2008
10. Joshi Y.K, *Basics of Clinical Nutrition*, 2nd edition, JP Medical Publishers Pvt Ltd, New Delhi, 2008
11. Stacy N, *William's Basic Nutrition and Diet Therapy*, 12th edition, Elseivier publications, UK, 2005

3. Gibney MJ, Elia M, Ljunggvist O, ***Clinical Nutrition (The Nutrition Society Textbook)*** Wiley Blackwell Publishers, 2005
4. Whitney EN and Rolfes SR, *Understanding Nutrition,* 9th edition, West/Wordsworth, 2002
5. Williams SR, *Nutrition & Diet Therapy*, CV. Mosby St. Louis, 2001
6. Garrow JS, James WPT, Ralph A, *Human Nutrition and Dietetics* 10th edition, Churchill Livingstone, NY, 2000
7. Shils ME, Obson JA, Shike M, *Modern Nutrition in Health and Disease*, Eighth edition, Volume I and II , Lea and Febiger Philadelphia, A Waverly Company, 2000
8. Cataldo, DeBruyne and Whitney, *Nutrition and Diet therapy– Principles and Practice* 5th edition, West/ Wadsworth, London. 1999
9. Antia, F.P. and Abraham P, *Clinical Dietetics and Nutrition*,.4th edition, Oxford University Press, Delhi,
10. Carroll AL &Rutherford K,*Nutrition and Diet Therapy* 2nd edition, F.A. Davis Company, Philadelphia
11. Ruth A., Townsend CE, *Nutrition and Diet Therapy* 8th edition,Thomson Delmar Learning

JOURNALS

8. International journal of Clinical Nutrition and Dietetics
9. International journal of Food, Nutrition and Dietetics
10. Food and nutrition bulletin

E- LEARNING RESOURCES:

5. https://www.youtube.com/watch?v=8vC7Jro4HRQ
6. https://www.youtube.com/watch?v=IxfNM6v3Ef4
7. https://www.youtube.com/watch?v=yD6UF3ogn_U
8. https://www.youtube.com/watch?v=jmF12JYPgoQ
9. https://www.youtube.com/watch?v=Haz8k8Rh6UQ
10. https://www.youtube.com/watch?v=Rcb6I7gsl-Y
11. https://www.youtube.com/watch?v=P9hBjrjMcSw
12. https://www.youtube.com/watch?v=y-shOXdsJeA
13. https://www.youtube.com/watch?v=iefghc2g91M
14. https://www.youtube.com/watch?v=chSyQPKsNk4
15. https://www.youtube.com/watch?v=Ueqs7pl5OAY
16. https://www.youtube.com/watch?v=XJQn8MXnTWg
17. https://www.youtube.com/watch?v=f-Fxlsb2dtQ&t=169s
18. https://www.youtube.com/watch?v=Hwi9dsFBuhg
19. https://www.youtube.com/watch?v=PGB6dN1KlwQ
20. https://www.youtube.com/watch?v=bFdTgty0T0I
21. https://www.youtube.com/watch?v=LcNQdo15lF8
22. https://www.youtube.com/watch?v=st7G2vyLSiY
23. https://www.youtube.com/watch?v=gE5gSU_8oHs

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO 1	Identify the role of dietitian and describe the processes involved in delivering quality food and nutrition services for clinical conditions.	K1&K2
CO 2	Demonstrate understanding of physiology, biochemistry, nutrient metabolism, nutrient – nutrient interaction and drug therapy.	K2
CO 3	Interpret, evaluate and use of current protocols and guidelines to make practical decisions in the treatment of critically ill patients.	K2&K5
CO 4	Apply the knowledge of nutrition assessment and evidence-based nutrition intervention for diseases and conditions.	K3
CO 5	Analyze the pathophysiology of nutrition-related clinical conditions and evaluate the role of diet therapy	K4&K5
CO6	Discuss and develop disease specific prevention and treatment strategies of various communicable diseases, gastrointestinal, liver, pancreas and gallbladder diseases based on the current nutrition research.	K6

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	1	3	2
CO2	3	3	2	2	3	2
CO3	3	3	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	2	2	3	2
CO6	3	3	3	3	3	3
AVERAGE	2.83	3.00	2.33	2.33	3.00	2.50

TEACHING METHODOLOGY

3. Lecture (Chalk and Talk-OHP-LCD)
4. Flipped Learning/Blended Classroom-E Content, Videos
5. Problem Solving-Group Discussion-Role Modeling
6. Quiz-Seminar
7. Peer Learning

SEMESTER I

NUTRACEUTICALS

TOTAL HOURS: 75 hours **COURSE CODE: 13SP18/1E/NTC**

CREDITS: 3 **L-T-P: 3-2-0**

COURSE OBJECTIVES

15. Understand the history, concepts of nutraceuticals.
16. Classify the nutraceuticals based on origin, chemical composition and mechanism of action.
3. Learn the health benefits of nutraceuticals from various sources.
4. Learn the various aspects of food as preventive drug or supplement.
5. Discuss the concepts of technologies in functional food industry.

COURSE OUTLINE

UNIT I: Nutraceuticals - History, Evolution, and Definition, Concept, Classification and General Mechanism of Action. (15 HOURS)

UNIT II: Functional foods – Definition, Development of functional foods, bioactive compounds as biomarkers to indicate efficacy of functional ingredients (15 HOURS)

UNIT III: Nutraceuticals withpotential health benefits fromplant phytochemicals, animal products, Novel sources & dietary fiber.
Role of Prebiotics &Probiotics as Nutraceuticals and commercial availability (15 HOURS)

UNIT IV: Significance of Nutraceuticals and Functional foods in diseases-anticancer agent, anti-inflammatory, antioxidant, anti-diabetic, hypo-cholesterolemic, and osteogenetic (15 HOURS)

UNIT V: Nutrigenomics –Relationship between Nutritional supplementation, gene expression and disease prevention.
Application of technologies in Functional food Industry.(15 HOURS)

RECOMMENDED TEXTBOOKS

- Wildman, R.E.C, *Handbook of Nutraceuticals and Functional Foods*, Second Edition, CRC Press.
- Mahan LK, Stump SE and Raymond JL, *Krause's Food and Nutrition Care Process*, 13th Edition, Elsevier Saunders, Missouri, 2012

REFERENCE BOOKS

1.Kramer K, Hoppe PP, Packer L, *Nutraceuticals in Health and Disease Prevention*, 1st edition, CRC Press, 2001

2.Groff JL, Gropper SS, *Advanced Nutrition and Human Metabolism* 3rd edition, West Wadsworth, UK. 2000

3.Gibson GR & William CM, *Functional foods : Designer Foods*, Pharma Foods, 2004

4.Flohe, J &Joost HG, *Nutritional Genomics : Impact on Health and Disease*, Wiley VCH

5.Cupp& Tracy TS, *Dietary Supplements: Toxicology and Clinical Pharmacology*, Humana Press

JOURNALS

8. Journal of nutraceuticals and food science
9. Annual review of Nutrition

E-LEARNING RESOURCES

5. https://www.nutraceuticalsworld.com
6. https://divisnutraceuticals.com
7. https://fssai.gov.in/cms/health-supplements.php
8. https://www.nutraceuticalseurope.com
9. http://www.chemistryindustry.biz/nutraceuticals.html
10. https://www.nutraingredients-asia.com

COURSE OUTCOME

CO No.	CO Statement	Knowledge Level
CO1	Identify the history, concept of nutraceuticals	K1
CO2	Explain the classification, mechanism of action of nutraceuticals	K2
CO3	Classify the health benefits of nutraceuticals from various sources	K3
CO4	Determine the significance of nutraceuticals in various disease condition	K4
CO5	Assess the relationship between nutrient supplementation, gene expression and disease prevention	K5
CO6	Compile the concepts of technologies in functional food industry	K6

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	2	2
CO2	3	3	2	2	2	2
CO3	3	3	2	2	3	2
CO4	3	3	3	2	3	2
CO5	3	3	3	2	2	2
CO6	3	2	2	3	2	3
AVERAGE	3	2.6	2.5	2.2	2.3	2.2

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

8. Lecture (Chalk and Talk-OHP-LCD)
9. Flipped Learning/Blended Classroom-E Content, Videos
10. Problem Solving-Group Discussion-Role Modelling
11. Quiz-Seminar
12. Peer Learning

SEMESTER I

ANALYTICAL TECHNIQUES IN NUTRITION
Practical – 1
CORE -3

TOTAL HOURS: 90 hours **COURSE CODE: 13SP18/1C/PR1**

CREDITS: 4 **L-T-P: 0-0-6**

COURSE OBJECTIVES

To enable the students to

4. To learn skills in weighing and processing of samples
5. To learn skills in reagent preparation, technique and instrumentation
6. To analyse the nutritive value of food samples
7. To determine the biochemical parameters in blood/ serum & urine sample
8. Quantitative estimation by applying standardized procedures and systematic formula

COURSE OUTLINE

PRACTICAL:

1. Estimation of proteins using macrokjeldhal method (10 HOURS)
2. Estimation of fat content in egg yolk using soxhlet extraction method
   Estimation of saponification value,
   Estimation of Iodine value in oil/fat
   Estimation of Acid value in oil/fat (14 HOURS)
3. Mineral Estimation in foods:
   Estimation of calcium (titrimetric)
   Estimation of Iron (spectrophotometry)
   Estimation of Phosphorous (colorimetry) (10 HOURS)
4. Vitamin estimation in foods:
   Estimation of Vitamin C (dye method),
   Estimation of Beta carotene (Column Chromatography) (10 HOURS)
5. Estimation of urinary calcium,
   Estimation of urinary creatinine (12 HOURS)
6. Estimation of hemoglobin in blood,
   Estimation of blood glucose using colorimetry and glucometer (8 HOURS)
7. Estimation of protein in serum using Biuret reagent (10 HOURS)
8. Estimation of serum sodium ,
   Estimation of serum potassium (10 HOURS)
9. Demonstration on food analysis using HPLC (6 HOURS)

