CURRICULUM FRAMEWORK AND SYLLABI FOR

MASTER OF NUTRITION AND DIETETICS

(FOR THE CANDIDATE TO BE ADMITTED FROM THE ACADEMIC YEAR 2021- 22)

(UNDER CHOICE BASED CREDIT SYSTEM-CBCS)

DEPARTMENT OF HOME SCIENCE

MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL

Mother Teresa Women's University, Kodaikanal
Department of Home Science
Choice Based Credit System (CBCS)
(2021-2022 onwards)
M.Sc Nutrition and Dietetics

1. About the Programme *

The Postgraduate Program in Nutrition and Dietetics exclusively focuses on nutrients in foods, its biological importance, role of nutrition and diet in overall health as well as therapeutic requirements. The dietetics focuses on different types of diet-oriented diseases, life style diseases, nutritional deficiencies and other health related issues in general and public. The Program aims to enhance the knowledge in the field of nutrition and dietetics among the younger dieticians, fitness trainers, nutritionists and health care workers. The Program focuses on research and extension activities in major thrust areas of nutrition and dietetics, therapeutic nutrition, hospital management and public health nutrition.

2. Eligibility

A pass in B.Sc. Foods and Nutrition/ B.Sc.-Home Science/B.Sc. Nutrition and Dietetics/ B.Sc. Food Science and Nutrition/ B.Sc. Food Technology/B.Sc. Clinical Nutrition and Dietetics, B.Sc. Nutrition, Food Service Management and Dietetics, B.Sc.-Nutrition Food Service Management with computer applications, are eligible to seek admission.

3. General Guidelines for PG Programme:

1. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be **conducted at the end of each semester for the respective subjects.**

2. **Medium of Instruction:** English

3. **Evaluation:** Evaluation of the candidates shall be through Internal and External assessment. The ratio of formative and summative assessment should be 25:75 for both Core and Elective papers.

Evaluation Pattern

	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

Question paper pattern for External examination for Core and Elective papers:

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions - 2 Questions from each Unit	**10**
2	**B**	**5*4=20** (Either/or, Choice, from each unit)	**20**
3	**C**	**3*15=45** (Open Choice) (Any three Questions out of 5 - one Question from each Unit)	**45**
Total Marks			**75**

Project Report

A student should select a topic for the Project Work at the end of third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages.

Evaluation:

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks, Viva: 75 Marks)

Minimum credits required to pass - 90.

4. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance should apply for condonation in the prescribed form with prescribed fee. Students with65% to 70% of attendance should apply for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

5. Any Other Information:

In addition to the above regulations, any other common regulations pertaining to the PG Programmes are also applicable for this programme.

Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

The Expected Programme Outcomes on completion of M.Sc. Foods and Nutrition

PROGRAMME OUTCOMES (PO)

Upon completion of this Programme, the students will be able to

PO1: expertise in the field of Food Science, Nutrition, and Dietetics.

PO2: work in hospitals, research laboratories, food industries, health sectors.

PO3: acquire professional competence to face the challenges of the food processing sector and other nutritional organizations.

PO4: acquire knowledge and skills in highly entrepreneurial courses in the areas of Food Processing, Quality Control, Food product development, Food labeling, and Nutritional Sciences.

PO5: do attained-based research in Foods and nutrition for improving the livelihood of the community and the nation.

PO6: identify food-based approaches for alleviating nutritional problems to improve nutrition and health security.

PO7: develop entrepreneurial skills by providing skill development programs in food processing sectors.

PROGRAMME SPECIFIC OUTCOMES (PSO)

Upon completion of this Programme, the students shall

PSO1 - understand the nature and basic concepts in the field of Food Science and Nutrition.

PSO2 -extend the knowledge on applications of research in Foods and nutrition for improving the livelihood of the community

PSO3 -analyze the relationship between diet and health and impart knowledge to alleviate nutritional problems and to achieve health security.

PSO4 -gain proficiency to get employability in hospitals, food processing sectors

PSO5 -apply knowledge on clinical intervention, nutrition education, and diet planning, counseling, and health promotion.

Mother Teresa Women's University-Kodaikanal

The framework of the Syllabus to be implemented from the Academic Year 2021-2022

M.Sc-Nutrition and Dietetics

S.No	Paper Code	Course title	Cr	Hours		Continuous Internal Assessment (CIA)	End Semester Exam (ESE)	Total
				L	P			
Semester-I								
1	P21NDT11	Core I Advanced Food science	4	5	0	25	75	100
2	P21NDT12	Core II - Human physiology	4	5	0	25	75	100
3	P21NDT13	Core III - Community nutrition	4	5	0	25	75	100
4	P21NDT14	Core IV - Nutrition through life cycle	4	5	0	25	75	100
5	P21NDP11	Core-V Practical I Advanced food science	4	-	6	25	75	100
6	P21CSS11	Supportive Course II Computer skills for web designing and video editing	2	-	4	25	75	100
		Total	**22**	**30**				**600**
Semester II								
7	P21NDT21	Core VI - Advanced nutrition - I	4	4	0	25	75	100
8	P21NDT22	Core VII - Nutritional Biochemistry	4	4	0	25	75	100
9	P21NDP23	Core VIII Therapeutic nutrition-I	4	5	0	25	75	100
10	P21NDT24	Core-IX Functional foods and Nutraceuticals	4	5	0	25	75	100
11	P21NDP22	Core-X Therapeutic nutrition practical-I	4	0	6	25	75	100
12	P21NDN211	Elective-I(NME)	4	4	0	25	75	100
13	P21NDS22	Supportive Course I(Skill) Public health nutrition	2	0	2	25	75	100
		Total	**26**	**30**				**700**
Semester-III								
14	P21NDT31	Core XI Research methods and statistics	4	5	0	25	75	100
15	P21NDT32	Core-XII Institutional food service management	4	5	0	25	75	100
16	P21NDT33	Core-XIII Therapeutic	4	4	0	25	75	100

		nutrition-II						
17	P21NDT34	Core-XIV Nutrition and fitness	4	4	0	25	75	100
18	P21NDP35	Core-XV Advanced nutrition-II	4	4	0	25	75	100
19	P21NDT36	Core-XVI Therapeutic nutrition practical-II	4	0	6	25	75	100
20	P21WSS33	Supportive Course III Women Empowerment	2	2	0	25	75	100
		Total	**26**	**30**				**700**
Semester IV								
21	P21NDE411/ P21NDE412/ P21NDE413	Elective-I* (Food product development/ Home science composite/ ICT tools for nutrition education/ any MOOC course [$])	4	4	0	25	75	100
22	P21NDE421/ P21NDE422/ P21NDE423	Elective-II* (Food toxicology / Food safety and quality control/ Nutrition counselling/ any MOOC course [$])	4	4	0	25	75	100
23	P21NDR41	Project	8	22	0	25	75	100
		Total	**16**	**30**	**0**			**300**
		Grand Total	**90**	**120**				**2300**

Additional Credit Courses

1. P21NDI21: Internship/Industrial Training – Two Credits- (Second Semester)
2. P21NDO31: Online Courses-Two Credits- (Third Semester)
3. P21NDV11Value Added Program I-Two Credits (First Semester: Drug and nutrient interactions)
4. P21NDV42: Value Added Program II-Two Credits (Fourth Semester: Scientific writing)

*Those who have CGPA 9 and want to do the project in industry/institution during the 4th semester, may opt for these two papers in third semester.

[$]The students can take one 4 credit course in MOOC as elective or two 2 credits course in MOOC as elective with the approval of Department committee.

Outside class hours

Health, yoga and physical fitness

Library information access and utilization

Employability training

Subject Elective courses

Paper No.	Paper Code	Name of the course	Hours	Credits	Continuous Internal Assessment (CIA)	End Semester Exam (ESE)	Total
Elective-I							
1	P21NDE411	Food product development	4	4	25	75	100
2	P21NDE412	Home science composite	4	4	25	75	100
3	P21NDE413	ICT tools for nutrition education	4	4	25	75	100
Elective-II							
4	P21NDE421	Food toxicology	4	4	25	75	100
5	P21NDE422	Food safety and quality control	4	4	25	75	100
6	P21NDE423	Nutrition counselling	4	4	25	75	100

Non-major Elective courses

Paper No.	Paper Code	Course Title	Name of the course	Hours	Credits	Continuous Internal Assessment (CIA)	End Semester Exam (ESE)	Total
1	P21NDN211	NME	Basics of human nutrition	4	4	25	75	100
2	P21NDN212	NME	Women and health	4	4	25	75	100
3	P21NDN213	NME	Food processing	4	4	25	75	100

Semester-I

Course Code	P21NDT11	ADVANCED FOOD SCIENCE	L	T	P	C
CORE -I			5	-	-	4
Cognitive Level	**K2: Understand** **K3: Apply** **K4: Analyze**					
Learning Objectives	**The course aims to** 1. To understand the composition, classification, and function of various food groups. 2. To analyze the factors affecting cooking and keeping quality of food. 3. To identify the foods with their nutritional properties and the scope of the research in future foods.					

Unit I Food classification: cereals and pulses

Food classification by ICMR, FSSI, Food groups, Cereals - Rice & wheat and other Millets - Composition, Nutritive Value, and Processing. Role of starch and gluten in cookery Pulses and legumes–Nutritive value, types, Processing, and anti-nutritional factors, factors affecting cooking quality, germination.

Unit II Fruits and vegetables

Fruits - Classification, Nutritive value, ripening of fruits, changes in ripening and pectic substances, browning. Vegetables: classification, nutritive values, processing, pigments, color changes, browning. Vegetable based preserved foods.

Unit III Milk and meat foods

Milk - Classification, Nutritive value, Putrefaction, processing. Egg - Structure, Composition, Nutritive Value, and Role of egg in cookery.Meat - Structure, Composition, Nutritive value, Changes on cooking and Rigor mortis. Poultry - Composition, Nutritive value, changes in cooking. Fish - Composition, Nutritive value, Selection, Spoilage, Changes on Cooking. Fish processing and its advancements.

Unit IV Fats and oils

Fats and Oils – Types, properties of fat relating to cooking, Rancidity, Tests for rancidity, antioxidants used for rancidity, Hydrogenation, the role of fats in cookery.

Unit V Sugar and beverages

a. Sugar cookery - Types of sugar, Properties, Crystallization, Stages in Sugar cookery, Application in Indian recipes. Artificial sweeteners: processing and safety measures of artificial sugar intake.
b. Beverages –Basic Classification, Nutritive value, Preparation of milk-based beverages. Tea, coffee, cocoa processing, malted beverages, flavored drinks. Processing of beverages, recent developments in beverage processing.
c. Spices and Condiments: production, nutrient contents, classification, processing of spices and condiments.

References Textbooks

1. Srilakshmi, M., Foodscience, New Age International (P) Ltd., Publishers 2010.
2. Swaminathan, M., Foodscience, Chemistry and E.xperimental Foods, Bappco Publishers, 2005.

3. Sivasankar B, Food Processing and Preservation, Prentice-Hall of India Private Limited, New Delhi, 2002
4. Mehas, K.Y., and Rodgers, S. L., Foodscience and You. Mcmillan Mcgraw Hill Company, 2000.
5. Potter, Norman N., and Joseph H. Hotchkiss. *Food science*. Springer Science & Business Media, 2012.
6. Manay S and Swamy S, Food Facts and Principles, New Age International (P) Ltd Publishers, New Delhi, 2001.

References: Books:

1. Brown. A. Understanding Food, Wadsworth, Thomson Learning Publications, 2000.
2. Mehas, K.Y., and Rodgers, S. L., Foodscience and You. Mcmillan Mcgraw Hill Company, 2000.
3. Paul, P.C., and Palmer, H. H., Food Theory and Applications. John Wiley and Sons, Newyork, 2000 Revised Edition.
4. Fellows,P, Food Processing Technology-Principles and Practice.,2nd edition, CRC press WoodLead Publishing Ltd, Cambridge, England, 2000.
5. Vaclavik, Vickie A., Elizabeth W. Christian, and Elizabeth W. Christian. *Essentials of food science*. Vol. 42. New York: Springer, 2008.

JOURNALS

1. Indian Food Science Journal
2. International journal of Food Technology

COURSE OUTCOMES

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

K2	**CO1**	The importance of food groups based on the nutrient value to enable meal planning in cereals
K2	**CO2**	The scientific basis of preliminary of food: pulses and fruits
K3	**CO3**	Conservation of nutrients and acceptability of food preparation in egg and fish
K2	**CO4**	Advanced food science in milk and oil.
K4	**CO5**	The effect of processing and storage on the nutritional composition of sugar, beverages, and spices

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	**M**	S	S	S	M	M	S	M
CO2	S	S	S	S	**M**	S	S	S	M	M	S	M
CO3	S	S	S	S	**M**	S	S	S	M	M	S	M
CO	S	S	S	S	**M**	S	S	S	M	M	S	M
CO5	S	S	S	S	**M**		S	S	M	M	S	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code	P21NDT12	HUMAN PHYSIOLOGY	L	T	P	C
CORE -I			5	-	-	4
Cognitive Level	**K1: Recall** **K2: Understand** **K4: Analyze**					
Learning Objectives	**The course aims** **1.** to aid the Students to conquer knowledge about the various physiological structure and functions of the human body. **2.** to integrate the functions of all the systems and disease conditions.					

Unit I Cell components

Cellular basis of Physiology - Body fluid compartment, membrane potential, cell structure, and functions - Regulation of cell multiplication.
Digestive System: Review of structure and function of various parts in the gastrointestinal tract in brief. Role of liver, pancreas, gall bladder and their dysfunction. Role of specific hormones associated in GI tract.