RECOMMENDED TEXTBOOKS

4. Nielson S, *Food Analysis Laboratory Manual*, 3rd edition, Springer International Publishing, 2017
5. Cheung PCK and Mehta BM (Eds), Handbook of Food chemistry, 1st edition, Springer-Verlag Berlin Heidelberg, 2015
6. James CS, *Analytical chemistry of Foods*, 1st edition Springer US, 1995

JOURNALS

3. Food analytical methods
4. Journal of food composition and analysis

E-LEARNING RESOURCES:

7. https://www.youtube.com/results?search_query=analytical+techniques+swayam
8. https://www.youtube.com/watch?v=-GR8Z3UerE0
9. https://www.youtube.com/watch?v=tXVDY1HvrVU
10. https://www.youtube.com/watch?v=FX-NiPVsYPM

COURSE OUTCOME

S.No.	CO Statement	Knowledge level
CO1	Repeat the experimentation for standardisation of procedures	K1
CO2	Estimate the nutritive value of food samples	K2
CO3	Apply standardised procedures and report the results in respective units	K3
CO4	Analyze and compare various biochemical parameters in blood, serum, urine and unknown sample with standard values	K4
CO5	Compare the nutrient composition food samples with Indian food composition table	K5
CO6	Compilation of experimentation with documentation of results	K6

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	2	2	2	2	2
CO3	2	2	2	2	2	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
CO6	3	2	2	1	1	1
AVERAGE	2.7	2.5	2.5	2.3	2.3	2.3

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

Lecture (Chalk and Talk-OHP-LCD)
Flipped Learning/Blended Classroom-E Content, Videos
Problem Solving-Group Discussion-Role Modelling
Quiz-Seminar
Peer Learning

SEMESTER II

ADVANCED FOOD SCIENCE

CORE - 4

TOTAL HOURS: 75 hours **COURSE CODE: 13SP18/2C/AFS**

CREDITS: 4 **L-T-P: 3-2-0**

COURSE OBJECTIVES

To enable students to

3. understand the composition, nutritive value and the effect of cooking on various food components
4. Gain knowledge on food labelling , food quality and standards
5. Develop skills on subjective and objective evaluation
6. Learn the emerging trends in food science.
7. Acquire knowledge on post harvest technology and food processing techniques

COURSE OUTLINE

UNIT I:Cereals and Pulses:

Cereals: Structure, composition and processing of rice, wheat, maize, sorghum and barley. Composition and nutritive value of Ragi, Bajra, foxtail millet and kodo millet; Cereal Cookery: Gelatinization, factors affecting gelatinization, gel formation, Retrogradation, Synersis and Dextrinisation; Gluten formation. Cereal products: Products of rice, wheat, maize and other cereal products and baked products; Modified starch

Pulses:Composition, nutritive value, processing, toxic constituents, effect of cooking on pulses. (15 HOURS)

UNIT II: **Vegetables and Fruits**: Composition, nutritive value, effect of cooking on pigments and polyphenols and vegetables and fruit preserves.

Fats and Sugars:

Fat: Types, composition, processing and changes during cooking and storage; Rancidity of fats; Modified Fats; Functions of fats and oils in food, Emulsion – Types.

Sugar and Jaggery: Types, nutritive value, manufacture, sugar cookery- crystallization and stages.

Browning of foods: Enzymatic and Non-enzymatic browning of foods (15 HOURS)

UNIT III: **Milk and Meat:**

Milk: Composition, nutritive value, processing, physical and functional properties of milk. Milk Cookery, Milk products-types and processing.

Egg: Structure, composition, nutritive value of egg; Egg quality; Egg Foams and Egg cookery.

Meat: Composition and nutritive value of meat, classes, cuts and grades of meat, post mortem changes in meat, tenderizing meat and meat cookery. Gelatin
Poultry: Classification, composition, nutritive value and processing
Fish: Classification, composition, nutritive value, selection, preservation and processing and fish cookery. (25 HOURS)

UNIT IV: **Food Quality and Food Labeling:**
Evaluation of Food Quality: Sensory evaluation and Objective evaluation
Adulteration- definition, types and methods of detection;
Food Labeling: Definition, requirements and use of food labeling.
Food standards – National and international standards – FSSAI, HACCP, ISO series (10 HOURS)

UNIT V: **Emerging trends in Food Science:**
Recent trends in post-harvest technology in foods- cereals, pulses, vegetables and fruits; Food Composition Databases, Organic foods, processed and convenience foods; GM foods; Food fortification and Food Enrichment;
Enzymes in food Industry: Classification, properties, Enzyme applications and new developments. (10 HOURS)

RECOMMENDED TEXTBOOKS

6. Manay S and Swamy S, *Food Facts and Principles*, New Age International (P) Ltd Publishers, New Delhi, 2001
7. Potter NM and Hotchkiss JH, *Food Science*, C.B.S. Publishers, New Delhi,1995

REFERENCE BOOKS

8. Reddy SM, *Basic Food science and Technology*, New Age Publishers, New Delhi, 2015
9. Lowe B, *Experimental cookery from chemical and physical stand point*, Forgotten books, UK, 2015
10. Srilakshmi B, *Food Science*, Sixth Edition, New Age International Ltd Publishers, New Delhi, 2015
11. Roday S, *Food science and Nutrition*, Oxford university press, New Delhi, 2007
12. KhetarPaul N; Grewal, R and Jood, S, *Bakery Science and Cereal Technology*, Dia publishing house, Delhi. 2005
13. McCance and Widdowson, *Composition of food*, 6th Edition, Food Standards Agency, 2004
14. Swaminathan .N, *Food Science and Experimental Foods*, Ganesh Publications, Madras, 2004
15. Vaclavik, V, *Dimensions of Food*, 5th Edition CRC press USA, 2002
16. Aylward, F, *Food technology Processing and laboratory control*,Agrobios Publishing, Jodhpur, 2001
17. Subramani A, *Concise Food Science*, Soundarya Publications, 1998
18. Meyers, L.M., *Food Chemistry*; Van Nonstrand Reinhold Co., New York,

JOURNALS

7. Journal of food science
8. Journal of food science and technology
9. Journal of nutrition and food science
10. International journal of food science and nutrition

E-LEARNING RESOURCES

3. https://en.wikipedia.org/wiki/Food_quality
4. https://www.science direct,com
5. https://www.eufic.org/food production/ processed-food

COURSE OUTCOME

CO No.	CO Statement	Knowledge Level
CO1	Outline and explain the structure, composition and the nutritive value of food groups	K1 &K2
CO2	Discuss the processing techniques and the effect of cooking on various food components	K2
CO3	Apply the principles of subjective and in objective methods and evaluate the quality of foods.	K3 &K5
CO4	Analyse the emerging trends in food science and gain detail insight on food quality and standards	K4&K1
CO5	Develop skills to undertake research in the field of food science and career in food industry	K6

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	1
CO2	3	3	3	1	3	3
CO3	3	3	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	3	3	3	3
AVERAGE	3.0	3.0	2.6	2.6	3	2.6

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

Lecture method, Power point presentation, Over Head Projector, Group discussion, Assignment, Seminar, Survey, Quiz.

SEMESTER II

APPLIED STATISTICS AND RESEARCH METHODOLOGY

CORE - 5

TOTAL HOURS: 75 hours **COURSE CODE: 13SP18/2C/SRM**

CREDITS: 4 **L-T-P: 3-2-0**

COURSE OBJECTIVES

- To define the principles of research and recall the methodologies in conducting a research
- To demonstrate their understanding of facts and principles to formulate research designs
- To identify the basic theories and techniques of research methodology
- To analyze and examine numerical data applying statistical procedures appropriate to the area of research
- To evaluate and discuss the results obtained and draw inferences to provide solutions to problems related to the field of nutrition
- To compile the data and discover new facts and theories from the research undertaken

COURSE OUTLINE

UNIT I: Meaning of research, Purposes of research, Types of research;
Selecting a research problem and preparing a research proposal-The academic research problem, using the library, sending related literature, Note taking;
Preparation of a research proposal for getting funds for the research;
Ethical Issues- Ethical importance of consent in research, Regulations and Guidelines for research on human subjects; Intellectual Property Rights
Experimental and quasi experimental research- Principles of experimental research experimental and control groups, variables, controlling extraneous variables, experimental validity, experimental designs,pre, post,true and quasi experimental design, Factorial design,Theory and hypothesis, experimentalcontrol (10 HOURS)

UNIT II: Sampling and Sample Designs-Census and sample methods-Theoretical basis of sampling, law of statistical regularity, law of inertia of large numbers, essentials of sampling.
Sampling from infinite population-concept of sampling distribution and standard error, relationship between sample size and standard error; Standard errors of sample mean. Sample variance, sample standard deviation and sample mean, sample standard deviation and sample proportion and the differences in these values
Methods of sampling Non-probability sampling methods, advantages, Limitation of probability sampling; Probability sampling methods –Types, Selection of appropriate method of sampling, size of sample, merits and limitations of sampling, sampling and non-sampling errors. (10 HOURS)

UNIT III: Collection of Data-Primary and secondary data, sources, published and unpublished sources, Editing primary and secondary data, and precautions in the use of secondary data.