Unit II Respiratory system
Review of structure and functions. Role of lungs in the exchange and transport of gases. Respiratory volumes
Excretory System: Anatomy and physiology of kidneys and nephron. Formation of urine, acid-base balance, Role of the kidney in maintaining pH of the blood.

Unit III Immune System

Immunity - Properties, natural and acquired Immunity, features of immune responses, antigen - antibodies - types, properties, and antigen-antibody interaction, Autoimmune disorder and allergy.
Circulatory System: Structure and function of the heart and blood vessels. Blood: Composition- plasma, blood cells, haemoglobin, blood clotting process. Regulation of cardiac output, cardiac cycle, blood pressure.

Unit IV Endocrine system

Anatomy and physiological functions of endocrine glands: Hormones - Mode of action - Pituitary, Adrenal, Thyroid, Parathyroid, Sex glands, and Pancreas. Hypo and Hyper activities of the glands.
Reproduction System: structure, physiological functions of male and female reproductive organs, menstrual and ovarian cycle, spermatogenesis, contraceptives, infertility and its recent developments, Rh factor.

Unit V Nervous system: Review of CNS & ANS, the function of neuron, conduction of nerve impulse, synapse, the role of neurotransmitters. The blood-brain barrier, CSF. Hypothalamus and its role in various body functions –sleep, memory, and obesity.
Sense organs: Review of structure and function skin, eye, ear, nose, and tongue in the perception of stimuli.

REFERENCES

Textbooks

1.Sembulingam, Kirma, and Prema Sembulingam. *Essentials of medical physiology*. JP Medical Ltd, 2012.
2.Ashalatha, P. R., and G. Deepa. *Textbook of Anatomy & Physiology for Nurses*. JP Medical Ltd, 2012.
3.Chatterjee CC, Human Physiology, Volume I, 11th Edition, CBS Publishers, New Delhi, 2016.
4.Sathya P and Devanand V, Textbook of Physiology, First edition, CBS Publishers and Distributers Pvt Ltd, New Delhi, 2013
5.Boron WF and Boulpaep EL, Medical Physiology, IIedition,SaundersElseivier, 2009
6.MariebEN,Human Anatomy and Physiology, VI edition, Pearson edition, 2004
7.Tortora. G&Grabowski, S.R. Principles of Anatomy & Physiology,10thEdition, John Wiley & Sons, USA,2003

Reference books

1.Ganong, WF, Review of Medical Physiology,21st Edition, McGraw Hill Publishers, 2003
2.Guyton AC & Hall JE,Textbook of Medical Physiology,10th Edition, Harcourt Asia P.Ltd Singapore, 2001
3.Subrahamanyam, Sarada, K. Madhavankutty, and H. D. Singh. *Textbook of human physiology*. S. Chand Publishing, 1987.

Course Outcome

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

K2	**CO1**	Cellular science and the human digestive system
K4	**CO 2**	Respiratory functions and excretory system functions
K2	**CO 3**	Immune system and role of the digestive system
K1	**CO 4**	Endocrine and reproductive system
K2	**C05**	Nervous system and sensory organs

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	**S**	M	**S**	**S**	**S**	M	**S**	M	**S**	**S**	M
CO2	M	**S**	M	**S**		**S**	M	**S**	M	**S**	**S**	M
CO3	M	**S**	M	**S**	**S**	**S**	M	**S**	M	**S**	**S**	M
CO4	M	**S**	M	**S**	**S**	**S**	M	**S**	M	**S**	**S**	M
CO5	M	**S**	M	**S**	**S**	**S**	M	**S**	M	**S**	**S**	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code	P21NDT13	COMMUNITY NUTRITION	L	T	P	C
Core - II			5	0	0	4
Cognitive Level	**K1: Recall** **K2: Understand** **K4: Analyze** **K5: Evaluate**					
Learning Objectives	**The course aims to** 1. understand the nutritional problems at the national and international levels. 2. recognize the various organizations and their role in communal health development.					

Unit I Community nutrition: an overview

Definition and key concepts – community, nutritional anthropology (community health) health situation in India, the concept of disease, causation (Agent, host, environmental factors) concept, control and prevention, modes of intervention.

Unit II Nutritional epidemiology

Nutritional epidemiology: classification Indirect methods - Demography, population dynamics, and vital events and their health implications, indicators of health, and nutrition (IMR, MMR).

Direct methods - Anthropometry, Biochemical, Clinical, Dietary and Functional indices of assessments.

Unit III Elements of health care

Elements & principles of health care, SDG, Millennium Development Goal, five-year plan, health care delivery system (primary health care), pyramidal structure of health care service, agencies (Govt. and Private) in delivery health care services.

Unit-IV Communicable and Non-communicable diseases

Communicable and non-communicable diseases (Epidemiology Prevalence Source of infection, Vaccination schedule, Preventive measures, diet therapy)

Communicable diseases: Typhoid, tuberculosis, cholera, chicken box, hepatitis, SARS, and covid-19.

Non-communicable diseases: Hypertension, CVD, cancer, renal disorders, liver disorders.

Unit V National and International agencies for health care

National organization – ICAR, ICMR, SCWB, SSWB, NNMB, NIN, CFTRI, DFRL, NIPCCID, and NFI; International Organizations - WHO, FAO, UNICEF, World Bank, FFHC, WFP; Voluntary organizations – Global Alliance for Improved Nutrition (GAIN).

References

1. Park, K. "Park's textbook of preventive and social medicine." *Preventive Medicine in Obstet, Pediatrics' and Geriatrics*, 2005.
2. Bamji, Mahtab S., Kamala Krishnaswamy, and G. N. V. Brahmam, eds. *Textbook of human nutrition*. Oxford & IBH, 2016.
3. Swaminathan, M. "Use of food exchange lists in dietary calculations, Essentials of food and nutrition, The Bangalore printing and Publishing co." *Ltd* 2 , 2007.

4. Bamji, M.S., Rao, P.N., Reddy, V (Eds): Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2003.
5. Swaminathan M, Essentials of Food and Nutrition. An Advanced Textbook Vol. I, The Bangalore Printing and Publishing Co. Ltd, Bangalore, 2007.

Journals:

1. Reports of the State of World's Children, WHO and UNICEF, Oxford University.
2. Reports of National Family Health Survey, International Institute for Population Science, Mumbai.
3. Indian Journal of Medical Research, ICMR, New Delhi,
4. Indian Journal of Pediatrics, Valley Nicro, Missouri, U.P.
5. Indian Journal of Nutrition and Dietetics, Avinashilingam Deemed University, Coimbatore.
6. Proceedings of the Nutrition Society of India, NSI, Hyderabad

Course outcomes

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

K1	**CO1**	Important nutrition problems and their prevention.
K4	**CO2**	Compare the nutritional needs for the disadvantaged and upper socio-economic strata in society.
K5	**CO3**	The causes/determinants and consequences of nutrition problems in society.
K4	**CO4**	The epidemiological issues of communicable and non-communicable diseases
K2	**CO5**	The various approaches to nutrition and health interventions, programs, and policies.

Mapping of Cos with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	M	S	S	S	M	M
CO2	S	S	M	M	S	S	M	S	S	S	M	M
CO3	S	S	M	M	S	S	M	S	S	S	M	M
CO4	S	S	M	M	S	S	M	S	S	S	M	M
CO5	S	S	M	M	S	S	M	S	S	S	M	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code	P21NDT14	NUTRITION THROUGH LIFE CYCLE	L	T	P	C
Core- IV			5	0	0	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply**				
Learning Objectives		**The course aims to** 1. know the role of diet in preventing the degenerative diseases 2. acquire knowledge about the types of diet 3. improve the lifestyle through proper diet planning				

Unit I Nutritional status overview

Nutritional status: malnutrition, undernutrition, overnutrition, factors associated with malnutrition, morbidity, and mortality. Global, and national data on malnutrition. Nutritional status of different age groups, Recommended dietary intake.

Unit II Nutrition in Pregnancy and lactation

Stages of gestation, maternal weight gain, complications of pregnancy, nutritional problems and dietary management, the importance of nutrition during and before pregnancy, teenage pregnancy - nutritional problems, and dietary management.

Nutrition in Lactation

Physiology of lactation, hormonal control, and reflex action, the efficiency of milk production, problems of breastfeeding, the nutritional composition of breast milk, nutritional concerns during lactation, special foods during lactation, dietary modification.

Unit III Nutrition in Infancy, pre-school and school children

Infant feeding, nutritional needs, premature infant and their feeding, weaning foods.
Feeding problems, infant formulae lactose intolerance.
Nutrition in Pre-school - Physiological development related to nutrition, feeding problems, behavioral characteristics, nutritional requirement.
Nutrition in school children - feeding school children and factors to be considered.
Nutritional requirements, feeding problems, packed lunch.

Unit IV Nutrition in Adolescents and Adults

- Physical changes
- Nutritional requirements
- Food behavior - food habits and dietary practices.
- Nutritional problems.

Unit V Geriatric Nutrition

- The aging process - Physiological, biochemical, and body composition changes.
- Socio-psychological aspects of ageing - Special problems of the elderly.
- Nutritional requirements of the elderly & dietary management to meet nutritional needs.

REFERENCES

Text books

1. Srilakshmi B, Dietetics, sixth edition, New age Publishing Press, New Delhi, 2011

2. Gopalan C., Ramanathan, P.V. Balasubramanian, S.C., Nutritive value of Indian foods, NIN, Hyderabad, 2001.

Reference books

1. Sharma M, Textbook of Nutrition, 1st edition, CBS publishers & distributors PVT Ltd, New Delhi, 2017.
2. Longvah T, Ananthan R, Bhaskar K, Venkaiah K, Indian Food Composition Tables, National Institute of Nutrition, 2017
3. Abraham S, Nutrition Through Lifecycle, 1st edition, New age international publishers, New Delhi, 2016
4. Verma P, Food ,Nutrition & Dietetics, 1st edition, CBS publishers & distributors PVT Ltd, NewDelhi, 2015
5. Edelstein S, Lifecycle Nutrition- An evidence based approach, 2nd edition, Jones & Bartlett learning publications, 2015,
6. Mahan LK, Stump SE and Raymond JL, Krause's Food and Nutrition Care Process, 13th Edition, Elsevier Saunders, Missouri, 2012
7. Stump SE, Nutrition and diagnosis related care, 7th edition, Lippincott, 2012
8. Stacy N, William's Basic Nutrition and Diet Therapy, 12th edition, Elseivier publications, UK, 2005
9. Whitney EN and Rolfes SR, Understanding Nutrition, 9 th edition, West/Wordsworth, 2002
10. Garrow JS, James WPT, Ralph A, Human Nutrition and Dietetics 10th edition, Churchill Livingstone, NY, 2000
11. Groff JL, Gropper SS, Advanced Nutrition and Human Metabolism 3 rd edition, West / Wadsworth, UK. 2000

JOURNALS

1. International journal of food, nutrition and public health
2. Indian journal of nutrition and dietetics

Course outcomes

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

K2	CO1	The Vulnerable sections of society
K3	CO2	Nutrition in pregnancy and lactation needs
K2	CO3	Nutrition and growth and development during infancy, pre-school, and school-going children.
K3	CO4	The students with the multifaceted aspects of adolescents and adults
K1	CO5	The nutritional and health care of the elderly.

Mapping of Cos with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	M	S	S	M	S	M
CO2	S	S	M	S	S	M	M	S	S	M	S	M
CO3	S	S	M	S	S	M	M	S	S	M	S	M
CO4	S	S	M	S	S	M	M	S	S	M	S	M
CO5	S	S	M	S	S	M	M	S	S	M	S	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code	P21NDP11	PRACTICAL - I ADVANCED FOOD SCIENCE PRACTICALS	L	T	P	C
Core V			0	0	6	4
Cognitive Level		**K2: Understand** **K5: Evaluate** **K6: Create**				
Learning Objectives		**The course aims to** 1. do various food evaluation methods for the determination of food constituents 2. understand the processing conditions on physicochemical properties of food constituents during food processing.				

1**. Food Evaluation**: -organoleptic evaluation.

2. **Cereal cookery**–Dextrinization, caramelization, and gelatinization. Study the development of gluten.
3.Pulse cookery - Effects of soaking, acid, alkali, and sprouting and different methods of cooking on cooking time and quality of pulses.
3. **Fruits and vegetable cookery** - Effect of acid, alkali, and methods of cooking on pigments.

4. **Egg, meat, fish, poultry** – egg foaming, egg coagulation, Study of cooking time on different types of meat.
5. **Fats and oils** - Smoking point of different fats and oils

6**. Sugar cookery** - Stages of sugar cookery, uses of sugar in Indian recipes. Crystallization and factors affecting crystallization.
7. Milk cookery- effect of acid, salt, heat on milk proteins.

Course outcomes

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

K5	**CO1**	Food evaluation techniques.
K5	**CO2**	Various cookery methods and their evaluation procedures in cereals, pulses, and vegetable cookery.
K5	**CO3**	The cooking principles on meat and poultry
K2	**CO4**	The smoking point of different fats and oils.
K6	**CO5**	Various sugar-based recipes food analytical techniques on sugar and milk cookery.

Mapping of Cos with POS & PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**M**	**M**	**S**	**S**
CO2	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**M**	**M**	**S**	**S**
CO3	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**M**	**M**	**S**	**S**
CO4	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**M**	**M**	**S**	**S**
CO5	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**M**	**M**	**S**	**S**

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Semester-II

Course Code	P21NDT21	ADVANCED NUTRITION- I	L	T	P	C
Core - VI			4	0	0	4
Cognitive Level		**K1: Recall** **K2: Understand** **K5: Evaluate**				
Learning Objectives		**The course aims to** 1. the essential of nutrients in the growth and development of humans 2. the importance of nutrients in maintaining human health and leading an active lifestyle				

Unit I Human energy requirements:

Total energy expenditure-Basal Metabolic Rate, Physical activity, SDA
a. Components of energy requirements.
b. Factors affecting energy expenditure and requirements: the thermal effect of food, energy expended in physical activity.
- Methods of estimation of energy expenditure and requirements.
Harris-Benedict equation

- Energy excess and energy are deficient in brief.

Unit II Carbohydrates
Classification (available and unavailable), sources, digestion, absorption, metabolic utilization functions, and regulation of blood glucose concentration.

Dietary fiber:
Classification of dietary fiber, physiological effects, potential health benefits, recommended intake, and sources

Unit III Proteins
a. Functions, classification, sources, RDA, Digestion, absorption, utilization and storage,
b. Evaluation of protein quality.
c. Essential and non-essential amino acids, Amino acid balance, imbalance, and toxicity

Unit IV Lipids
- Functions, classification, sources, RDA
-Digestion, absorption, utilization, and storage.
- Transport and storage of fats in the body.
- Lipoproteins.

Unit V Water
Water: composition of body fluids extra- and intra- cellular fluid; Physiological functions; water balance and its regulation; Requirement and the sources; Nutritional and health problems due to deficiency or excess of water intake.

REFERENCES

1. Krause,M.V and Hunsher,M.A, Food, Nutrition and Diet Therapy, 11th edition, W.B.Saunders company, Philadelphia, London, 2007.

2. Advanced Nutrition: Macronutrients, Micronutrients, and Metabolism Carolyn D. Berdanier (Author), Lynnette A. Berdanier , Janos Zempleni Edition: 1 2008.

3. Recommended dietary allowances, ICMR, National Institute of Nutrition, Hyderabad, 2010.

4. Swaminathan,M. Advanced Textbook on Food Science and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printing and Publishing Co Inc, Bangalore, 2012.

5. Sri lakshmi,B, Nutrition Science, New Age International (Pvt) Ltd, New Delhi, 4th edition 2012.

6. Maurice Edward Shils, Moshe. Shike Modern Nutrition in Health and Diseases 10th edition 2006.

7.Srilakshmi, B. *Nutrition Science*. New Age International, 2006.

8. Wahlqvist, Mark L. "The new nutrition science: sustainability and development." *Public Health Nutrition* 8, no. 6a (2005): 766-772.

Journals:

1. Annual Reports, National Institute of Nutrition, Hyderabad.

2. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.

3. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.

4.The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Education Trust Institutions for Women, Coimbatore.

Course outcomes

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

K2	CO1	The methods to determine body composition
K1	CO2	The current trends in the area of human nutrition requirements the methods of determining nutrient requirements and current figures of nutritional requirements.
K2	CO3	Advances in the field of energy, carbohydrate, lipid, and protein nutrition.
K5	CO4	Facts on nutrients and their requirements.
K2	CO5	Functional foods and their applications

Mapping of Cos with POS & PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	M	S	S	M	S	M
CO2	S	S	M	M	S	S	M	S	S	M	S	M
CO3	S	S	M	M	S	S	M	S	S	M	S	M
CO4	S	S	M	M	S	S	M	S	S	M	S	M
CO5	S	S	M	M	S	S	M	S	S	M	S	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code	P21NDT22	NUTRITIONAL BIOCHEMISTRY	L	T	P	C
Core - VI			4	0	0	4
Cognitive Level		**K1: Recall** **K2: Understand** **K5: Evaluate**				
Learning Objectives		**The course aims to** On successful completing of this course the student will be able to: 1. Understand the biochemical basis for nutrition and health 2. Understand the mechanisms adopted by the human body for the regulation of metabolic pathways. 3. Get an insight into interrelationships between various metabolic pathways.				

Unit I Metabolism of carbohydrate

Introduction, Classification. Structure and Properties of monosaccharides (hexoses and pentoses). Oligosaccharides – Sucrose, maltose, lactose, isomaltose, cellobiose. Homopolysaccharides - Structures of storage polysaccharides (starch and glycogen). Heteropolysaccharides – Structures of Hyaluronic acid, Heparin, and Chondroitin sulfate.
Glycolysis, Gluconeogenesis, TCA cycle, HMP shunt, bioenergetics, disorders of carbohydrate metabolism - galactosemia, glycogen storage disease, pentosuria, abnormal level in blood glucose.

Unit-II Protein and amino acid metabolism

Structure and classification of amino acids.
Biosynthesis of protein, general catabolism of amino acids, deamination, transamination, urea cycle, disorders of amino acid metabolism - phenylketonuria, cystinuria, albinism, alkaptonuria, maple syrup disease.

Unit-III Biological Oxidation

Enzymes and co-enzymes involved in oxidation and reduction, respiratory chain, phosphates in biologic oxidation and energy capture, the role of the respiratory chain, and mechanism of phosphorylation.

Unit-IV Metabolism of nucleic acids

Structure of DNA, Structure of RNA, Replication, Biosynthesis of purine and pyrimidine nucleotides, Disorders of purine and pyrimidine metabolism

Unit-V Metabolism of lipids

Biosynthesis and oxidation of saturated and unsaturated fatty acids, glycerides, phospholipids and cholesterol, bioenergetics, disorders of lipid metabolism (fatty liver, atherosclerosis), lipoproteins and their significance.

References

Text books

1.Ramadevi K, Ed: Ambika Shanmugam's Fundamentals of biochemistry for medical students, 8th edition, Wolters Kluwer Health, India, 2016

2.Rodwell V, Bender D, Botham KM, Kennelly PJ, Weil PA, Harper's Illustrated Biochemistry, 30th Edition, McGraw hill Education, 2015

Reference books

1. Sulochana H, Principles of Biochemistry, PBS enterprises, Chennai, 2010
2. Cox MM and Nelson DL, Lehninger Principles of biochemistry, 5th edition, EH Freman&Company, New york, 2008
3. Vasudevan DM, Sreekumari S, Textbook of Biochemistry, 5th edition, Jaypee Publishers, New Delhi, 2007
4. Veerakumari L, Biochemistry, 1st edition, MJP Publishers, 2005
5. Murray RK, Granner DK, Mayes PA, Rodwell VW, Harper's IllustratedBiochemistry,26th edition, Mcgraw hill publishing house,., 2003
6. Montgomery R, Conway TW, Spector AA, Biochemistry-A care oriented Approach. Mosby Company, 1990

Journals

1. International journal of Clinical Nutrition
2. Indian Journal of medical Biochemistry

Course outcomes

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

K1	**CO1**	The concepts and chemistry of biological oxidation
K2	**CO2**	The concepts of macronutrient metabolism
K5	**CO3**	The metabolism of lipids
K2	**CO4**	The concepts of protein and amino acid metabolism
K2	**CO5**	The role of nucleic acids in metabolism

Mapping of Cos with POS & PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	M	M	S	S	S	M	M
CO2	S	S	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	S	S	M	M	S	S	S	M	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code	P21NDT23	THERAPEUTIC NUTRITION - I	L	T	P	C
Core - VI			5	0	0	4
Cognitive Level		**K2: Understand** **K3: Apply** **K4: Analyze**				
Learning Objectives		**The course aims to** provide an exposure on the study of etiology, symptoms and medical nutrition therapy in various diseases. learn the method to plan and prepare diet for various diseases.				

Unit I Therapeutic diets

Definition - Introduction - Types - routine hospital diet - clear fluid, full - liquid and soft diets, Pre and Post-operative diet. Regular normal diet. Special feeding methods-tube feeding - types of food- food requirements- parental feeding. TPN formula for children, adolescents.

Unit II Diet in Obesity &Underweight:

Dietary management in Obesity a) Etiology, Classification and Energy balance b) Physiology of the obese state & Clinical manifestations c) Risk factors, Complications and Lifestyle modifications d) Nutraceuticals and Dietary management Dietary management in Underweight a) Etiologyand dietary management Dietary management in Eating disorders a) Definition, Signs and symptoms and Complications/health risks, Diagnostic criteria and nutrition management in Anorexia Nervosa and Bulimia Nervosa.

Unit-III Diet in Febrile condition & Gastrointestinal Diseases:

Classification and etiology of fever/infection, symptoms, diagnostic tests , Metabolic changes during infection and dietary treatment for - Typhoid, Influenza, Malaria, Tuberculosis and HIV & AIDS.

GI disorders- etiology, symptoms and medical nutrition therapy for Peptic ulcer, Constipation, Diarrhea,

Unit-IV Diet in Diabetes Mellitus

Dietary management of Diabetes mellitus a) Prevalence, Types, Aetiology and Signs and Symptoms b) Factors affecting normal blood glucose levels c) Impaired glucose homeostasis d) Diagnostic test for diabetes e) Complications of diabetes - macro-vascular and micro-vascular Management of Diabetes a) Food exchange list, b) Glycaemic index of foods, Carbohydrate counting and Resistant starch c) Sweeteners and sugar substitutes d) Meal planning approaches - With and without Insulin and during sickness. e) Medications - Oral hypoglycaemic drugs and Insulin. f) Lifestyle modification and exercise to manage diabetes mellitus.

Unit-V Diet in Cardiovascular Diseases:

Diet in Cardiovascular Diseases a) Prevalence, Clinical effects b) Risk factors, Role of fat in the development of atherosclerosis c) Dietary management d) Hyper tension e) Physical activity and Heart diseases f) Fat substitute .

Hypertension – etiology, symptoms, medical nutrition therapy

REFERENCES

Text books

1. Robinson, Corinne Hogden, and Marilyn R. Lawler. *Normal and therapeutic nutrition*. No. Ed. 16. Collier Macmillan Publishers, 1982.
2. Dietary Guidelines of Indians- A Manual, National Institute of Nutrtition, Hyderabad, 2006.
3. Srilakshmi B, Dietetics, sixth edition, New age Publishing Press, New Delhi, 2011
4. Stacy N, William's Basic Nutrition and Diet Therapy, 12th edition, Elseivier publications, UK, 2005.
5. Elia M, Ljunggvist O, Stratton RJ, Lanham SA, Clinical Nutrition (The Nutrition Society Textbook), 2nd edition, Wiley Blackwell Publishers, 2013
6. Mahan LK, Stump SE and Raymond JL, Krause's Food and Nutrition Care Process, 13th Edition, Elsevier Saunders, Missouri, 2012
7. Stump SE, Nutrition and diagnosis related care, 7th edition, Lippincott Williams and Wilkins, Canada, 2012

Reference books

1. Gopalan C., Ramanathan, P.V. Balasubramanian, S.C., Nutritive value of Indian foods, NIN, Hyderabad, 2010
2. Srilakshmi B, Dietetics, sixth edition, New age Publishing Press, New Delhi, 2011.
3. Marian M et al., Clinical Nutrition for surgical patients, Jones and Bartlett Publishers, Canada, 2008
4. Joshi Y.K, Basics of Clinical Nutrition, 2nd edition, JP Medical Publishers Pvt Ltd, New Delhi, 2008
5. Stacy N, William's Basic Nutrition and Diet Therapy, 12th edition, Elseivier publications, UK, 2005
6. Gibney MJ, Elia M, Ljunggvist O, Clinical Nutrition (The Nutrition Society Textbook) Wiley Blackwell Publishers, 2005
7. Whitney EN and Rolfes SR, Understanding Nutrition, 9 th edition, West/Wordsworth, 2002
8. Guthrie H, Introductory Nutrition, CV Mosby Co.St. Louis, 2002
9. Williams SR, Nutrition & Diet Therapy, CV. Mosby St. Louis, 2001
10. Garrow et al, Human Nutrition & Dietetics, 10th Edition, Churchill Livingston, 2001

Journals:

1. Journal of American Dietetic Association. The American Dietetic Association Mount Arris, Illinois-61054, USA.
2. The American Journal of Clinical Nutrition Published by the American society for Clinical Nutrition, Inc., USA.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Home Science College for Women, Coimbatore.
4. Clinical Nutrition, Bell and Bain Ltd., Scotland.
5. Food and Nutrition Bulletin, United Nations University Press, Japan

Course outcomes

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

K2	**CO1**	Plan and prepare standardized hospital diet for the needed patients.
K2	**CO2**	Select specific foods for management for obesity and underweight.
K3	**CO3**	Apply nutrition principles to health promotion and the prevention of gastrointestinal diseases.
K2	**CO4**	Compare the food exchange list in the control of diabetes and complications
K4	**CO5**	Identify the relationship between diet and cardiovascular disease.

Mapping of Cos with POS & PSOs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	**M**	S	S	S	**M**	**M**	S	**M**
CO2	S	S	S	S	**M**	S	S	S	**M**	**M**	S	**M**
CO3	S	S	S	S	**M**	S	S	S	**M**	**M**	S	**M**
CO4	S	S	S	S	**M**	S	S	S	**M**	**M**	S	**M**
CO5	S	S	S	S	**M**	S	S	S	**M**	**M**	S	**M**

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Course Code	P21NDT24	NUTRACEUTICALS AND FUNCTIONAL FOODS	L	T	P	C
Core - VI			5	0	0	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply**				
Learning Objectives		**The course aims to** On successful completion of this course the student will be able to: 1. Knowledgeable about specific issues concerning functional foods and nutraceuticals 2. Understanding the use of various functional foods in therapeutic conditions 3. To develop diet supplements incorporating functional foods 4. Practicing the effect of each food and its effect on health				

Unit I Functional foods and Nutraceuticals

Functional foods and Nutraceuticals – Introduction – Defining, the concept – Review of the history of functional foods – technology of Nutraceuticals – primary and secondary metabolites in plants general teleology – a) Carotenoids b) Conjugated linolenic acid c) Flavonoids d) Nitrogen and Sulphur containing Amino acid derivatives e) proteinase and alpha-amylase inhibitors f) Omega – 3 PUFA g) Terpenoids.