Organization of data collection –Limitations and sources of error, Tools of research- Quantitative and Qualitative studies.Observation, Questionnaire, Opinionnaire- various methods and techniques; Reliability and validity of research tools

Classification and tabulation of Data-Meaning and objectives of classification, objects of classification, Types of classification, formation of frequency distribution, typessymmetric and asymmetric distribution considerations in the construction of frequency distribution

Tabulation of data-Difference between classification and tabulation of data, Role of tabulation Parts of the table, general rules of tabulation Review of a table types of tables, machine tabulation. Editing and coding of data records. Diagrammatic and graphicalrepresentation Significance of diagrams and graphs, comparison of tabular and diagrammatic presentation types of diagrams. Graphs-Techniques of constructing graphs, graphs of time series or line graphs Rules for constructing the line graph or natural scale, types of graphs, graphs of frequency distribution-Histogram, frequency polygon, smoothed frequency curve, cumulative frequency curves or gives, limitations of diagrams and graphs. (10 HOURS)

UNIT IV: Meaning of statistics, scope and limitations of statistic as a tool for decision making under uncertainty

Measures of central tendency –mean, median, mode and their relative merits finding combined mean, weighted mean, finding median and mode graphically.

Measures of variation-absolute and relative measures-range standard deviation of mean, combined standard deviation given the SD's of two distribution, coefficient of variation, percentiles and their applications

Correlationmethods-meaning, product moment, coefficient of correlation, rank correlation, scatter diagram and regression lines and their uses. Concepts of partial and multiple correlations

Test of significance-hypothesis testing, tests involving normal distribution, tests for large and small samplest tests-A tests to compare means of population and sample means of two independent samples c means of two dependent samples ,F tests-comparison of SD's of two samples ,analysis of variance , non-parametric tests-chi square test. (35 HOURS)

UNIT V: Report Writing -style manual, format of the research report ,The thesis or dissertation- style of writing, typing a report, reference form (Bibliography)-Pagination, tables, figures-Evaluating a research report-Foot notes plagiarism, Technical and popular reports (10 HOURS)

RECOMMENDED TEXTBOOKS

3. Gupta. S.P, *Statistical Methods*, S Chand & Sons,, New Delhi, 2008
4. Kothari, C. and Garg, G, *Research methodology Methods and Techniques* 3rd edition, New Delhi: New Age International (P) Ltd, 2014

REFERENCE BOOKS

5. Singh, Y.K, *Fundamental of Research Methodology and Statistic*. New Age International (P) Ltd., Publishers. New Delhi, 2015
6. Saravanavel, P, *Research Methodology*, KitabMahal Agencies, New Delhi, 2005
7. Elhance .D.N, Veenaand and Agarwal .B.M, *Fundamental of statistics*,48thEdition, KitabMahal, Allahabad, 2005
8. Best JW and Kahn JV, *Research in Education*, Prentice Hall of India Pvt. Ltd., New Delhi, 1996
9. Koul L, *Methodology of Educational Research*,3rd edition Vikas publishing House Pvt.Ltd,New Delhi
10. William Giles Campbell, *Form and style in Thesis writing*, Houghton Mifflin Company, Boston.
11. Sadhu A.N andSingh A,*Research Methodology in Social Sciences*, Himalaya Publishing House, Mumbai,

JOURNALS

8. International journal of social research methodology
9. Journal of research practice

COURSE OUTCOME

CO No.	CO Statement	Knowledge Level
CO1	To recall the definitions , theories and statistical procedures and gain critical thinking skills to effectively undertake research	K1& k2
CO2	To demonstrate understanding of the concept of research and acquire the necessary skills to formulate research outline.	K2&K1
CO3	To implement the skills in employing appropriate tools and techniques in structuring the research designs and solving the research problem.	K3 &K2
CO4	To analyze and classify the data collected using the principles of research methodology and draw conclusions by subjecting it to various statistical treatments	K4
CO5	To interpret and make valid judgements determining the statistical significance obtained	K5
CO6	To compile the information, develop new theories and propose alternative solutions based on the outcomes of the research.	K6

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	2
CO2	3	3	2	3	3	3
CO3	3	3	3	2	2	2
CO4	2	3	3	2	2	3
CO5	2	2	3	3	2	3
CO6	2	2	3	3	3	3
AVERAGE	**2.5**	**2.6**	**2.8**	**2.5**	**2.5**	**2.5**

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

Lecture (Chalk and Talk-OHP-LCD)
Flipped Learning/Blended Classroom-E Content, Videos
Problem Solving-Group Discussion-Role Modelling
Quiz-Seminar
Peer Learning

SEMESTER II

MEDICAL NUTRITION THERAPY – II
CORE - 6

TOTAL HOURS: 60 hours **COURSE CODE: 13SP18/2C/MT2**

CREDITS: 3 **L-T-P: 3-1-0**

COURSE OBJECTIVES

- To impart knowledge on weight management.
- To introduce the current protocol for nutrition care process in renal diseases, trauma, burns and surgery
- To enable the students to learn the evidence-based diet therapy and lifestyle modification for non-communicable diseases like obesity, diabetes mellitus, cardiovascular disorders and cancer

COURSE OUTLINE

UNIT I:

Nutrition for weight management:
Etiology, Regulation of body weight, factors regulating energy intake and body weight, assessment, and health risks, management of obesity in adults and children- lifestyle modification, dietary modification, pharmaceutical management,
Role of Leptin, Ghrelin and Glycemic load, surgical procedures.

Nutrition for Leanness:
Etiology, assessment, management, high energy diets for weight gain (10HOURS)

UNIT II:

Diet in Cardiovascular diseases:
Etiology, symptoms, role of specific nutrients in cardiac efficiency, clinical findings related to nutritional care and medical nutrition therapy of Atherosclerosis, Hyperlipidemia, hypertension, myocardial infarction and congestive heart failure. (10 HOURS)

UNIT III:

Diet in Diabetes Mellitus:
Incidence and predisposing factors, types, symptoms and tests for detection, metabolism and treatment – oral hypoglycemic drugs, insulin, & exercise, dietary guidelines and rationale for dietary modifications. Acute and chronic complications, age related issues – children and adolescents, pregnancy.
Hypoglycemia: types, diagnostic criteria and management.

5. Williams SR, *Nutrition & Diet Therapy*, CV. Mosby St. Louis, 2001
6. Garrow JS, James WPT, Ralph A, *Human Nutrition and Dietetics* 10th edition, Churchill Livingstone, NY, 2000
7. Shils ME, Obson JA, Shike M, *Modern Nutrition in Health and Disease*, Eighth edition, Volume I and II , Lea and Febiger Philadelphia, A Waverly Company, 2000
8. Cataldo, DeBruyne and Whitney, *Nutrition and Diet therapy– Principles and Practice* 5th edition, West/ Wadsworth, London. 1999
9. Antia, F.P. and Abraham P, *Clinical Dietetics and Nutrition*,.4th edition, Oxford University Press, Delhi,
10. Carroll AL &Rutherford K,*Nutrition and Diet Therapy* 2nd edition, F.A. Davis Company, Philadelphia
11. Ruth A., Townsend CE, *Nutrition and Diet Therapy* 8th edition,Thomson Delmar Learning

JOURNALS

3. International journal of Clinical Nutrition
4. International journal of Food and Nutrition

E-LEARNING RESOURCES

8. https://www.youtube.com/watch?v=2dbCmdCccGk
9. https://www.youtube.com/watch?v=1nuSSsAnRVM
10. https://www.youtube.com/watch?v=ZGPa_4FN9M4
11. https://www.youtube.com/watch?v=Lf5R9yqpun8
12. https://www.youtube.com/watch?v=MOe1Svj3Tg8
13. https://www.youtube.com/watch?v=v67BwDQcFOM
14. https://www.youtube.com/watch?v=fQwar_-QdiQ
15. https://www.youtube.com/watch?v=vKIRWY-LMYc
16. https://www.youtube.com/watch?v=7m2WG91HZy8
17. https://www.youtube.com/watch?v=1mo80kTZgW4

COURSE OUTCOME:

CO No.	CO Statement	Knowledge Level
CO 1	Recall and describe the work of dietary department with whom the dietitian collaborates in the delivery of food and nutrition services.	K1, K2
CO 2	Demonstrate the Nutrition Care Process in complex clinical conditions like trauma, renal disorders, diabetes mellitus and cancer	K2
CO 3	Explain the mechanisms by which different foods, food constituents and unhealthy life style progresses the risk of Non-Communicable diseases.	K5
CO 4	Evaluate and apply scientific knowledge into clinical practice.	K3, K4
CO 5	Plan, analyze, assess and develop disease specific dietary modification for the patient.	K3,K4, K5, K6

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	2	2	2
CO2	3	3	3	3	2	3
CO3	3	3	3	2	3	2
CO4	3	3	3	3	3	2
CO5	2	2	2	3	3	2
AVERAGE	2.6	2.6	2.6	2.6	2.6	2.2

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

b) Lecture (Chalk and Talk-OHP-LCD)
c) Flipped Learning/Blended Classroom-E Content, Videos
d) Problem Solving-Group Discussion-Role Modelling
e) Quiz-Seminar
f) Peer Learning