Unit II Classifying Nutraceuticals Organizational models for Nutraceuticals

Classifying Nutraceuticals Organizational models for Nutraceuticals
a) Food source – Plant: Soya, olive oil, plant steroid, tea, grapevine, garlic, capsicum, dietary fibre, and other fruits.
b) Animal: Milk and products, meat, fish. Microbial probiotics.
c) Mechanism of action – Anticancer, positive influence on blood lipid profile, anti-oxidation, anti-inflammatory, osteogenetic
d) Chemical nature – Isoprenoid derivatives, phenolic substances, fatty acids, and structural lipids, carbohydrates and derivatives, amino acid-base substances, microbes, minerals.

Unit III Dietary supplements

Regulation of dietary supplements – Types – inborn errors of metabolism, - obesity, neurological disorder, diabetes mellitus, hypertension vitamin A deficiency, protein energy malnutrition, anemia, Instant foods, and formulas supplement soups, Herbal, and Flowers as functional foods.

Unit IV Bioavailability of nutrients

Bioavailability of nutrients in different foods; measurement of functional component and their bioavailability. Need for measurement, safety quality assurance, and cost bioavailability: definition, factor affecting, chemical measurement and physical testing and microbiological testing- functional foods and vitro studies.

Unit V Nutrigenomics

Pharmacology and Nutraceuticals pharmacology of chemical components. derived from a plant source and the therapeutic derived from a plant source and the therapeutic efficiency of functional food ingredients. Nutrigenomics Relationship between nutritional supplementation and gene expression and disease prevention.
Dietary supplements

REFERENCES:

1. Mary, K. Schmidl and Theodre, P. Labuza, Essentials of Functional Foods, Culinary and hospitality industry publication services, 2000.
2. Israel Goldberg, Functional foods, pharma foods, Nutraceuticals, Culinary and hospitality industry publication services, 2001.
3. Robert easy Wildman, Handbook of Nutraceuticals and functional foods, Culinary and hospitality industry publication services, 2001.
4. Paresh, C. Dutta, Phytosterols as Functional Food Components and Nutraceuticals, Marcel Dekker Inc, New York, 2004.
5. Jeffery Horst, Methods of Analysis for Functional Foods and Nutraceuticals, CRS press, 2002.
6. Webb, G.P, Dietary Supplements and Functional Foods. New York: Blackwell Publishing Ltd, 2006.
7. Wildman, R.E.C, Handbook of Nutraceuticals and Functional Foods. London: CRC Press, Taylor, and Francis, Boca Raton, 2007.
8. Gibson GR & William CM. Functional Foods - Concept to Product. 2000.
9. Goldberg I. Functional Foods: Designer Foods, Pharma Foods. 2004.
10. Brigelius-Flohé, J & Joost HG. Nutritional Genomics: Impact on Health and Disease. Wiley VCH. 2006.
11. Cupp J & Tracy TS. Dietary Supplements: Toxicology and Clinical Pharmacology. Humana Press. 2003.

Course outcomes:
On successful completion of the course, the students will be able to gain knowledge about

K1	CO1	The growing importance of Nutraceuticals and functional foods
K2	CO2	The role of functional foods in health
K2	CO3	The commercial food supplements and their occupation in the market
K3	CO4	The functional assessment of foods
K2	CO5	Nutraceuticals and functional foods on health.

Mapping of Cos with POS & PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	M	S	S	M	M	S	S
CO2	S	M	S	S	M	M	S	S	M	M	S	S
CO3	S	M	S	S	M	M	S	S	M	M	S	S
CO4	S	M	S	S	M	M	S	S	M	M	S	S
CO5	S	M	S	S	M	M	S	S	M	M	S	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code	P21NDP22	THERAPEUTIC NUTRITION	L	T	P	C
I PRACTICAL			0	0	6	4
Cognitive Level		K2: Understand K3: Apply K4: Analyze				
Learning Objectives		The course aims to				

Unit I Routine hospital diet

Routine hospital diet, importance of hospital diets, types of diet - Full liquid, clear liquid, soft, light, bland, and regular diet. Different types of diseases conditions and its variations. Diet for - obesity, underweight: menu planning, preparation, standardization, sensory analysis, nutrient calculation and cost calculation.

Unit-II Underweight and obesity

Planning of diet in Underweight & Obesity: Preparing nutrient dense -high calorie and high protein recipes and Preparing high fiber low calorie recipes for over weight persons.
Underweight: high calorie diet, protein rich diet, low residue diet, foods with high biological value.

Unit III Diet in Gastrointestinal diseases:

Planning and preparation of diets for the following conditions- Gastro Intestinal Disorders- Peptic Ulcer, Constipation, Diarrhoea, Lactose intolerance, Celiac Disease, IBS and IBD: menu planning, preparation, standardization, sensory analysis, nutrient calculation and cost calculation.

Unit IV Planning of diet in Diabetes Mellitus

Diet in Diabetes mellitus –type 1, type 2, GDM, Planning and preparation of diets for the individuals with Diabetes mellitus - Type I diabetes, Type II diabetes and gestational diabetes. Prepare few sweets using artificial sweeteners. Menu planning, preparation, standardization, sensory analysis, nutrient calculation and cost calculation.

Unit V Diet in Cardiovascular Disease

Planning and preparation of diet for Cardio vascular disease patients – Atherosclerosis, Acute myocardial Infarction, Hypertension and Hypercholesterolemia: Menu planning, preparation, standardization, sensory analysis, nutrient calculation and cost calculation.

Text Books:

1. Gibney M.J, Elia, M Ljingquist. O (2005), Clinical Nutrition, Blackwell Science Publishing Co. USA, 2005.

2. Swaminathan, M, Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company. Bangalore, 2002.

Course outcomes

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

K2	**CO1**	Assess knowledge in the method to plan and prepare diet for various diseases.
K2	**CO2**	Identify about the principles of meal planning, diet therapy, therapeutic diets and nutrition support.
K3	**CO3**	Create skill development in planning therapeutic diets using food exchange lists.
K2	**CO4**	Evaluate the concept of food groups and exchanges for planning and preparing a balanced diet
K4	**CO5**	Make appropriate dietary modifications for various disease conditions based on the pathophysiology.

Mapping of Cos with POS & PSOs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	**M**	S	S	S	M	M	S	M
CO2	S	S	S	S	**M**	S	S	S	M	M	S	M
CO3	S	S	S	S	**M**	S	S	S	M	M	S	M
CO4	S	S	S	S	**M**	S	S	S	M	M	S	M
CO5	S	S	S	S	**M**	S	S	S	M	M	S	M

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Course Code	P21NDS22	SUPPORTIVE SKILL COURSE-II	L	T	P	C
PRACTICAL		PUBLIC HEALTH NUTRITION	0	0	2	2
Cognitive Level		**K2: Understand** **K3: Appl** **K5: Evaluate** **K6: Create**				
Learning Objectives		**The Course aims to** On successful completion of this course the student will be able to: 1. To make the communication process with small and large groups 2. To create awareness among people with Mass media and advertisement. 3. To develop the tools for nutrition education				

Unit I Nutritional assessment : Anthropometrical and biochemical

Assessment of Nutritional Status, Dietary surveys, anthropometry and body composition, biochemical and clinical methods. Anthropometric assessment: IBW, BMI, kanwati index, Gomez classification, fat free mass measurements, WHR, skin fold measurements. etc. Bio chemcial assessment: Blood analysis and hemogram, clinical assessment for deficiency diseases. Albumin, prealbumin, CRP, transferrin, hemoglobin, urea and creatine, lymphocytes and point deficiencies.

Unit II Assessment: clinical and dietary

Clinical assessment for nutritional deficiency diseases, Dietary assessment- 24 hour dietary recall, food frequency, 3 day dietary recall. Stress scale (Standard), personality test (MMPI), cognition tests. Standardization of tools and techniques,

Unit III Development of low cost recipes

Development of low-cost recipes: recipe design, standardization, cost calculation. Development of recipes for needed communities: infants, preschoolers, elementary school children, adolescents, pregnant and lactating mothers. The sensory analysis of developed recipes with rating scales.

Unit IV Field visit

Field visits to ongoing national nutrition programs: Integrated Child Development Services, Mid day meal program, Iron folic acid supplementation, deworming, maternal and child welfare programs, vaccination centers, primary health centre, nutrient ball supplementation.

Unit V Weaning foods

Importance of weaning foods, rules and regulations for weaning foods, specific regulating conditions applicable for baby foods and foods for immune competence. Formulation of different weaning foods: nutrient calculation, sensory analysis and cost calculation.

References

Text books

1. ChanderVir S, Public Health Nutrition in developing countries, Part I, 1st edition, Woodhead Publishing, New Delhi, 2011.
2. Park K, Park's Textbook of preventive medicine, 2005. 3. Bamji, Textbook of Human Nutrition, Oxford publishers, New Delhi, 2010

Reference books

1. ChanderVir S, Public Health Nutrition in developing countries, Part II, 1st edition, Woodhead Publishing, New Delhi, 2011
2. Gopalan C., Ramanathan, P.V. Balasubramanian, S.C., Nutritive value of Indian foods, NIN, Hyderabad, 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.

Course outcomes

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

K3	CO1	Plan and prepare low-cost nutritious dishes/menus for vulnerable groups.
K6	CO2	Preparation of communication aids and planning nutrition education programs for the community.
K2	CO3	The ongoing national nutrition programs
K5	CO4	Basic community-based survey and nutrition education.
K2	CO5	Specific foods and their food regulations

Mapping of Cos with POS & PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	**M**	S	S	**M**	S	S	S	S	**M**
CO2	S	S	S	**M**	S	S	**M**	S	S	S	S	**M**
CO3	S	S	S	**M**	S	S	**M**	S	S	S	S	**M**
CO4	S	S	S	**M**	S	S	**M**	S	S	S	S	**M**
CO5	S	S	S	**M**	S	S	**M**	S	S	S	S	**M**

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Semester-III

Course Code	P21NDT31	Research Methods and Statistics	L	T	P	C
			5	0	0	4
Cognitive Level		**K2: Understand** **K3: Apply** **K4Analyze**				
Learning Objectives		The course aims to ➢ Learn some basic concepts of research and its types ➢ Know the different statistical analyses. ➢ Understand different types of research ➢ Study scientific investigation to solve the problem, test hypotheses, develop or invent new products. ➢ Gain knowledge on the research process and report preparation				

Unit I Research methodology: an overview

Research: definition, the process of research, objectives of the research, and characteristics of research. Identifying the research problem, sources of the research problem, Basic components of research design. Types of research: fundamental/ basic research, applied research, action research, descriptive research, exploratory research, case studies, experimental research.
Review of literature: meaning, sources of literature review, the importance of literature collection.

Unit II Data and methods of sampling

Primary and secondary data: Methods of data collection: Interview schedule, questionaries, observation, experimentation, Pre-testing, and pilot study
Methods of sampling- probability and non-probability, Hypothesis- meaning and types of hypothesis.

Unit-III Data analysis: Descriptive measures

The measure of central tendency: Mean, Median, Mode and their uses with applications
The measure of Dispersion: significance and methods used in studying dispersion and their uses with applications, standard deviation: uses and applications. Tables, figures and charts: formulation, interpretation and application.

Unit IV Probability and test of significance

Co-efficient of correlation, rank correlation, basic concepts in regression, Student- "t" test, chi-square: use and application of t test and chi square. Analysis of variance- one way and two-way classification- characteristics of ANOVA.
Computer-assisted data coding and analysis: Statistical Package for Social Sciences (SPSS)

Unit V Concept of the research report

Research reports- basic concepts of the research report

a. Preliminaries- title page, acknowledgment, list of tables, list of figures, index.

b. Main text.
c. Data analysis: Classification- qualitative, Quantitative- frequency distribution, discrete and continuous Tabulation of data- parts of a table, preparation of blank tables Diagrammatic – One-dimensional diagrams, two-dimensional diagrams, pictogram, and cartography Graphical- Frequency graphs- line, polygon, curve, histogram
d. Bibliography, glossary, appendices.

REFERENCES
Textbooks

1. Kothari, Chakravanti Rajagopalachari. *Research methodology: Methods and techniques*. New Age International, 2004.
2. Singh, Yogesh Kumar. *Fundamental of research methodology and statistics*. New Age International, 2006.
3. Goddard, Wayne, and Stuart Melville. *Research methodology: An introduction*. Juta and Company Ltd, 2004.
4. McNeill, Patrick. *Research methods*. Routledge, 2006.
5. Bhandarkar, P. L., T. S. Wilkinson, and D. K. Laldas. "Methodology & Techniques of Social Research Himalaya Publishing House." (2000).
6. Corbetta, Piergiorgio. *Social research: Theory, methods and techniques*. Sage, 2003.
7. Chiang, Chin Long. *Statistical methods of analysis*. World Scientific, 2003.

Reference books

1. Vijayalakshmi Ponnuraj and Sivaprakasam, C, Research Methods: Tips and Techniques, MJP Publishers, 2008.
2. Rajendra Kumar, C., Research Methodology, APH Publishing Corporation, New Delhi 2008.
3. Anantarayanan Raman and Jayashree Nimmagadda, A Handbook of Research Process, Macmillan Publishers, 2006.

COURSE OUTCOMES

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

K2	CO1	Research design and concepts
K3	CO 2	Application of Statistics in research
K4	CO 3	Analyzing the process of developing a Research Plan.
K2	CO 4	Research process and report preparation
K3	C05	Efficient usage of different statistical tools and interpretation of data

Mapping of Cos with POS & PSOs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	S	M	M	M	S	M	S	M
CO2	M	S	M	M	S	M	M	M	S	M	S	M
CO3	M	S	M	M	S	M	M	M	S	M	S	M
CO4	M	S	M	M	S	M	M	M	S	M	S	M
CO5	M	S	M	M	S	M	M	M	S	M	S	M

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Course Code	P21NDT32	INSTITUTIONAL FOOD SERVICE MANAGEMENT	L	T	P	C
			5	0	0	4
Cognitive Level		**K2: Understand** **K3: Apply** **K4: Analyze**				
Learning Objectives		**The course aims to** 1.Provide a comprehensive understanding of the basic principles of management in food service units. 2. Helps to accept responsibilities in catering establishment and hospitals 3. paves a way for becoming a conscientious caterer and food service administrator				

Unit I Food Service Establishment

History and development b) Definition and importance c) Factors affecting development of Food Service institutions d) Principles, tools and functions of organizations e) Recent trends in food service institutions. Various types of food service institutions a) Commercial and Non-commercial b) Various institutions catering needs to different types of handicapped personnel c) Various approaches in the management of Food service Institutions. - traditional- systems approach-MBO and TQM.

Unit-II: Personnel Management

Definition, development and policies b) Sources of recruitment, Selection, Induction, training, development, promotion, motivation and leadership c) Wages and other welfare benefits for personnel d) Labor laws and other legal aspects.
Recruitment, Selection, Induction, Training and Supervision of Personnel, Labour Policies and Legislation.

Unit-III: Food Service Unit Layout and Equipment

Food Service Unit Layout and Design a) Steps and different types of Planning, b) Various Phases of layout and Various factors influencing layout design c) Pointing work centers d) Work pattern. Equipments a) Classification, Selection and Design b) Factors influencing selection of various equipments c) Base materials and finishes in food industries 1018 d) Installation and operation e) Care and maintenance of equipments. Types of Food Service, Styles of Service, Formal and Informal. Equipments, Classification, Selection, Maintenance and Care of equipment.

Unit-IV: Financial Management

Types of budget, Records for purchase, Receiving, Storage and Production b) Service and income and expenditure record. c) Costing and cost control- - Factors affecting cost control - Importance and Components of Costing - Breakeven Analysis - Determining Selling Price of Food - Checklist for Cost Control

Unit-V: Institutional kitchen and Sanitation

Types of kitchen, layout of kitchen ,kitchen design plan and work simplification.
Hygiene and sanitation in preparation and serving area a) Personal hygiene b) Types and sources of contamination c) Prevention and safety measures d) Methods of controlling infestation. e) Methods of dish washing

References:

1. Payne-Palacio, June, and Monica Theis. *Foodservice management*. Pearson Education UK, 2015.
2. Sethi, Mohini. *Institutional food management*. New Age International, 2008.
3. Cousins, John, Dennis Lillicrap, and Suzanne Weekes. *Food and beverage service*. Hachette UK, 2014.
4. Vijay Dhawan, Food and Beverage Service, 1st Edition, Frank Bros & Co., 2000 Braun, Verlagshans.of Spa Design, 2009.
5. Aggarwal D.K, Housekeeping Management, AMAN Publications, NewDelhi, 2006.
6. Dr. Singh.R.K, Modern Trends in Hospitality industry, AMAN Publications, New Delhi, 2006.

Reference books

1. Fospett D and Paskins P, The theory of Hospitality and Catering, Hodder Education, UK, 2011
2. Jaiswal P, Food Quality and safety, CBS Publishers and Distributers Pvt Ltd, New Delhi, 2011
3. Bali PS, Quantity food Production operations & Indian Cuisine, Oxford University Press, New Delhi, 2011
4. George B and Chatterjee S, Food and beverage Service and Management, JAICO, 2010

Course outcomes

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

K2	**CO1**	Discuss about the scope of food service management principles and functions.
K3	**CO2**	Explain the functions of personnel management organization
K4	**CO3**	Compare the electrical and non-electrical equipment's in food service establishment.
K2	**CO4**	Analyze the cost account methods and its importance.
K3	**CO5**	Evaluate the kind of kitchen layout.

Mapping of Cos with POS & PSOs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO

												5
CO1	S	S	S	S	**M**	S	S	S	M	M	S	M
CO2	S	S	S	S	**M**	S	S	S	M	M	S	M
CO3	S	S	S	S	**M**	S	S	S	M	M	S	M
CO4	S	S	S	S	**M**	S	S	S	M	M	S	M
CO5	S	S	S	S	**M**	S	S	S	M	M	S	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code & Title	**THERAPEUTIC NUTRITION – II**		
P21NDT33	**Semester-III**	**Credits:4**	**Hours:4**
Cognitive Level	**K2: Understand** **K3: Apply** **K4: Analyze**		
Learning Objectives	**The course aims to** imparts knowledge in the field of clinical nutrition to make appropriate dietary modifications for various disease conditions based on the patho -		

	physiology. develop capacity and aptitude in taking up dietetics as a profession create awareness on community nutrition-based programmes.

Unit I The Dietitian:

The Dietician a) Classification b) Code of ethics c) Responsibility d) The dietician in India e) Indian dietetic association f) Technology in diet counselling: different types of diet counselling, role of technology in diet counselling, online diet counselling. Factors considered during diet counselling.

Unit II Diet in Liver and gall bladder:

Dietary management of Liver disease a) Types, Etiology, Symptoms and Complications b) Physiology, functions of the liver and liver function tests. c) Metabolic consequences of alcohol consumption d) Dietary management for - Hepatitis, Cirrhosis and Hepatic coma. Dietary management ofGall Bladder Diseases a) Physiology and functions of Gall Bladder b) Gall bladder function tests c) Dietary management for - Cholecystitis, Cholelithiasis, Acute Cholangitis and Cholestasis

Unit III Diet in Trauma and burns

Dietary management in Trauma a) Physiological, metabolic and hormonal response to injury b) Dietary management in trauma Dietary management in Sepsis a) Definition andDietary management of Sepsis with or without Multiple Organ Dysfunction Syndrome (MODS).

Dietary management in Burns a) Classification and Complications b) Metabolic changes in protein and electrolytes c) Dietary management & mode of nutrition support for burns and wound management of burns.

Unit-IV Diet in kidney disease:

Dietary management of Kidney Diseases a) etiology, clinical signs & symptoms b) Physiology & functions of kidney c) Kidney function tests. 1525 d) Types of kidney diseases - Glomerulonephritis,Nephrotic Syndrome, Acute Renal Failure (ARF), Chronic Renal Failure (CRF), End Stage Renal Disease (ESRD)-Dialysis and Kidney Transplant.

Nephrolithiasis/Renal Calculi a) etiology b) Types of stones and nutritional care- acid and alkaline ash diet. c) Use of sodium, potassium and phosphorus exchange lists in diet planning of kidney diseases patient.

Unit V Diet in Cancer and HIV

Diet in Cancer a) Risk factors and Symptoms b) Nutritional problems of cancer therapy c) Nutritional requirements and Dietary management 864 d) Role of food in the prevention of cancer e) Physical activity and cancer.

AIDS: etiology - Symptoms - Dietary Management

REFERENCES

Text books

1. Robinson, Corinne Hogden, and Marilyn R. Lawler. *Normal and therapeutic nutrition*. No. Ed. 16. Collier Macmillan Publishers, 1982.
2. Dietary Guidelines of Indians- A Manual, National Institute of Nutrtition, Hyderabad, 2006.
3. Srilakshmi B, Dietetics, sixth edition, New age Publishing Press, New Delhi, 2011 Stacy N, William's Basic Nutrition and Diet Therapy, 12th edition, Elseivier publications, UK, 2005.
4. Elia M, Ljunggvist O, Stratton RJ, Lanham SA, Clinical Nutrition (The Nutrition Society Textbook), 2nd edition, Wiley Blackwell Publishers, 2013
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 Williams and Wilkins, Canada, 2012

Reference books

1. Gopalan C., Ramanathan, P.V. Balasubramanian, S.C., Nutritive value of Indian foods, NIN, Hyderabad, 2010
2. Marian M et al., Clinical Nutrition for surgical patients, Jones and Bartlett Publishers, Canada, 2008.
3. Joshi Y.K, Basics of Clinical Nutrition, 2nd edition, JP Medical Publishers Pvt Ltd, New Delhi, 2008
4. Stacy N, William's Basic Nutrition and Diet Therapy, 12th edition, Elseivier publications, UK, 2005.
5. Gibney MJ, Elia M, Ljunggvist O, Clinical Nutrition (The Nutrition Society Textbook) Wiley Blackwell Publishers, 2005
6. Whitney EN and Rolfes SR, Understanding Nutrition, 9 th edition, West/Wordsworth, 2002

Journals:

1. Journal of American Dietetic Association.
2. The American Journal of Clinical Nutrition
3. The Indian Journal of Nutrition and Dietetics
4. Clinical Nutrition
5. Food and Nutrition Bulletin

Course outcomes

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

K2	**CO1**	Discuss the role of dietitians and their responsibilities
K2	**CO2**	Formulate the therapeutic diet based on disease condition
K3	**CO3**	Evaluate the nutritive adequacy of a diet and prescribed nutrient and energy levels.
K2	**CO4**	Explain disease states and types of diet prescribed for each.
K4	**CO5**	Identify and define medical terminology.

Mapping of Cos with POS & PSOs:

CO/ PO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO2	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO3	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO4	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO5	S	S	S	S	S	**M**	S	S	S	M	M	S	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code & Title	**NUTRITION AND FITNESS**

P21NDT34	Semester-III	Credits:4	Hours:4
Cognitive Level	**K2: Understand** **K3: Apply** **K4: Analyze**		
Learning Objectives	**The course aims to** learn about the terms related to health and fitness comprehend the interaction between fitness and nutrition.		

Unit I Health

Concept of Health, changing concepts definitions of health, dimensions of health, concept of wellbeing, spectrum of health, determinants of health, ecology of health, right to health, responsibility for health, indicators of health. Individual health indicators, national health indicators.

Unit II Exercise and health related fitness

Health related fitness, health promotion, physical activity for health benefits. Sports related fitness: Role of nutrition in sports, nutrition to athletic performance. Energy substrate for activities of different intensity and duration, aerobic and anaerobic activities.

Unit III Body weight and composition for health and sports

Nutritional considerations for sports / exercising person as compare to normal active person. Ideal body weight, values and limitations of the BMI, composition of the body, Diet during training, prior to competition, during Dietary supplements after competition for sports. Carbohydrate as an energy source for sport and exercise.

Unit IV Exercise performance

Carbohydrate stores, c. Fuel for aerobic and anaerobic metabolism d. Glycogen re-synthesis and CHO Loading e. CHO composition for pre exercise, during and recovery period. f. Diets for persons with - High energy requirements, Stress, Fracture and Injury. Protein requirement and metabolism during endurance exercise

Unit V Exercise programmes

Resistance exercise training, aerobic exercise, types of exercise, effective for weight contrast, - dieting or exercise, weight reduction programme for young athletes. Factors affecting fat oxidation (intensity, duration , training status, CHO feeding) d) Effect of fasting and fat ingestion.

References

Text books:

1.Melvin H.Williams , Nutrition for Health, fitness and Sports, Seventh edition, MC Graw Hill international Edition, USA, 2005.

2.Micheal J Nutrition and Metabolism, Blackwell Publishing Company, Bangalore, 2004.

3.Srilakshmi B, Suganthi V, Ashok CK. Exercise physiology, fitness and Sports Nutrition. New age international publishers, 2018.

Reference Books

1. Dunford M, Fundamentals Of Sports And Exercise Nutrition, Human Kinetics, Illinois, 2010

2. Jeukendrup A and Gleeson M, Sports Nutrition: An introduction to energy production and performance, Human Kinetics publishers, 2004

3. Maughan RJ, Burke LM, Handbook of Sports Medicine & Science- Sports Nutrition, Blackwell Science publications, 2002

4.Richard B. Kreider, 2019. Essentials of Exercise & Sports Nutrition: Science to Practice Kindle Edition.Lulu publishing services.

Course outcomes

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

K2	**CO1**	Outline the self-responsibility for personal health and wellness.
K2	**CO2**	Analyse the role ole of nutrition in sports.
K3	**CO3**	Discuss the various parameters used to find health status.
K2	**CO4**	Evaluate the effect of exercise on various nutrient metabolisms.
K4	**CO5**	Compare different exercise methods and learn its application.

Mapping of Cos with POS & PSOs:

CO/ PO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO2	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO3	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO4	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO5	S	S	S	S	S	**M**	S	S	S	M	M	S	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code & Title	**ADVANCED NUTRITION II**		
P21NDT35	**Semester-III**	**Credits:4**	**Hours:4**
Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply**		
Learning	**The course aims to** On successful completion of this course the student will be able to:		

Objectives	1. The role and importance of nutrition management in exercise and sport performance 2. The coping mechanism of the human body during high altitude and sea travel and nutrition management during emergencies

Unit I Fat-soluble vitamins

Fat-soluble vitamins-A, D, E, K- Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction of fat-soluble vitamins with other nutrients. Hypo and hypervitaminosis.

Unit II Water-soluble vitamins

Water-soluble vitamins**:** Vitamin C, Thiamine, Riboflavin, Niacin, Pyridoxine (B6), Folic acid, Cyanocobalamin (B12), Biotin: Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Source, RDA, Deficiency, Diagnosis of deficiency, Toxicity, Interaction of fat-soluble vitamins with other nutrients.