SEMESTER II

NUTRITION IN SPECIAL NEEDS

Elective - 3

TOTAL HOURS: 60 hours **COURSE CODE: 13SP18/2E/NSN**

CREDITS: 3 **L-T-P: 3-1-0**

COURSE OBJECTIVES

To understand the importance of nutrients for special children, astronauts, soldiers, high altitude, artic and Antarctic travelers and during disaster

e) To learn the dietary modification for children with special conditions

f) To study the nutritional requirements for age related problems

COURSE OUTLINE

UNIT I: Nutrition in children with feeding problems – cleft lip, cleft palate, Underweight, failure to thrive, overweight and swallowing problems
Nutrition for Special children: ADHD, Autism, Cerebral Palsy, Epilepsy or Seizure Disorder, Muscular Dystrophy , Mental Retardation, Down Syndrome, PraderWilli (PW) Syndrome, Spina Bifida , Cystic Fibrosis, Rett Syndrome (15 HOURS)

UNIT II: Space nutrition – Classification, Types of foods, selection of food, microgravity, planning, food preparation and serving (10 HOURS)

UNIT III: Nutrition during emergency situations like Tsunami, earthquake, draught, famine and cyclone. Role of National and international agencies in emergency feeding (10 HOURS)

UNIT IV: Nutrition in high Altitudes, Nutrition in Arctic and Antarctic regions & Military foods (10 HOURS)

UNIT V: Nutrition in Geriatrics:
Nutritional requirements in age related problems- Alzheimer's disease, Parkinson's disease, changes in the gastrointestinal tract, age-related renal impairment, reduced immunity, weight loss, cognitive impairment and vascular risk factors and hospitalized elderly patient. (15 HOURS)

RECOMMENDED TEXTBOOKS

b) Mahan LK, Stump SE and Raymond JL, *Krause's Food and Nutrition Care Process*, 13th Edition, Elsevier Saunders, Missouri, 2012.

4. Lane HW and Smith SM., 'Nutrition in Space", In: *Modern Nutrition in Health and Disease,* 9th edition, eds. Shils ME, Olson JA, Shike M, and A. C. Ross. Baltimore: Williams & Wilkins

REFERENCE BOOKS

11. Abraham S, *Nutrition Through Lifecycle*, 1st edition, New age international publishers, New Delhi, 2016
12. Edelstein S, *Lifecycle Nutrition- An evidence based approach*, 2nd edition, Jones & Bartlett learning publications, 2015,
13. Stump SE, *Nutrition and diagnosis related care*, 7th edition, Lippincott, 2012
14. A Report on Toolkit for Addressing Nutrition in Emergency Situations, June 2008, www.motherchild.org
15. Stacy N, *William's Basic Nutrition and Diet Therapy*, 12th edition, Elseivier publications, UK, 2005
16. Whitney EN and Rolfes SR, *Understanding Nutrition,* 9th edition, West/Wordsworth, 2002
17. Wildman RE, Handbook of Nutraceuticals and Functional foods, Culinary and Hospitality industry publication services, 2001
18. Garrow JS, James WPT, Ralph A, *Human Nutrition and Dietetics* 10th edition, Churchill Livingstone, NY, 2000
19. Cataldo, DeBruyne and Whitney, *Nutrition and Diet therapy– Principles and Practice* 5th edition, West/ Wadsworth, London, 1999
20. Swaminathan M, *Principles of Nutrition and Dietetics,* Bappeo, Bangalore,1995
21. Space Food and Nutrition – An Educators guide with activities in Science and Mathematics, NASA, http://spacelink.nasa.gov/products
22. Public Health Guide for Emergencies, www.jshsh.edu

JOURNALS

3. International journal of Clinical Nutrition and Dietetics
4. International journal of Food, Nutrition and Dietetics

E-LEARNING RESOURCES:

Course Outcome

CO No	CO statement	Knowledge level
CO1	Identify and define the children and elderly persons with special needs and emergency situations	K1
CO2	Infer the role of nutrition for special children, elderly people, astronauts, soldiers, high altitude, artic and Antarctic travelers and during disaster	K2
CO3	Explain the importance of nutrition during special condition and emergency situations	K3
CO4	Plan, develop and prioritize the diet for children with special needs, geriatric conditions.	K4, K5,K6

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	2	2
CO2	3	3	3	2	2	1
CO3	3	3	3	3	2	1
CO4	3	3	3	3	3	3
AVERAGE	3	3	2.5	2.5	2.25	1.75

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

3. Lecture (Chalk and Talk-OHP-LCD)
4. Flipped Learning/Blended Classroom-E Content, Videos
5. Problem Solving-Group Discussion-Role Modelling
6. Quiz-Seminar
7. Peer Learning

SEMESTER II

FOOD PRESERVATION
(INTERDISCIPLINARY)
ELECTIVE -4

TOTAL HOURS: 60 hours **COURSE CODE: 13SP18/2E/FPN**

CREDITS: 3 **L-T-P: 4-0-0**

COURSE OBJECTIVES

To enable students :

3. To understand the role of biological agents (microorganisms) in preservation of foods
4. To learn science behind the various preservation/ processing technologies.
5. To impart knowledge on the need, importance of food preservation.
6. To obtain knowledge on current trends in food packaging.
7. To familiarize with food safety management systems and food regulations.

COURSE OUTLINE

UNIT I: **Importance, Principles of preservation & Spoilage:**

Importance and principles of preservation; Preservation of various foods cereals, pulses, fruits & vegetables, milk & milk products, flesh foods; Food spoilage – causes of spoilage, spoilage of various foods & food product (15 HOURS)

UNIT II: **Methods of food preservation**:

Traditional methods of preservation; Preservation as sugar concentrates- Jams, Jelly, Marmalades and Preserves; Fruit Juice Beverages– Preparation and preservation; Chemical preservation - advantages and disadvantages (15 HOURS)

UNIT III: **Role of Temperature in Food Preservation**:

Use of High temperatures – Drying, sterilizations, canning, pasteurization, Blanching, Irradiation

Use of low temperatures – Refrigeration & freezing. (15 HOURS)

UNIT IV: **Packaging:**

Functions of Packaging, packing materials and forms, special packaging– military & space foods, safety & package tests

(15 HOURS)

UNIT V: **Food additives and food standards**:

Food Additives and Food Standards (15 HOURS)

RECOMMENDED TEXTBOOKS

14. *Khetarpaul N, Food Processing & Preservation, 2nd Edition, Daya Publishing House, 2012.*
15. Jood S and Khetarpaul N, *Food Preservation*, Agro Tech Publishing Academy, Udaipur, 2002

REFERENCE BOOKS

3. Sivasankar B, *Food Processing and Preservation*, Prentice Hall of India (P) Ltd, New Delhi, 2008
4. Manay SN, Swamy MS, *Food Facts and Principles*, 3rd edition, New Age International Ltd, New Delhi, 2008
5. Khetarpaul N, *Food Processing and Preservation*, Daya Publishing House, New Delhi, 2005
6. Hausner A, *Preserved Foods and Sweetmeats*, Biotech Books, New Delhi, 2005
7. Subbulakshmi G, Udipi SA, *Food Processing and Preservation*, New Age International Ltd, Publishers, New Delhi, 2001
8. NIIR BOARD, *Manual of Modern Technology on Food Preservation,* Asia Pacific Business Press Inc, New Delhi.
9. *Desroisier, Technology of Food Preservation, 1st Edition, CBS Publishers, 1998*

JOURNALS

5. Food Science Research Journal
6. Current Research in Nutrition & Food Science Journal
7. Journal of Experimental food chemistry

E-LEARNING RESOURCES

8. www.nchfp.uga.edu
9. https://preservingfoodathome.com
10. https://www.buecher.de
11. https://www.barnesandnoble.com
12. https://www.crcpress.com

COURSE OUTCOMES

CO Number	CO STATEMENT	Knowledge scale
CO 1	Explain the importance of microorganisms in food preservation	K5
CO 2	Identify the concept of different methods of food preservation	K4
CO 3	Elaborate on the principles of food preservation including high and low temperature	K6
CO 4	Develop knowledge on different types of food packaging materials, requirements of effective packaging	K3
CO 5	Interpret food safety management systems and food regulations	K5
CO6	Classify the various types of food additives	K4

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
AVERAGE	3	3	3	3	3	3

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

2. Lecture (Chalk and Talk-OHP-LCD)
3. Flipped Learning/Blended Classroom-E Content, Videos
4. Problem Solving-Group Discussion-Role Modelling
5. Quiz-Seminar
6. Peer Learning

SEMESTER II

ADVANCED FOOD SCIENCE PRACTICAL

Practical -2

CORE – 7

TOTAL HOURS: 90 hours **COURSE CODE: 13SP18/2C/PR2**
CREDITS: 4 **L-T-P: 0-0-6**

COURSE OBJECTIVES

To enable the students to

- Acquire in depth-knowledge of food science to analyse, discriminate and interpret the results
- Evaluate the sensory and objective quality of food products
- Assess the effect of cooking and processing on various food components
- Estimate pectin strength ,smoking temperature and discuss the factors affecting foam formation and crystallization of sugar
- Equip with skills of preparation of various recipes