Unit III Macro Minerals:

Macro Minerals: Calcium, Phosphorous, Magnesium, Sodium, Potassium, Chloride: biological importance, Distribution in the body, digestion, absorption, Utilization, transport, excretion, deficiency, toxicity, food sources, RDA, Regulation of calcium concentration, commercial nutrient supplementation.

Unit IV Micro minerals

Micro Minerals: Iron, Zinc, Copper, Selenium, Chromium, Manganese, Iodine, Fluorine. Distribution, digestion, absorption, Utilization, transport, excretion, deficiency, toxicity, food sources, factors affecting nutrient absorption, recommended dietary allowances, elemental nutrient supplementation,

Unit V Antioxidants and Free Radicals:

Antioxidants and free radicals: definition, importance, functions, food sources, mechanism of free radical formation.

Role of vitamins and minerals as antioxidants

Role of oxygen free radicals.

Role of antioxidants in degenerative diseases.

REFERENCES

Text Books:

1. Recommended dietary intakes for Indian – Indian Council of Medical Research, New Delhi, 2012.

2. Gopalan,C Ramasastry, B.V. and Balasubramanian, S. Nutritive Value of Indian Foods, National Institute of Nutrition, Hyderabad, 2007

3. Swaminathan, M. Essentials of Foods and Nutrition, Volume I and II Ganesh and Co., Madras, 2003.

4. Mahan, Kathleen L. Krause‟s Food, Nutrition and Diet Therapy, W.B.Saunder‟s, 11th Edition 2004.

5. Srilakshmi. E. Nutrition Science, New Age International Publishers, 2012.

6. Swaminathan,M.Advanced Textbook on Food Sceince and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printind and publishing Co Inc, Bangalore, 2003.

Journals:

1. American Journal of Clinical Nutrition, The American Society for Clinical Nutrition, Inc., USA.

2. Annual Reports , National Institute of Nutrition, Hyderabad.

3. British Journal of Nutrition ,Cambridge University Press, London.

4. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.

5. Nutrition, Newsletter, Food and Agricultural Organization of United Nations.

6. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Education Trust Institutions for Women, Coimbatore.

7. Nutrition Reviews- The Nutrition Foundations Inc., New York.

Course outcomes

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

K1	CO1	Recent developments in the field of vitamins and minerals.
K2	CO2	The importance of vitamins and minerals concerning other nutrients.
K2	CO3	Food components other than essential nutrients
K3	CO4	The information on the potential health implication and mechanisms of action of functional foods
K3	CO5	The role of antioxidants in our health

Mapping of Cos with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S	S	M	S	M	S	S	M
CO2	S	M	M	S	S	S	M	S	M	S	S	M
CO3	S	M	M	S	S	S	M	S	M	S	S	M
CO4	S	M	M	S	S	S	M	S	M	S	S	M
CO5	S	M	M	S	S	S	M	S	M	S	S	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code & Title	**THERAPEUTIC NUTRITION – II PRACTICAL**		
P21NDT33	**Semester-III**	**Credits:4**	**Hours:6**
Cognitive Level	**K2: Understand** **K3: Apply**		

	K4: Analyze
Learning Objectives	**The course aims to** plan and prepare diet for various diseases. Design concept of food groups and exchanges for planning and preparing a balanced diet for various age groups and physiological conditions.

Planning and preparation of Diets for the following diseases:

Unit I Meal planning for Liver disease

Planning and preparation of diets for the liver and pancreatic disorders - Hepatitis, cirrhosis, hepatic encephalopathy, gall stones and pancreatitis: Menu planning, recipe standardization, nutrient calculation, sensory analysis and cost calculation.

Unit II Meal planning Gout and hospital diet

Gout Menu planning, recipe standardization, nutrient calculation, sensory analysis and cost calculation. Different types of tube feeding and its nutrient calculation.

Market survey on elemental formulas and tube feeding diet: product name, manufacturer, price and safety measures.

Unit III Meal planning, Trauma and Burns

Trauma : stages of trauma, Menu planning, recipe standardization, nutrient calculation, sensory analysis and cost calculation.

Burns : degree of burns Menu planning, recipe standardization, nutrient calculation, sensory analysis and cost calculation.

Unit IV Meal planning for kidney disease

Planning and preparation of diet for renal disorders- Glomerulonephritis, Nephrosis, acute renal failure, chronic renal failure, dialysis and renal calculi: Menu planning, recipe standardization, nutrient calculation, sensory analysis and cost calculation.

Unit V Meal planning for Cancer and AIDS

Planning and preparation of diet for the cancer patient based on the 11 treatment and other conditions: Menu planning, recipe standardization, nutrient calculation, sensory analysis and cost calculation.

Planning and preparation of diet for HIV with and without comorbidities

References:

1. Stump SE, Nutrition And Diagnosis Related Care, 7th edition, Lippincott Williams and Wilkins, Canada, 2012.

2. Gopalan C., Ramanathan, P.V. Balasubramanian, S.C., Nutritive value of Indian foods, NIN, Hyderabad, 2010

3. Srilakshmi B, Dietetics, sixth edition, New age Publishing Press, New Delhi, 2011.

4. Marian M et al., Clinical Nutrition for surgical patients, Jones and Bartlett Publishers, Canada, 2008

5. Joshi Y.K, Basics of Clinical Nutrition, 2nd edition, JP Medical Publishers Pvt Ltd, New Delhi, 2008.

Course outcomes

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

K2	**CO1**	Demonstrate in the method to plan and prepare diet for various diseases.
K2	**CO2**	Design the principles of meal planning, diet therapy, therapeutic diets and nutrition support.
K3	**CO3**	Create skill development in planning therapeutic diets using food exchange lists.
K2	**CO4**	Evaluate the concept of food groups and exchanges for planning and preparing a

		balanced diet for various age groups and physiological conditions.
K4	**CO5**	Make appropriate dietary modifications for various disease conditions based on the pathophysiology.

Mapping of Cos with POS & PSOs:

CO/ PO		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO2	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO3	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO4	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO5	S	S	S	S	S	**M**	S	S	S	M	M	S	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code & Title	**WOMEN AND EMPOWERMENT**		
P21WSS33	**SEMESTER-III**	**Credits: 2**	**Hours: 2**
Cognitive Level	**K1: Remember** **K2: Understand**		

	K4: Analyze **K5: Evaluate**
Objectives	➢ **To understand about Women Empowerment** ➢ **To learn about the social empowerment** ➢ **To analyze the economic empowerment of women** ➢ **To Transform women to get real empowerment** ➢ **To evaluate capacity building and training for women**

Unit I Empowerment

Empowerment – Meaning and concept of empowerment – Individual and collective empowerment – Framework for empowerment – Choices women can make for empowerment- Women and the Indian Constitution -Welfare approach – Women in Development – Equity approach – Empowerment approach – Indian Women Today.

Unit II: Social empowerment

Meaning – Importance and framework – Demography, education, health and nutrition, environment, violence against women – problems and rights of the girl child – Media – Science and technology – Women in difficult circumstances.

Unit III: Economic empowerment

Women in labor force participation – Women and domestic work – Home-based work – Work in organized and unorganized sector – Women in agriculture – industry and service sector – women entrepreneurs – Women self-help groups (Micro credit), Gender and poverty – Globalization and women.

Unit IV: Political empowerment

Need of women in politics – Dominant women in politics –political participation in grass-root level -Barriers for the participation of women in local governments – Reservation policy for women in politics – Legal empowerment

Unit V Capacity building

Capacity building for the empowerment of women – Gender training and capacity building – Training methodology – women Leadership – Group dynamics – Problem-solving – Conflict resolution – Group discussions – Crisis management.

REFERENCES

- Singh, D.P. & Singh, M. (2005), Women and Empowerment, Unistar Publications, Chandigarh
- Bharat, J. &Madhu, J.(2004), Indian Approach to Women's Empowerment, RawatPublications, New Delhi
- Seth & Mira (2001), Women Development: The Indian Experience, SagePublications, New Delhi
- Government of India, Planning and Commission, The Tenth Five- Year Plan
- Government of India, Department of Women and Child Development, Annual Report 2002-2003, New Delhi.
- Meenapriyadharshini S (2017) social empowerment of Women 24/7 publications, Kolkatta.
- Blumberg, R.L. (2005): "Women's Economic Empowerment as the Magic Potion of Development?" Paper presented at the 100th annual meeting of the American Sociological Association, Philadelphia
- Desai, N. and U. Thakkar (2007): "Women and Political Participation in India", Women in Indian Society, New Delhi, National Book Trust.

COURSE OUTCOMES

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

K1	**CO1**	Concept of Women Empowerment
K2	**CO2**	Social and Economic Empowerment
K4	**CO3**	Political Empowerment

K4	**CO4**	Transform women to get real empowerment
K5	**CO5**	Capacity building and training for women

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	S	S	M	S	S	M	M	M	S	M	M
CO2	M	S	S	M	S	S	M	M	M	S	M	M
CO3	M	S	S	M	S	S	M	M	M	S	M	M
CO4	M	S	S	M	S	S	M	M	M	S	M	S
CO5	M	S	S	M	S	S	M	M	M	S	M	S

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

SEMESTER-IV

PROJECT

P21NDR41 **Credits 8**

The dissertation should be based on individual studies and carry the following format:

Preliminary

1. Title page- title, authors 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. Acknowledgment
8. Abstract

I. Introduction: Statement of the problem, significance, need for the study, objectives, and definitions.
II. Review of literature
III. Methodology: tools used, procedures, hypothesis.
IV. Results and discussion: tables and figures, statistical presentations, hypothesis testing.
V. Summary and conclusion
VI. Suggestion for the future study
VII. References

SUBJECT ELECTIVE COURSES

Course Code & Title	**FOOD PRODUCT DEVELOPMENT**

P21NDE411	Semester-IV	Credits:4	Hours:4
Cognitive Level	**K2: Understand** **K3: Apply** **K4 Analyze**		
Learning Objectives	The course aims to ➢ To understand various aspects of the development of a food product ➢ Standardize and generate the process flow chart for a new food product ➢ To acquire knowledge on the importance of Consumer Research, Finance and Communication		

Unit I Food consumption pattern

Trends in Food Consumption pattern. Economical, Psychological and Sociological Dimensions of Food Consumption patterns. Trends in Social Change as a Base for New Product Development. Food product development in India, advantages of new food product development and its new trends.

Unit II Introduction to Food Processing and Product Development

Food Components, Types of Food Processing, Status of Food Processing Industry in India and Scope of Growth in Future Principles and Purpose of New Product Development, Product Design, and Specifications.

Unit III Recipe Development

Traditional Foods, Weaning Foods, Convenience Foods, RTE, RTS, Extruded foods, IMF Foods, Specialty Products, Health foods, Nutritional Supplements, Functional Foods, Nutraceuticals, and Designer Foods, Sports Foods, Foods for Defense Services, Space foods. Different food products and its significance.

Unit IV Testing, Evaluation, and Packaging of Products

Standardization, Portion size, Portion Control, Quantity Cooking, Shelf Life Evaluation-Sensory and Microbial Testing of Processed Foods, Nutrient Analysis. Suitable Packaging Materials for Different Foods, SWOT Analysis, cost calculation and its importance, nutrient calculation.

Unit V Financial Management and Marketing of Food Products

Institutional Support (Training and Finance) for Entrepreneurship Development.

Financial Institutions (Central and State Government) banks/Funding Agencies, Financial Accounting Procedures, Book Keeping, Market Research, Marketing Strategies, Cost

Calculation, Advertising Methods, Product sales, Product License, Legal specifications, Consumer Behaviour and Food Acceptance

REFERENCES

1. Smith, Jim, and Edward Charter, eds. "Functional food product development." (2011).
2. Sankaranarayanan, A., N. Amaresan, and Dharumadurai Dhanasekaran, eds. *Fermented food products*. CRC Press, 2019.
3. Fuller, Gordon W. *New food product development: from concept to marketplace*. CRC Press, 2016.
4. Vijaya Khader "Textbook of Food Science and Technology", Indian Council of Agricultural Research, 2013.
5. Jacqueline H. Beckley, M. Michele Foley Elizabeth J. Topp&_J. C. Huang WitoonPrinyawiwatkul , Accelerating New Food Product Design and Development. Blackwell Publishing Company. IFT Press. USA, 2007.
6. Howard R. Moskowitz, I. Sam Saguy& Tim Straus (2009). An Integrated Approach to New Food Product Development. Taylor and Francis Group, LLC.USA, 2009.
7. Mary Earle and Richard Earle, Case studies in food product development Wood head Publishing Limited and CRC Press LLC.USA, 2008.

COURSE OUTCOMES

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

K2	**CO1**	The Food needs & consumer preference for new food product
K3	**CO 2**	The design thinking process to develop a concept for a new food product
K4	**CO 3**	The knowledge of standardization for large-scale production.
K2	**CO 4**	The Quality, safety & regulatory aspects of developed products.
K3	**C05**	Marketing and Entrepreneurship awareness.

Mapping of Cos with POS & PSOs:

CO/ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	M	M	S	M	M	M	S	M	S	M
CO2	S	S	M	M	S	M	M	M	S	M	S	M
CO3	S	S	M	M	S	M	M	M	S	M	S	M
CO4	S	S	M	M	S	M	M	M	S	M	S	M
CO5	S	S	M	M	S	M	M	M	S	M	S	M

Strongly Correlating (S) -3 Marks

Moderately Correlating (M) -2 marks

Weakly Correlating (W) -1 Mark

No Correlation (N) -0 mark

Course Code &	

Title	HOME SCIENCE COMPOSITE		
P21NDE412	Semester-IV	Credits:4	Hours:4
Cognitive Level	K1: Recall K2: Understand K3: Apply		
Learning Objectives	The course aims to On successful completion of this course the student will be able to: 1. Describe the importance of each branch of Home Science 2. Understand the essence of each subject 3. Prepare them for UGC NET, SLET and ICMR		

Unit I Food science and nutrition:

-Basic concepts of food groups and nutrients.

- Role of microorganisms in food spoilage and its prevention

- Recent advances in food processing and preservation.

-Recent techniques in food technology.

Institutional management:

-Management of hospitality institutes- hospitals/hotels/restaurants/cafeteria and outdoor catering.

Unit II

Extension education:

- History and development of home science
- Formal/ non-formal and extension education
- Vocationalisation of home science in India
- Concept and classification of communication
- Trends in home science research

Unit III Resource management

- Concept of home management and steps
- Classification of resources
- Basic characteristics of resources
- Work simplification

- Interior decoration
- Household equipment, decision making

Unit IV Human development

- Child development-principles and stages
- Life span development
- Theories of human development
- Early childhood care and education
- Family welfare programs

Unit -V Textiles and Clothing

Textile Fibers-Definition, Classification of Fibers. Natural fiber – Cotton, silk, wool - Man Made Fibers- Polyester, Nylon - Primary and secondary characteristics of textile fibers.

Yarn-Definition- Types- Applications.

Fabric manufacturing techniques – Weaving, Knitting, Non-woven -Definition and applications.

Garment Manufacturing-Terminology used in apparel industry- Introduction to apparel categories-Men, Women and children. Tools used-Measuring, Marking, Cutting, finishing and general tools. Steps involved in Garment Manufacturing-Design development, Body measurements, Pattern making, spreading, marking, cutting and apparel construction.

REFERENCES

1. Jha, J.K, Encyclopaedia of Teaching of Home Science, Vol.I,II and III . New Delhi: Anmol Publications, 2002
2. Varghese , M.A.et al. Home Management , New Delhi: Viley Eastern Limited, 2001
3. Suriakanthi.A., Child Development - An Introduction Gandhigram : Kavitha Publications, 2002.
4. Education Planning group, Home Management. Newdelhi: Arya Publishing House, 2001.
5. .Hurlock, E.B,. Developmental Psychology A Life-Span Approach. New Delhi: Tata Mcgraw Hill Publishing Company Limited, 2007.
6. E.P.G. Gohl, L.D. Velensky, “Textile Science” CBS Publishers and Distributors, 2003.
7. AJ. Hall. “The standard hand book of Textiles”, Wood head Publishing 8th edition 2004.

8. P.V. Vidyasagar, “Hand Book of Textiles”, A. Mittal Publications, 2005 5.Sara J. Kadolph, “Textiles”, Prentice Hall, 10th edition 2007.
9. Williams, Abigail. *The Social Life of Books*. Yale University Press, 2018.

Course outcomes

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

K1	**CO1**	The field of food science and nutrition
K2	**CO2**	Various concepts of home science extension education
K3	**CO3**	The concepts of home science and its applications in resource management
K2	**CO4**	The basic knowledge of human development.
K3	**CO5**	The importance of textile and clothing in our daily life events.

Mapping of Cos with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**S**	**M**
CO2	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**S**	**M**
CO3	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**S**	**M**
CO4	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**S**	**M**
CO5	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**S**	**M**

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code & Title	**ICT tools for Nutrition Education**

P21NDE413	Semester-IV	Credits:4	Hours:4
Cognitive Level	**K2: Understand** **K3: Apply** **K4Analyze**		
Learning Objectives	The course aims to ➢ Create awareness among people with Mass media and advertisement. ➢ Develop the tools for nutrition education.		

Unit I ICT in Nutrition Education

ICT in Nutrition Education a) Nutrition Education- Nature and Importance to the Community, Objectives, Training Workers in Nutrition Education, and Extension Work.

ICT tools to include - Printed media (Newspaper, books, journal magazines) - Computers - Telephones - Communication Network - E-mail - Electronic media (Radio, television, videos films) - Telex - Satellite – Internet.

Unit II Principles of nutrition education

Principles of Planning, Executing and Evaluating Nutrition Education Programmes. c) Problems of Nutrition Education Programmes and Approaches to overcome.

Information and communication devices for making learning in food and Nutrition education: concepts. Develop nutritional messages/ slogan on health and nutrition issues for vulnerable groups in the community.

Unit III Nutrition education tools

Selection and development of appropriate ICT aids for different health and nutrition issues for various vulnerable groups in the community – chart, poster, leaflet, flipbook/flashcard.

Development of nutritional games on health and nutrition issues for vulnerable groups in the community.

Unit-IV Different audio visual aids in nutrition education

Audio-Video messages through mobile phones, mobile apps, alert calls regarding nutritional uptake of rural mass and regular health checkups. Package of practices of nutrient rich varieties. Monitoring and feedback mechanism through mobile based applications.

Dissemination of recommended dietary requirement [carbohydrate, protein, fat, vitamin , minerals and dietary fibre) to rural mass. Nutritional Campaigns organization and mass awareness in villages.

Unit V Nutritional intervention through ICT

Analyse the dietary intake and calorie requirement. Analyse the required quantity carbohydrate, protein, fat, vitamin, minerals and dietary fibre • Content Development regarding best nutrition practices.

Mobile based nutritional awareness: nutrify India, Dietary guidelines for Indians, Nutrition atlas, vikas pedia, blog creation online diet counselling: scope and importance.

References

1.Suryatapadas –Textbook of Community Nutrition, Academic Publishers, 2016.

2. Prabha Bisht- Community Nutrition in India, Star Publications, 2017.

3. B.Srilakshmi - Nutrition Science, New Age International, 2006

4. Swaminathan.M- Advanced Textbook on Food & Nutrition Vol 1& 2, Bappco.

5. Hyun, Taisun, Miyong Yon, Sun Hee Kim, Nan Hee Kim, Suk Mi An, Sun Mi Lee, Hyun Jung Chi et al. "Development of a nutrition education website for children." *Korean Journal of Community Nutrition* 8, no. 3 (2003): 259-269.

6. Bhatt D.P, Health Education, Khel Sahitya Kendra, New Delhi, 2008.

COURSE OUTCOMES

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

K2	CO1	Various concepts of nutrition education
K3	CO 2	ICT significance nutrition education
K4	CO 3	Different tools in nutrition education
K2	CO 4	Content making for nutritional and health issues
K3	C05	Creation of mobile apps, videos, online counselling

Mapping of Cos with POS & PSOs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	S	M	M	M	S	M	S	M
CO2	M	S	M	M	S	M	M	M	S	M	S	M
CO3	M	S	M	M	S	M	M	M	S	M	S	M
CO4	M	S	M	M	S	M	M	M	S	M	S	M
CO5	M	S	M	M	S	M	M	M	S	M	S	M

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Course Code & Title	**Food toxicology**		
P21NDE421	**Semester-IV**	**Credits:4**	**Hours:4**
Cognitive Level	K2: Understand K3: Apply K4-Analyse		
Learning Objectives	The course aims to On successful completion of this course the student will be able to: ➢ Evaluate the toxicity in food ➢ Understand the mechanism of toxicity ➢ Create awareness about Food allergies and sensitivities		

Unit I Principles of toxicology

Principles of Toxicology: Classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity. Evaluation of toxicity: Risk vs. benefit: Experimental design and evaluation. Recent advances in food toxicology.

Unit II Natural toxins in food

Natural Toxins in Food: Natural toxins of importance in food- Toxins of plant and animal origin; Microbial toxins (e.g. Algal toxins, bacterial toxins and fungal toxins). Natural occurrence, toxicity and significance. Food poisoning; Mycotoxicosis of significance. Determination of toxicants in foods and their management.

Unit III Food allergies and sensitivities

Food allergies and sensitivities: Natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies; food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions); Safety of Genetically Modified food: potential toxicity and allergenicity of GM foods. Safety of toys and children consumables.

Unit IV Contaminants and drug residues

Environmental Contaminants and Drug Residues in Food: Fungicide and pesticide residues in foods; heavy metal and their health impacts; use of veterinary drugs (e.g. Malachite Green in

fish and β- agonists in pork); other contaminants in food. Radioactive contamination of food, Food adulteration and potential toxicity of food adulterants.

Unit V Food additives and toxicants

Food Additives and toxicants added or formed during Food Processing: Safety of food additives; toxicological evaluation of food additives; food processing generated toxicants: nitroso compounds, heterocyclic amines, Dietary Supplements and Toxicity related to Dose: Common dietary supplements; relevance of the dose; possible toxic effects.

Reference books

Text Books:

1. Kotsonis, Frank N., and George A. Burdock. "Food toxicology." *Casarett and Doull's Toxicology: The Basic Science of Poisons* (2008):
2. Shibamoto, Takayuki, and Leonard F. Bjeldanes. "Introduction to food toxicology." (2009).
3. Deshpande, S. S. *Handbook of food toxicology*. CRC Press, 2002.
4. Helferich, William, and Carl K. Winter, eds. *Food toxicology*. CRC press, 2000.
5. Helferich, W., and Winter, C.K. Food Toxicology CRC Press 2001
6. Duffus, John H., and Howard GJ Worth, eds. *Fundamental toxicology*. Royal Society of Chemistry, 2006.
7. Shibamoto, Takayuki, and Leonard F. Bjeldanes. "Introduction to food toxicology." (2009).

Reference Books:

1. Stine, Karen E., and Thomas M. Brown. *Principles of toxicology*. Crc Press, 2015.

2. Püssa, Tõnu. *Principles of food toxicology*. CRC Press, 2013.

Course outcome

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

K2	**CO1**	Principles of Toxicology: Classification
K3	**CO 2**	**Natural toxins and its occurrence**
K4	**CO 3**	Food allergies and its consequences
K2	**CO 4**	Environmental contaminants
K3	**C05**	**Impact of food additives**

Mapping of Cos with POS & PSOs:

CO/ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	S	M	S	S	M	M	M	S	S
CO2	S	S	S	S	M	S	S	M	M	M	S	S
CO3	S	S	S	S	M	S	S	M	M	M	S	S
CO4	S	S	S	S	M	S	S	M	M	M	S	S
CO5	S	S	S	S	M	S	S	M	M	M	S	S

Strongly Correlating (S) -3 Marks

Moderately Correlating (M) -2 marks

Weakly Correlating (W) -1 Mark

No Correlation (N) -0 mark

Course Code &	**Food Safety and Quality Control**

Title			
P21NDE422	**Semester-IV**	**Credits:4**	**Hours:4**
Cognitive Level	**K2: Understand** **K3: Apply** **K4 Analyze**		
Learning Objectives	The course aims to ➢ To study the importance of food safety and quality. ➢ To know the laws and standards ensuring food quality and safety. ➢ To know about the food additives and adulterants.		

Unit I Food safety

Food safety: Principles of quality control and safety, need of quality control and safety, strategy and criteria for food safety, Quality Standards – mandatory standards, Quality Standards - optional standards, Consumer lifestyle, Consumer demand, issues in food safety, food traceability, food recall.

Unit II Importance of food safety

Importance of food safety in the food processing industry, risk classification, national and international food regulatory agencies, nutritional labeling regulation (mandatory and optional nutrients, nutritional descriptors, and approved health claims); microbial contamination (including cross-contamination/indirect contamination), chemical contamination, physical contamination, and allergen contamination.

Unit III Food Additives and Adulterants

Food Additives and Adulterants: Food additives definition; Common food additives and their function and usage; Permissible limits of additives in foods; Implications of additives on consumers health; Food adulteration: Meaning and definition; Types of food adulterants; Methods used for detection of food adulterants.

Unit IV Food safety programs

Food safety programs: HACCP, codex Alimentarius, pest control program, facility maintenance, personal hygiene, supplier control, sanitary, design of equipment and infrastructure, procedures for raw material reception, storage, and finished product loading, sanitation program. Sanitation standard operating procedures (SSOPs), product identification, tracking and recalling program, preventive equipment.

Unit V Food Laws and Standards

Food Laws and Standards: Need and importance; National food legislation such as FSSA, Essential Commodities Act, ISI or BIS, AGMARK, FPO, and PFA; International Organization such as FAO, WHO, Codex Alimentarius, and APEDA. Good Manufacturing Practices (GMP), Good Hygienic Practices (GHP), Good Laboratory Practices (GLP), ISO 22000, FSSC 22000, Food Safety Audit.

REFERENCES

Textbooks

1. Ronald H. Schmidt, and Gary E. Rodrick., "Food Safety Handbook", John Wiley & Sons, New Jersey, 2005.
2. YasmineMotarjemi and HuubLelieveld., "Food Safety Management - A Practical Guide for the Food Industry", Elsevier, New York, 2014.
3. FSSAI., "Manual of Food Safety Management System", FSS Act, 2006, Ministry of the Health and Family Welfare, New Delhi, 2006.
4. FSSAI., "Food Safety and Standards Regulations – 2011", Ministry of the Health and Family Welfare, New Delhi, 2011.
5. Early, R. (1995). Guide to Quality Management Systems for the Food Industry, Blackie, Academic and Professional, London.
6. InteazAlli, "Food Quality Assurance: Principles and Practices", 2nd Edition, Taylor and Francis, UK, 2014.
7. Surendar S. Ghokrokta., "Science and Strategies for Safe Food", CRC Press, USA, 2017.