COURSE OUTLINE

1. Evaluation of Food quality:
   Sensory methods: Threshold, Aroma recognition and difference tests. (5 HOURS)
   Objective Methods: Ink print, line spread, specific gravity, seed displacement and percent sag (5 HOURS)
2. Convenience & Traditional Foods and Fermented Foods: (20 HOURS)
3. Gelatin, Pectin and Browning: (15 HOURS)
   1. Factors affecting gelatin
   2. Testing pectin strength in fruit and vegetable extract
   3. Enzymatic Browning and its prevention in fruits and vegetables
   4. Vegetable and fruit preserve preparation – Jam , Jelly and Marmalade
   5. Marshmallows, Lemon chiffon pie, Coffee panacotte
4. Fats, Oils, Emulsions and Foams: (15 HOURS)
   a) Determination of smoking temperature of fats and oils
   b) Types of Emulsions: Permanent emulsions – preparation of mayonnaise using different variations; Temporary emulsions
   c) Egg Foaming: Factors affecting foam formation.
5. Sugar cookery: (10 HOURS)
   - Crystallization of sugar
   - Factors affecting crystallization of sugar
   - Recipes

1. Estimation of gluten content
2. Recipes: Breads, Buns, Biscuits and Cakes

7. Adulteration: (10 HOURS)
   a) Easy methods of detection of adulterants

RECOMMENDED TEXTBOOKS

4. Lowe B, *Experimental cookery from chemical and physical stand point*, Forgotten books, UK, 2015
5. Swaminathan .N, *Food Science and Experimental Foods*, Ganesh Publications, Madras, 2004

REFERENCE BOOKS

1. KhetarPaul N; Grewal, R and Jood, S, *Bakery Science and Cereal Technology*, Dia publishing house, Delhi. 2005
2. McCance and Widdowson, *Composition of food*, 6th Edition, Food Standards Agency, 2004

JOURNALS

4. Food Science Research Journal
5. Current Research in Nutrition & Food Science Journal
6. Journal of Experimental food chemistry
7. International journal of Food Science & Technology
8. International journal of Food Properties
9. International Journal of Agriculture & food Science technology
10. Journal Of Food Science & Technology
11. Asian Journal of dairy and Food research
12. Rice Research
13. Research & Review; Journal of Food Science & Technology
14. Journal of applied research in Food Science & Nutrition

COURSE OUTCOME:

CO No.	CO Statement	Knowledge Level
CO1	Apply the principles of subjective and objective methods for evaluating the quality of food products	K3&K5
CO2	Demonstrate the crystallisation of sugar and assess the factors affecting crystallisation and egg foam formation	K2 &K5
CO3	Acquire knowledge on enzymatic browning reactions and illustrate preventive methods	K2
CO4	Estimate pectin strength, gluten content, and determine the smoking temperature of fats and oils.	K4
CO5	Compare and differentiate traditional and convenience foods	K4
CO6	Apply the principles of food science ,develop skills and gain hands on practical experience on an individual basis that motivate them to undertake research in the field of food science and career in food industry	K6

Mapping of CO with PSO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	2	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
CO6	3	3	3	3	3	3
AVE RAGE	3	3	3	3	3	3

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

11. Lecture (Chalk and Talk-OHP-LCD)
12. Flipped Learning/Blended Classroom-E Content, Videos
13. Problem Solving-Group Discussion-Role Modelling
14. Quiz-Seminar
15. Peer Learning

SEMESTER III

FOOD AND DRUG INTERACTION
ELECTIVE - 5

TOTAL HOURS: 60 hours **COURSE CODE: 13SP18/3E/FDI**

CREDITS: 3 **L-T-P: 3-1-0**

COURSE OBJECTIVES

- To enable students to gain an insight on basic concepts in pharmacology.
- Learn the mechanism of pharmacokinetics and pharmacodynamics.
- To help students understand the drug therapy.
- To assess the dietary modification during drug therapy for various disease condition
- To analyse the effect of drug on nutrient intake
- To assess the impact of food on drug absorption

COURSE OUTLINE

UNIT I: General Pharmacology:

a) Drug – Definition, Sources of drugs, Routes of drug administration- Enteral (Oral ingestion), Parenteral (Injections, Inhalation, Transdermal, Transmucosal) and special drug delivery system.

b) Pharmacokinetics and drug dosage – Definition, drug passage through the biological membranes: Passive & Active transfer, Absorption of drug, Factors influencing absorption, Bioavailability, Distribution, Metabolism of drugs, Inhibition of drug metabolism and Excretion of drugs – routes of excretion.

c) Drug Dosage: Definition of Minimum dose, Maximum dose, Toxic dose, Lethal dose, Fixed dose, individualizing dose and Loading dose (10 HOURS)

UNIT II: Pharmacodynamics:

a) Definition, Principles and mechanism of drug action (physical, chemical, through enzymes), stimulation and inhibition of drug action. Receptors- Definition and functions of receptors.

b) Antagonism (physical, chemical, physiological and receptor mediated), Factors modifying drug action – body size, age, sex, route of administration, diet &environment, psychological factors, pathological state, genetic factors and dose (10 HOURS)

UNIT III: Drug therapy& Dietary modifications

a) Drugs acting on Gastro intestinal system: Drugs used in peptic ulcer, Drugs used for Constipation and Drugs used for the treatment of Diarrhea. Dietary modifications during ingestion of drugs

b) Drugs in Renal diseases: Diuretics and Anti diuretics: Examples, adverse effects, Precautions taken by dietitian
c) Cardiovascular drugs: Drugs used in Congestive cardiac failure, Angina pectoris, Myocardial infarction, Lipid lowering drugs, and hypertension. Dietary modifications during ingestion of drugs
d) Coagulants & Anti-coagulants: definition, classification – Coumarin derivatives, warfarin and heparin, Dietary modifications during ingestion of drugs. (15 HOURS)

UNIT IV: Drug Therapy& Dietary modifications

a) Hypoglycemic drugs: definition, classification – insulin, oral hypoglycemic drugs (Sulphonyl urea derivative and Biguanides), plant source, mechanism of action. Dietary modification during ingestion of drugs.
b) Chemotherapy in Cancer: General principles in the treatment of cancer. Common adverse effects to anticancer drugs, Dietary modifications during ingestion of drugs
c) Drugs in Asthma, Allergies and infections:Drugs used in bronchial asthma, NSAIDs- mechanism of action, adverse effects, Dietary modifications
d) Drugs in Gout and Rheumatism: Anti gout drugs and Anti rheumatics, Dietary modifications.
e) Drugs in Seizures, Mood disorders and Sleep disorders: definition of hypnotics, sedatives, Anticonvulsants, Antipsychotics, antianxiety drugs, antidepressants and tranquillizers. Dietary modifications. (15 HOURS)

UNIT V: Food and drug interactions:

a) Effect of drugs on food and nutrition- nutrient absorption, nutrient metabolism, and nutrient excretion
b) Effect of food on drug therapy- drug absorption, drug distribution, drug Metabolism, drug excretion.
c) Modification of drug action
d) Effects of drugs on nutritional status – alterations in oral taste and smell perceptions, gastro intestinal system, appetite, glucose levels, organ system toxicity. (10 HOURS)

RECOMMENDED TEXTBOOKS

1. *Ashutoshkar, SC, Mehta, Essentials of Pharmacology, 1st Edition, New Age International Publications, New Delhi, 2013*
2. Mahan LK, Stump SE and Raymond JL, *Krause's Food and Nutrition Care Process*, 13th Edition, Elsevier Saunders, Missouri, 2012

REFERENCE BOOKS

1.Murugesh N, *A Concise Text Book of Pharmacology*, 6th publishers, edition, Sathya Madurai, 2011

2.Udaykumar P, *Pharmacology for Nurses*,2nd edition reprint,Jaypee Brothers Medical Publishers, New Delhi, 2010

3.Raje VN, *Pharmacology and toxicology*, 1st New edition reprint, CBS publishers, Delhi, 2011.

4. Grover JK, Malik M, Drug Interaction, 1st Edition, Pee Pee Publication, 2005 5.Katzung B, Masters S, Trevor A, *Basic and Clinical Pharmacology*, 13th edition, Mcgraw hill education, 2015

JOURNALS

1. The Journal of Nutrition
2. British Journal of Nutrition
3. Advances in Nutrition
4. Nutrition Reviews
5. Journal of Human Nutrition & Dietetics

E-LEARNING RESOURCES

- http://evolve.elsevier.com
- www.foodmedinteractions.com
- www.nih.gov/ccc/patient_education
- https://www.fda.gov
- https://www.food.actapol.net

COURSE OUTCOME

CO No.	CO Statement	Knowledge Level
CO1	List the sources of drugs, routes of drug administration	K1
CO2	Explain the drug pharmacokinetics and pharmacodynamics mechanism	K2
CO3	Classify the drug therapy for various diseases condition	K3
CO4	To determine the dietary modification during drug therapy	K4
CO5	Assess the effect of drug on nutrient intake	K5
CO6	To compile the impact of food on drug absorption	K6

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	2	2	2
CO4	2	3	2	3	2	3
CO5	2	3	3	3	2	2
CO6	3	3	2	3	2	2
AVERAGE	2.6	3	2.5	2.8	2	2.2

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

1. Lecture (Chalk and Talk-OHP-LCD)
2. Flipped Learning/Blended Classroom-E Content, Videos
3. Problem Solving-Group Discussion-Role Modelling
4. Quiz-Seminar
5. Peer Learning

SEMESTER III

NUTRITION AND PHYSICAL FITNESS

(INTERDISCIPLINARY)

ELECTIVE – 6

TOTAL HOURS: 60 hours **COURSE CODE: 13SP18/3E/NPF**

CREDITS: 3 **L-T-P: 4-0-0**

1. To impart knowledge on the balanced diet, menu planning and classification of food.
2. To understand the need of consuming nutritionally balanced diet
3. To introduce the sources, functions and deficiencies of macronutrients and micronutrients
4. To learn the importance of fitness in daily life
5. To study the nutritional requirements for athletes

COURSE OUTLINE

UNIT I: Introduction to nutrition - Definition of terms - Food, Nutrient and Health.
Food and our body -RDA - Factors affecting RDA, reference man, reference woman, RDA for adolescents and adults; Basic 5 food group system (ICMR), factors involved in food selection;
Definition of menu planning; principles of menu planning; Planning balanced diet for adults and adolescents.(15 HOURS)

UNIT II: Basic nutrients - Proximate principles - CHO, fats and proteins.
Carbohydrates - Classification, Functions, Sources, Deficiency;
Proteins - Classification, Functions, Sources and Deficiency;
Fats - Classification, Functions and Sources;
Energy - Definition of energy, Kilo Calories, energy from CHO, proteins and fats,
Physiological fuel value, gross fuel value, BMR - factors affecting BMR (15 HOURS)

UNIT III: Vitamins: Fat soluble vitamins (A,D,E,K) - sources, functions, deficiency. Water soluble vitamins (Thiamine, Riboflavin, Pyridoxine, Niacin, Vitamin B12) - sources, functions, deficiency.

Minerals (Calcium, Iron, Phosphorus, Sodium, Potassium, Iodine, Zinc) - sources, functions, deficiency. Water - functions, sources, requirements, water balance, dehydration, water intoxication (10 HOURS)

UNIT IV: Fitness -Definition of fitness, benefits of fitness. Components of fitness, aerobic and anaerobic activities (10 HOURS)

UNIT V: Diet for athletes -Requirement for CHO, protein, fat, vitamin, mineral and fluids for an athlete. Pre event and post event meal (10 HOURS)

RECOMMENDED TEXTBOOKS

1. Srilakshmi B, *Nutritional Science*, 3rd edition, New age Publishing Press, New Delhi, 2002
2. Mudambi, S.R. and Rajagopal, M.V., Fundamentals of food and nutrition, Wiley Eastern Limited, 2003

REFERENCE BOOKS

1. Sharma M, *Textbook of Nutrition*, 1st edition, CBS publishers & distributors PVT Ltd, New Delhi, 2017
2. Abraham S, *Nutrition Through Lifecycle*, 1st edition, New age international publishers, New Delhi, 2016
3. Verma P, *Food ,Nutrition & Dietetics*, 1st edition, CBS publishers & distributors PVT Ltd, New Delhi, 2015
4. Edelstein S, *Lifecycle Nutrition- An evidence based approach*, 2nd edition, Jones & Bartlett learning publications, 2015,
5. Mahan LK, Stump SE and Raymond JL, *Krause's Food and Nutrition Care Process*, 13th Edition, Elsevier Saunders, Missouri, 2012
6. Stump SE, *Nutrition and diagnosis related care*, 7th edition, Lippincott, 2012
7. Mullick P, *Textbook of Home Science*, Kalyani Publishers, India, 2006
8. Joshi S., *Nutrition and Dietetics*, 2nd Edition, Tata McGraw Hill Publishing Company, New Delhi. 2002
9. Stacy N, *William's Basic Nutrition and Diet Therapy*, 12th edition, Elseivier publications, UK, 2005
10. Whitney EN and Rolfes SR, *Understanding Nutrition,* 9th edition, West/Wordsworth, 2002
11. Bean A,, The Complete guide to sports Nutrition, 3rd Edition, A&C Black Publishers Ltd, 2000
12. Garrow JS, James WPT, Ralph A, *Human Nutrition and Dietetics* 10th edition, Churchill Livingstone, NY, 2000
13. Cataldo, DeBruyne and Whitney, *Nutrition and Diet therapy– Principles and Practice* 5th edition, West/ Wadsworth, London, 1999
14. Gordon WM, *Perspectives in Nutrition*, 4th edition, McGraw Hill, 1999
15. Swaminathan M, *Principles of Nutrition and Dietetics,*Bappeo, Bangalore,1995

JOURNALS

1. International Journal of Sports Nutrition
2. Journal of nutrition science research

E-LEARNING RESOURCES

- www.nal.usda.gov/fnic/food comp
- www.niddk.nih.gov/health/nutrit/nutrit.htm

- www.sportsci.org
- www.nal.usda.gov/fnic/fpyr/pyramid.html
- http://evolve.elsevier.com
- http://www.choosemyplate.gov
- http://www.healthypeople.gov
- https://gradireland.com/institution/ulster-university
- https://weblink.lakehealth.org/WLP2/#!/classes/info/C10002GC

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO 1	Identify the classification of food by ICMR and Food guide pyramid	K1
CO 2	Identify and describe the role of amino acids, lipids, carbohydrates, and vitamins in our body	K1,K2
CO 3	Explain the functions, food sources, and consequences of deficiencies and toxicities for each of the essential macro and micro nutrients	K3, K4
CO 4	Apply the current understanding of nutrition to aspects of physical fitness	K3
CO 5	Analyze and understand the principles in menu planning and alter food intake to reach the daily recommendation of an individual or an athlete.	K4
CO 6	Discuss and develop nutrition plan for athletes	K5,K6

Mapping of CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	3	2	2	2	2	2
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3
CO6	3	3	3	3	3	3
AVERAGE	3	2.7	2.7	2.7	2.7	2.3

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

1. Lecture (Chalk and Talk-OHP-LCD)
2. Flipped Learning/Blended Classroom-E Content, Videos
3. Problem Solving-Group Discussion-Role Modelling
4. Quiz-Seminar
5. Peer Learning

SEMESTER III

INNOVATIVE FOOD PRODUCT DEVELOPMENT
Practical – 3- CORE -11

TOTAL HOURS: 90 hours **COURSE CODE: 13SP18/3C/PR3**

CREDITS: 4 **L-T-P: 0-0-6**

COURSE OBJECTIVES

- Learn to develop an innovative product
- To enhance their entrepreneurship skills
- To understand the importance of getting patent for the product
- To gain knowledge on product life cycle and standardization.
- To advertise and market the products

COURSE OUTLINE

1. Market survey on innovative ingredients and products available(5 HOURS)
2. Consumer oriented product development (5 HOURS)
3. Product life cycle – optimization, Scale up, production (10 HOURS)
4. Theme/ concept based product formulation (6 HOURS)
5. Ingredient combinations (6 HOURS)
6. Processing technique (6 HOURS)
7. Standardization of the product (6 HOURS)
8. Subjective and objective evaluation of the standardized product (6 HOURS)
9. Nutrient analysis (8 HOURS)
10. Packaging and labeling (6 HOURS)
11. Shelf life analysis (6 HOURS)
12. Cost benefit analysis (4 HOURS)
13. Advertising and sale of the developed innovative product (4 HOURS)
14. Documentation (6 HOURS)
15. Report submission (6 HOURS)

RECOMMENDED TEXTBOOKS

1. Earle M, Earle R and Anderson A. Food and product development; maximising success, Woodhead publishing ltd, food series, No.64, 2001.
2. Paine FA, Paine HY(Eds) . A handbook of food packaging. Second ed, Blackie Academic and professional. 1992.

JOURNALS

1. International journal of Food Engineering
2. Food Marketing and Technology
3. Journal of Agriculture and Food Economics

COURSE OUTCOME

CO No.	CO Statement	Knowledge Level
CO1	Identify and understand the food products and process innovations in the market	K3
CO2	Design and execute product innovation trials to efficiently optimise the product formulation and process	K6
CO3	Learn methods of generating, evaluating and testing product ideas	K5
CO4	Develop good communication and team work skills	K3
CO5	Identify relevant components and plan a product launch	K3
CO6	Learnmethodsof evaluatingand monitoring the success of a launch	K5

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
CO6	3	3	3	3	3	3
AVERAGE	3	3	3	3	3	3

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

1. Lecture (Chalk and Talk-OHP-LCD)
2. Flipped Learning/Blended Classroom-E Content, Videos
3. Problem Solving-Group Discussion-Role Modelling
4. Quiz-Seminar
5. Peer Learning
6. Field Visits

SEMESTER III

SOFT SKILL-3

COMPUTING SKILLS

TOTAL HOURS: 30 hours **COURSE CODE: 13SP18/3S/CSS**

CREDITS: 2 **L-T-P: 2-0-0**

COURSE OBJECTIVES

- ✓ To understand the use of Nutrition Care Process Model.
- ✓ To introduce the current nutrition assessment and screening techniques
- ✓ To study the protein quality of different food items
- ✓ To calculate energy expenditure and physical activity level for an individual using different methods

COURSE OUTLINE

UNIT I: Nutritional Care process
Nutritional assessment: use of SOAP(Subjective data, Objective data, Assessment and Plan), MNA (Mini Nutritional Assessment), SGA (Subjective Global Assessment) and MUST (Malnutrition Universal Screening Tool) – assessment, diagnosis and intervention

UNIT II: Energy requirement:
Estimation of energy content is using bomb calorimeter, energy requirement of an individual on a working and non-working day using Sathyanarayana and factorial method.
Software available in the market for calculating the energy requirement and expenditure

UNIT III: Development of energy and protein rich recipes by calculating the chemical score and Net Dietary Protein calorie Percentage

RECOMMENDED TEXTBOOKS

1. Mahan LK, Stump SE and Raymond JL, *Krause's Food and Nutrition Care Process*, 13th Edition, Elsevier Saunders, Missouri, 2012
2. Garrow JS, James WPT, Ralph A, *Human Nutrition and Dietetics* 10th edition, Churchill Livingstone, NY, 2000

REFERENCE BOOKS

1. Gordon WM, *Perspectives in Nutrition*, 4th edition, McGraw Hill, 1999
2. Swaminathan M, *Principles of Nutrition and Dietetics*, Bappeo, Bangalore, 1995

JOURNALS

1. International Journal of community nutrition
2. Journal of nutrition science research

COURSE OUTCOMES

CO No.	CO Statement	Knowledge Level
CO 1	Recall and describe the use of nutrition care process model	K1
CO 2	Use the Nutrition Care Process to make decisions and identify nutrition-related problems of different clinical cases	K3
CO 3	Apply principles of nutrition assessment and screening to determine and evaluate nutrition interventions for clinical conditions	K3, K4
CO 4	Gather, analyze, and interpret the amino acid composition of foods	K3,K4, K5
CO 5	Use of different methods to evaluate the energy expenditure and physical activity of an individual	K4, K5

Mapping of CO with PSO

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

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

1. Lecture (Chalk and Talk-OHP-LCD)
2. Flipped Learning/Blended Classroom-E Content, Videos
3. Problem Solving-Group Discussion-Role Modelling
4. Quiz-Seminar
5. Peer Learning

SEMESTER IV

PUBLIC HEALTH NUTRITION
CORE - 13

TOTAL HOURS: 90 hours **COURSE CODE: 13SP18/4C/PHN**

CREDITS: 4 **L-T-P: 4-2-0**

COURSE OBJECTIVES

To enable students

1. To understand the role of nutritional epidemiology in public health.
2. To outline the issues related to maternal and child nutrition.
3. To recognise the solutions to overcome the problems of malnutrition.
4. To create awareness on the interventional strategies for preventing micronutrient deficiencies in India.
5. To understand the concept of food and nutrition security and management of nutrition in emergency situations.

COURSE OUTLINE

UNIT I: Nutritional Epidemiology:
Application of Epidemiological study in Nutrition- cross sectional studies, ecological studies, cohort studies, case control studies, randomized controlled trials: prophylactic, therapeutic and community trials; Sampling and Sample size; From research to programs- Applying knowledge to improve nutrition outcomes. (20 HOURS)

UNIT II: Maternal and Child Nutrition:
Nutrition burden in women: Maternal Nutritional status; Factors associated with deterioration of maternal nutritional status; Interventions to improve nutritional status in women.
Under nutrition in children: Stunting, underweight and wasting- an overview of the global situation; determinants of under nutrition, Prevention of under nutrition in children-a lifecycle approach;
Over nutrition in children: The epidemic of obesity in children, consequences and prevention of overweight and Obesity. Policies and programmes for reducing malnutrition in the Indian context. Integration of breastfeeding and complementary feeding practices into National programme. (20 HOURS)

UNIT III: Vitamin A Deficiency (VAD): Consequences of Vitamin A deficiency; Epidemiology of vitamin A deficiency; Vitamin A deficiency status in India; Intervention strategies for preventing VAD; Policies and programmes in the Indian context.
Iodine: Importance of iodine for human population; Requirements, Controlling of IDD- a three prong strategy; Elimination of IDD- international focus; Fortification –

Universal Salt Iodization; Policies and programmes in the Indian context. (15 HOURS)

UNIT IV:

Iron deficiency anemia &Nutritional anemia:Prevalence,causes, Approaches for the prevention and control of anemia; Policies and programmes in the Indian context.
Zinc: Zinc epidemiology, Requirements, Evidence from Zinc supplementation studies on child health and Zinc intervention strategies. (15 HOURS)

UNIT V:

Food and Nutrition Security:

a) Food and Nutrition Security – Basic concepts; Food insecurity and vulnerability; Factors underlying the current state of Food and Nutrition security- food pricing, climate, agriculture, biofuels, agricultural commodities, impact of green revolution, food supply inIndia, land fragmentation, poverty, hidden hunger and purchasing power; Food and Nutrition Situation in India; Sustainable diets and Sustainable development goals

b) Food and Nutrition in Natural and Manmade Disasters: Food insecurity and malnutrition- identification and measurement, Nutritional Requirements & intervention, Disaster management in India. (20 HOURS)

RECOMMENDED TEXTBOOKS

1. ChanderVir S, *Public Health Nutrition In Developing Countries*, Part I, 1st edition, Woodhead Publishing, New Delhi, 2011
2. ChanderVir S, *Public Health Nutrition In Developing Countries*, Part II, 1st edition, Woodhead Publishing, New Delhi, 2011
3. Park K, Park's Textbook of preventive medicine, 2005

REFERENCE BOOKS

1. Gopalan C., Ramanathan, P.V. Balasubramanian, S.C., *Nutritive value of Indian foods*, NIN, Hyderabad, 2010
2. Bamji M,*Textbook of Human Nutrition,* Oxford publishers, New Delhi, 2010
3. Bhatt VB, *Protein Energy Malnutrition*, PeePee Publishers, New Delhi, 2008
4. Sharma N, *Child Nutrition*, 1st edition, Murarilal& sons, New Delhi, 2006
5. Gupte S, *Textbook of Pediatric Nutrition*, Pawaninder P Vij Publishers, New Delhi, 2006
6. Gibney MJ, Margetts BM, Kearney JM, Arab L (Ed), *Public Health Nutrition (The Nutrition Society Textbook),* 1st edition, Wiley black well, 2004
7. WHO, *The Management of Nutrition in Major Emergencies*, AITBS Publishers, New Delhi, 2000
8. Sachdev HPS, Choudhary P, *Nutrition In Children – Developing Country Concerns*, BI publications, New Delhi, 1994
9. Swaminathan M, *Principles of Nutrition and Dietetics*, Bappeo, Bangalore, 1993

10. Young H, *Nutrition in Emergencies* (Practical Health Guides), 1st edition, Oxfam, 1991
11. Robert H. Fletcher, Suzanne W. Fletcher and Edward H. Wagner, *Clinical Epidemiology- the essentials,* 2nd edition, Williams & Wilkins, Baltimore
12. Nutrition foundation of India series, scientific reports
13. Hindu survey of Indian agriculture, latest edition

JOURNALS

1. International journal of Community Nutrition
2. Indian journal of community health

E-LEARNING RESOURCES

1. http://www.hsc.wvu.edu/library/U-links/community- nutrition.htm
2. www.asns.rg/nnjun04a.pdf
3. www.fns.usda.gov/fsec/FILES/safetyNet.pdf
4. www.ext.vt.edu/action for healthykids/assistance/lesson5background.pdf
5. *https://www.aaas.org/sites/default/files/migrate/uploads/EnvironmentalHealth.pdf*
6. https://www.rand.org/content/dam/rand/pubs/research_reports/.../RAND_RR1084.pdf
7. *https://www.nih.gov/health-information*

COURSE OUTCOME

CO No.	CO Statement	Knowledge Level
CO 1	Identify and explain the various types of study designs commonly used in nutritional epidemiologic research.	K3&K2
CO 2	Assess the factors associated with maternal and child nutrition	K5
CO 3	Classify the causes of malnutrition in India and perceive the knowledge of various nutrition intervention schemes provided.	K2&K5
CO 4	Discuss on the various intervention programmes and policies concerned with micronutrient deficiency.	K6
CO 5	Analyse the basic concepts of food and nutrition security and summarize the food and nutrition security situation in India.	K4&K2
CO6	Categorise and formulate the various nutritional assessment techniques for the community	K4&K6

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
CO6	3	3	3	2	2	3
AVERAGE	3	3	3	2.8	2.8	3

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY:

1. Lecture (Chalk and Talk-OHP-LCD)
2. Flipped Learning/Blended Classroom-E Content, Videos
3. Problem Solving-Group Discussion-Role Modelling
4. Quiz-Seminar
5. Peer Learning

SEMESTER IV

PROJECT
CORE - 14

TOTAL HOURS: 90 hours **COURSE CODE: 13SP18/4C/PRO**

CREDITS: 4 **L-T-P: 0-6-0**

COURSE OBJECTIVES

To enable students

- ✓ To gain knowledge in the area of research
- ✓ To contribute to the community or to the existing research base

COURSE OUTLINE

The project should be based on individual study and carry the following format:

1. Title page – Title, author's name
2. Certificate of originality by the guide
3. Declaration by the author
4. Table of contents
5. List of tables
6. List of figures
7. Acknowledgement
8. Abstract.
9. Introduction: statement of the problem,significance,need for the study,objectives, and operational definitions.
10. Review of literature
11. Methodology – Sampling and tools for data collection,procedures,hypothesis
12. Results and Discussion–Tables and figures, statistical presentations,hypothesis testing.
13. Summary and Conclusion
14. References.
15. Appendices

RECOMMENDED TEXTBOOKS

1. Singh, Y.K, *Fundamental of Research Methodology and Statistic*. New Age International (P) Ltd., Publishers. New Delhi, 2015
2. Kothari, C. and Garg, G, *Research methodology Methods and Techniques* 3rd edition, New Delhi: New Age International (P) Ltd, 2014
3. Gupta. S.P, *Statistical Methods*, S Chand & Sons,, New Delhi, 2008
4. Saravanavel, P, *Research Methodology*, KitabMahal Agencies, New Delhi, 2005
5. Elhance .D.N, Veenaand and Agarwal .B.M, *Fundamental of statistics*,48thEdition, KitabMahal, Allahabad, 2005
6. Best JW and Kahn JV, *Research in Education*, Prentice Hall of India Pvt. Ltd., New Delhi, 1996

7. Koul L, *Methodology of Educational Research*, 3rd edition Vikas publishing House Pvt. Ltd ,New Delhi
8. William Giles Campbell, *Form and style in Thesis writing*, Houghton Mifflin Company, Boston.
9. Sadhu A.N and Singh A, *Research Methodology in Social Sciences*, Himalaya Publishing House, Mumbai,

JOURNALS

1. International journal of Nutrition and Dietetics
2. International journal of Clinical Nutrition and Dietetics
3. International journal of Food Microbiology
4. International journal of Food Engineering
5. International journal of Food Properties
6. Food and Nutrition Bulletin
7. Annual review of Nutrition
8. Food Science Research Journal
9. Journal of Agriculture and Food Economics
10. Current Research in Nutrition & Food Science Journal

SEMESTER IV

PUBLIC HEALTH NUTRITION PRACTICAL
Practical -4 (CORE – 15)

TOTAL HOURS: 90 hours **COURSE CODE: 13SP18/4C/PR4**

CREDITS: 4 **L-T-P: 0-0-6**

COURSE OBJECTIVES

1. To create awareness of various national agencies involved in health and nutrition
2. To learn various health indices and assessment techniques for the community.
3. To plan and conduct nutrition and health education programme for the community balancing the socio-cultural environment.
4. To formulate and prepare low cost recipes for the vulnerable group.
5. To overcome the nutrition and health problems faced by the community.

COURSE OUTLINE

1. Visit to various organizations concerned with food and nutrition –ICMR, FNB, WVS, ICDS, FCI, PDS, DMS, MSSRF, Agricultural department, Social welfare Board. (10 HOURS)
2. Identification of Vulnerable group and Assessment of nutritional Status of vulnerable group (20 HOURS)
3. Formulation, and preparation of low cost recipes – weaning, pregnancy, lactation, Vitamin A, Iron and Iodine (20 HOURS)
4. Planning and implementation of Nutrition–Health Education (NHE) for a vulnerable group (20 HOURS)
5. Preparation of teaching aids for Nutrition- Health Education. (20 HOURS)

REFERENCE BOOKS

1. ChanderVir S, *Public Health Nutrition In Developing Countries*, Part I, 1st edition, Woodhead Publishing, New Delhi, 2011
2. ChanderVir S, *Public Health Nutrition In Developing Countries*, Part II, 1st edition, Woodhead Publishing, New Delhi, 2011
3. Gopalan C., Ramanathan, P.V. Balasubramanian, S.C., *Nutritive value of Indian foods*, NIN, Hyderabad, 2010
4. Bamji M,*Textbook of Human Nutrition,* Oxford publishers, New Delhi, 2010
5. Bhatt VB, *Protein Energy Malnutrition*, PeePee Publishers, New Delhi, 2008
6. Sharma N, *Child Nutrition*, 1st edition, Murarilal& sons, New Delhi, 2006
7. Gupte S, *Textbook of Pediatric Nutrition*, Pawaninder P Vij Publishers, New Delhi, 2006
8. Park K, Park's Textbook of preventive medicine, 2005

JOURNALS

1. International journal of Community Nutrition
2. Journal of community health nursing

E-LEARNING RESOURCES

- http://www2.mfa.gr/infofiles/radC4CD6Health-Nutrition%20Orgs%20(2008).pdf
- http://www.jmedscindmc.com/article.asp?issn=1011-4564;year=2014;volume=34;issue=5;spage=211;epage=213;aulast=Shrivastava
- https://www.indiastudychannel.com/resources/120148-Teaching-Aids-Their-Needs-Types-and-Importance-Of-Teaching-Aids-In-Teaching-Learning-Process.aspx
- http://www.yourarticlelibrary.com/nutrition/nutrition-education-of-community-importance-methods-and-other-details/64428
- http://vikaspedia.in/health/nutrition/nutritive-value-of-foods/low-cost-nutritious-supplements

COURSE OUTCOME

CO No.	CO Statement	Knowledge Level
CO 1	Identify and explain the broad determinants of dietary and food aspects of health and wellbeing.	K1&K2
CO 2	Analyse the principles of, and approaches to nutritional assessment.	K4
CO 3	Assess and deliver effective nutritional information to the vulnerable group.	K5
CO 4	Develop nutrition and health information to a wide range of audiences through diverse teaching aids.	K6
CO 5	Formulate and prepare low cost recipes for the nutritionally disadvantaged to combat the nutritional deficiencies.	K5

Mapping of CO with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO1	3	3	3	3	3	3
CO2	2	3	3	2	2	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	2	3	3	3	2	3
AVERAGE	2.6	3	3	2.8	2.6	3

KEY:STRONGLY CORELATED-3 MODERATELY CORELATED-2WEAKLY CORELATED-1 NO CORELATION-0

TEACHING METHODOLOGY

1. Lecture (Chalk and Talk-OHP-LCD)
2. Flipped Learning/Blended Classroom-E Content, Videos
3. Problem Solving-Group Discussion-Role Modelling
4. Quiz-Seminar
5. Peer Learning
6. Field Visits

SEMESTER IV

SOFT SKILL-4

SCIENTIFIC WRITING AND PRESENTATION SKILLS

TOTAL HOURS: 30 hours **COURSE CODE: 13SP18/4S/SWS**

CREDITS: 2 **L-T-P: 2-0-0**

COURSE OBJECTIVES

1. To gain knowledge in scientific writing and presentation skill.
2. To understand the principles for oral presentations.
3. To gain in depth knowledge on research paper publication

COURSE OUTLINE

UNIT I: Scientific writing - abstract, full paper, clinical update, manuscripts. Process of copy editing journals

UNIT II: Presentation skills – Thematic, poster, oral, 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, Soft wares available in the market for plagiarism

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 Eed, Prentice Hall of India Pvt. Ltd, New Delhi, 2000.
3. Elhance. D. N Veena and Elhance and Agarwal . B.M, Fundamentals of Statistics, 48th ed, Kitab mahal, Allahabad, 2005.
4. Sadhu AN, Amarjit Singh, Research methodology in Social Sciences. Himalaya Publishing House, gurgoan, Mumbai, 1992.

JOURNALS

1. Journal of academic writing

E-LEARNING RESOURCES

Course Outcome

CO No	CO statement	Knowledge level
CO1	Develop a frame work for scientific writing.	K1
CO2	Describe, Compare and Interpret various means for poster, oral presentation and copy editing.	K2, K4, K5
CO3	Evaluate the use of websites, search engine, E-journals and E-library for research	K5
CO4	Propose the authenticity of the research article using plagiarism checking soft ware.	K6

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:**S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2**W**EAKLY CORELATED-1 **N**O CORELATION-0

TEACHING METHODOLOGY

1. Lecture (Chalk and Talk-OHP-LCD)
2. Flipped Learning/Blended Classroom-E Content, Videos
3. Problem Solving-Group Discussion-Role Modelling
4. Quiz-Seminar
5. Peer Learning

Diet in Cancer: Etiology, types, metabolic effects, nutritional implications in different types of cancers and alternative nutritional therapies. (15 HOURS)

UNIT IV: Diet in Renal disorders:
Basic renal function, Etiology, symptoms, metabolic and nutritional implications and dietary treatment of Acute and chronic glomerulonephritis, Nephrotic syndrome, Acute kidney disease and End stage renal disease in adults and children.
Nephrolithiasis: Risk factors, composition of renal stones, diagnosis, medical nutrition therapy. (10 HOURS)

UNIT V: Diet in Burns: Types, Metabolic alterations, Rule of nine and Medical nutritional therapy.
Diet in Surgery: Pre-operative nutritional assessment.
Pre and post nutritional care in gastro intestinal surgery and Bariatric Surgery
Pre and post nutritional care in Liver transplantation, Cardiac transplantation and Kidney transplantation (15 HOURS)

RECOMMENDED TEXTBOOKS

c) Mahan LK, Stump SE and Raymond JL, *Krause's Food and Nutrition Care Process*, 13th Edition, Elsevier Saunders, Missouri, 2012
d) Kane K and Prelack K, Advanced Medical Nutrition Therapy , First Edition, jones and Barlett learning, Burlington, 2019.

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3. Verma P, *Food ,Nutrition & Dietetics*, 1st edition, CBS publishers & distributors PVT Ltd, New Delhi, 2015
4. Edelstein S, *Lifecycle Nutrition- An evidence based approach*, 2nd edition, Jones & Bartlett learning publications, 2015,
5. Elia M, Ljunggvist O, Stratton RJ, Lanham SA, *Clinical Nutrition (The Nutrition Society Textbook)*, 2nd edition, Wiley Blackwell Publishers, 2013
6. Stump SE, *Nutrition and diagnosis related care*, 7th edition, Lippincott Williams and Wilkins, Canada, 2012
7. Srilakshmi B, *Dietetics*, sixth edition, New age Publishing Press, New Delhi, 2011.
8. **Skipper A, Advanced Medical Nutrition Therapy Practice,** Jones and Barlett Learning, MA, 2008
9. Marian M et al., *Clinical Nutrition for surgical patients*, Jones and Bartlett Publishers, Canada, 2008
10. Joshi Y.K, *Basics of Clinical Nutrition*, 2nd edition, JP Medical Publishers Pvt Ltd, New Delhi, 2008
11. Stacy N, *William's Basic Nutrition and Diet Therapy*, 12th edition, Elseivier publications, UK, 2005
12. Gibney MJ, Elia M, Ljunggvist O, ***Clinical Nutrition (The Nutrition Society Textbook)*** Wiley Blackwell Publishers, 2005
13. Whitney EN and Rolfes SR, *Understanding Nutrition,* 9th edition, West/Wordsworth, 2002