Other Reference

1. George, A.B. Encyclopedia of Food and Color Additives. Vol. III. CRC Press, 2006.

COURSE OUTCOMES

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

K2	**CO1**	The various criteria of food safety and quality.
K3	**CO 2**	The role and significance of national and international food law that ensures the safety of the food products.
K4	**CO 3**	Food additives and adulterants information and its consequences.
K2	**CO 4**	Various food safety programs.
K3	**C05**	The laws and standards ensuring food quality and safety.

Mapping of Cos with POS & PSOs:

CO/ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	S	M	S	S	M	S	M	S	M
CO2	S	S	S	S	M	S	S	M	S	M	S	M
CO3	S	S	S	S	M	S	S	M	S	M	S	M
CO4	S	S	S	S	M	S	S	M	S	M	S	M
CO5	S	S	S	S	M	S	S	M	S	M	S	M

Strongly Correlating (S) -3 Marks
Moderately Correlating (M) -2 marks
Weakly Correlating (W) -1 Mark
No Correlation (N) -0 mark

Course Code & Title	**NUTRITION COUNSELING**

P21NDE423	Semester-IV	Credits:4	Hours:4
Cognitive Level	**K2: Understand** **K3: Apply** **K4: Analyze**		
Learning Objectives	**The course aims to** provide an exposure on the study of etiology, symptoms and medical nutrition therapy in various diseases. learn the method to plan and prepare diet for various diseases.		

Unit I Diet counselling

Dietitian as part of the Medical Team and Outreach Services. Clinical Information - Medical History and Patient Profile Techniques of obtaining relevant information, Retrospective information, Dietary Diagnosis, Assessing food and nutrient intakes, Lifestyles, Physical activity, Stress, Nutritional Status.

Unit II Counselling concepts

Correlating Relevant Information and identifying areas of need. The Care Process - Setting goals and objectives short term and long term, Counselling and Patient Education, Dietary Prescription. Motivating Patients. Working with - Hospitalized patients (adults, pediatric, elderly, and handicapped).

Unit III Different counselling types

Adjusting and adopting to individual needs. People with special needs (adults, pediatric, elderly, physically challenged), techniques and modes. Follow up, Monitoring and Evaluation of outcome, home visits, importance of out patient counselling and scope of diet counselling. Use of technology in diet counselling.

Unit IV Tools for diet counselling

Teaching aids used by dietitians- charts, leaflets, posters etc., preparation of teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes, Atherosclerosis & Hepatitis and cirrhosis.

Diet counselling for pregnancy health care, nourishing care, adolescent menstrual and dietary needs.

Unit V Record documentation

Maintaining records, record assessment, record evaluation, reporting findings, applying findings, resources and aids for education and counselling, terminating counselling, education for individual patients, use of regional language, linguistics in communication process, counselling and education.

References:

1. Srilakshmi, B, Dietetics, New Age International Publishers, New Delhi, 2018.
2. Marian M et al., Clinical Nutrition for surgical patients, Jones and Bartlett Publishers, Canada, 2008
3. Joshi Y.K, Basics of Clinical Nutrition, 2nd edition, JP Medical Publishers Pvt Ltd, New Delhi, 2008
4. Stacy N, William's Basic Nutrition and Diet Therapy, 12th edition, Elseivier publications, UK, 2005
5. Gibney MJ, Elia M, Ljunggvist O, Clinical Nutrition (The Nutrition Society Textbook) Wiley Blackwell Publishers, 2005
6. Whitney EN and Rolfes SR, Understanding Nutrition, 9 th edition, West/Wordsworth, 2002

Course outcomes

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

K2	**CO1**	Plan and prepare procedure for diet counselling
K2	**CO2**	Select specific counselling methods
K3	**CO3**	Diet counselling and monitoring
K2	**CO4**	Teaching aids used for diet counseling
K4	**CO5**	Report making and documentation

Mapping of Cos with POS & PSOs:

CO/ PO		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO2	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO3	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO4	S	S	S	S	S	**M**	S	S	S	M	M	S	M
CO5	S	S	S	S	S	**M**	S	S	S	M	M	S	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

NON-MAJOR ELECTIVES

Course Code & Title	**BASICS OF HUMAN NUTRITION**		
P21NDN211	**Semester-II**	**Credits:4**	**Hours:4**
Cognitive Level	**K2: Understand** **K3: Apply** **K4 Analyze**		
Learning Objectives	The course aims to ➢ To have appropriate knowledge on nutrition ➢ To address the role of nutrition in health and wellness		

Unit I Basic concept of health

Health: definition, importance of health, malnutrition: undernutrition, overnutrition, factors associated with malnutrition: prevalence, dietary recommendations, RDA- ICMR.

Functions of food: food groups, classification of food groups. Interaction between food and health: Role of food in health promotion.

Unit-II Macro nutrients

Nutrients: definition, classification, macronutrients: Carbohydrates: functions, requirements, food sources, deficiencies and recommended intake.

Proteins: functions, requirements, food sources, deficiencies and recommended intake.

Fats: functions, requirements, food sources, deficiencies and recommended intake.

Unit III Micro nutrients

Micronutrients: Vitamins and minerals:

Fat soluble vitamins: functions, requirements, food sources, deficiencies and recommended intake.

Water soluble vitamins: functions, requirements, food sources, deficiencies and recommended intake.

Macro minerals: functions, requirements, food sources, deficiencies and recommended intake.

Micro minerals: functions, requirements, food sources, deficiencies and recommended intake.

Unit IV Life cycle nutrition

life cycle nutrition: infancy: nutritional needs, nutritional deficiencies, RDA and dietary measures. Pre-school : nutritional needs, nutritional deficiencies, RDA and dietary measures. School going: nutritional needs, nutritional deficiencies, RDA and dietary measures. Adolescents: nutritional needs, nutritional deficiencies, RDA and dietary measures. Pregnancy: nutritional needs, nutritional deficiencies, RDA and dietary measures. Lactation: nutritional needs, nutritional deficiencies, RDA and dietary measures. Adulthood and old age: nutritional needs, nutritional deficiencies, RDA and dietary measures.

Unit V Communicable and non-communicable diseases

Communicable and non-communicable diseases: causes, symptoms, risk factors, consequences, dietary management.

Communicable and non-communicable diseases (Epidemiology Prevalence Source of infection, Vaccination schedule, Preventive measures, diet therapy)

Communicable diseases: Typhoid, tuberculosis, cholera, chicken box, hepatitis, SARS, and covid-19.

Non-communicable diseases: Hypertension, CVD, cancer, renal disorders, liver disorders.

References

1. Srilakshmi B, Dietetics, sixth edition, New age Publishing Press, New Delhi, 2011
2. Stacy N, William’s Basic Nutrition and Diet Therapy, 12th edition, Elseivier publications, UK, 2005.
3. Mahan LK, Stump SE and Raymond JL, Krause's Food and Nutrition Care Process, 13th Edition, Elsevier Saunders, Missouri, 2012
4. Barasi, Mary. *Human nutrition: a health perspective*. Crc Press, 2003.
5. Roday S, Food science and Nutrition, Oxford university press, New Delhi, 2007
6. Mahan LK, Stump SE and Raymond JL, Krause's Food and Nutrition Care Process, 13th Edition, Elsevier Saunders, Missouri, 2012.
7. Robinson CH, Normal and Therapeutic nutrition, Oxford and IBH publishing company, Bombay, 2010.

COURSE OUTCOMES

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

K2	**CO1**	The basic concepts of health and food
K3	**CO 2**	The concept of macronutrients
K4	**CO 3**	The micro nutrients role health
K2	**CO 4**	Role of nutrition in each stage of human life
K3	**C05**	Communicable and non-communicable disease

Mapping of Cos with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	M	S	S	M	S	M
CO2	S	S	M	M	S	S	M	S	S	M	S	M
CO3	S	S	M	M	S	S	M	S	S	M	S	M
CO4	S	S	M	M	S	S	M	S	S	M	S	M
CO5	S	S	M	M	S	S	M	S	S	M	S	M

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Course Code & Title	**Women and Health**

P21ND212	Semester-II	Credits:4	Hours:4
Cognitive Level	**K2: Understand** **K3: Apply** **K4 Analyze**		
Learning Objectives	The course aims to ➢ To have appropriate knowledge of women's health ➢ To address women's Development and Empowerment		

Unit I Basics of women's health

Concept of health, Concept of Women's Health, the status of women's health.

Adolescent health: adolescent sexual and reproductive health, global strategy for adolescent health, adolescent mental health, adolescent pregnancy, adolescent nutritional requirements, nutritional deficiencies, eating disorders, obesity, underweight and adolescent anemia sexually transmitted diseases.

Unit-II Maternal nutrition

Maternal nutrition: MMR, health care delivery system, stages of pregnancy, physiological changes of pregnancy, nutritional requirements in pregnancy, nutritional deficiencies, complications of pregnancy: Anemia, undernutrition, Gestational Diabetes Mellitus (GDM), Pregnancy-induced Hypertension (PIH).

Unit III Nutritional needs in lactation

Nourishing health: the physiological process of lactation, nutritional needs in lactation period, problems of lactation, the importance of breastfeeding, nutritional problems in the lactation period.

Unit IV Health needs of women

Health needs of women: early, middle and late adulthood, nutritional needs in adulthood period, Polycystic ovarian disease, hormonal imbalances, menopause hormonal changes, nutritional care in menopause period.

Unit-V Lifestyle diseases of women

Lifestyle diseases of women: breast cancer, cervical cancer, osteoporosis, arthritis, and other degenerative diseases: incidence, causes, dietary preventive measures.

Health care programs to improve women's health: International, national and state-level agencies for women's health

References

1. B. Srilakshmi S. Dietetics (5th edition) New age international publishers,
2. Park, K. : Park's Textbook of Preventive and Social Medicine, 18th Edition, M/s. Banarasi das Bhanot, Jabalpur, 2000.
3. Swaminathan, M. Essentials of Food and Nutrition, Vols. I and II. Ganesh & Co. 2000.
4. Indian National Code for Protection and Promotion of Breast Feeding, Govt. of India. Ministry of Social Welfare, New Delhi.
5. Mahan LK, Stump SE and Raymond JL, Krause's Food and Nutrition Care Process, 13th Edition, Elsevier Saunders, Missouri, 2012

COURSE OUTCOMES

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

K2	**CO1**	The status of women's health.
K3	**CO 2**	Health care services and available health care providers.
K4	**CO 3**	Critical issues in women's health
K2	**CO 4**	Women's health and education
K3	**C05**	Health policy in India and international perspectives on health.

Mapping of Cos with POS & PSOs

CO/	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5

PO												
CO1	S	S	M	S	S	M	M	S	S	M	S	M
CO2	S	S	M	S	S	M	M	S	S	M	S	M
CO3	S	S	M	S	S	M	M	S	S	M	S	M
CO4	S	S	M	S	S	M	M	S	S	M	S	M
CO5	S	S	M	S	S	M	M	S	S	M	S	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code & Title	**FOOD PROCESSING**		
P21NDN213	**Semester-II**	**Credits:4**	**Hours:4**
Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply**		
Learning Objectives	**The course aims to** On successful completion of this course the student will be able to: 1. To Knowledgeable about the applications of preservation 2. To make out the different preservation process		

Unit I Basic requirements in general for a food processing unit.

Basic requirements in general for a food processing unit : The principle underlying food processing operations, Physical means in food processing operation(including thermal, radiation, refrigeration, freezing, & dehydration) Chemical means in food processing(by sugar, salt, curing, smoke, acids,& Chemicals, Effect of processing on physicochemical characteristics.

Unit II Preservatives and processing of various foods

Different types of preservatives, natural and chemical preservatives, use of class II preservatives: advantages and disadvantages.

Processing Technology for the preservation and production of various food products. Processing of cereals, legumes, oilseeds, fruits, and vegetables.

Unit III Processing Technology for milk and milk products

Processing Technology for milk and milk products. Indigenous milk products pannier and yogurt. Egg processing – manufacturing of egg powder. Fleshy food processing – preprocessing, canning, dehydro freezing, dehydration of meat, poultry, and fish, smoking and curing of meat, fish oil extraction.

Unit IV Beverages and sugar processing

The brief manufacturing process of coffee, tea, cocoa, ready-to-serve beverages: treating water, compounding ingredients, carbonating product, filling product, packaging. Hazard prevention in beverage processing, potential risks and health effects.

Sugar – Manufacturing of sugar from sugarcane and palm, sugar cubes, and powdered sugar.

Unit V Recent advances in food technology

Incorporation of conventional and innovative techniques in food processing: food fortification: in wheat flour, salt, oil rice and milk. Importance of food fortification and its recent developments in India. Technologies underlying in enrichment, fermentation, malting, germination.

REFERENCES

1. Jood S and Khetarpaul N, Food preservation, Agrotech Publishing, Udaipur, 2002
2. Manay S andSwamyM S, Foods: Facts and Principles, New Age International (P) Limited, Chennai, 2005.
3. Swaminathan,M.Advanced Textbook on Food Sceince and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printind and publishing Co Inc, Bangalore, 2003.

Course outcomes

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

K2	CO1	The importance and methods of post-harvest conservation of foods.
K1	CO2	Food processing. technology for preservation and production
K3	CO3	Various food processing techniques and its recent developments in milk processing
K2	CO4	Various food processing technology and their applications in beverages
K2	CO5	Food fortification and enrichment in fermentation techniques

Mapping of Cos with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	S	S	S	M	M	S	S
CO2	S	M	S	S	M	S	S	S	M	M	S	S
CO3	S	M	S	S	M	S	S	S	M	M	S	S
CO4	S	M	S	S	M	S	S	S	M	M	S	S
CO5	S	M	S	S	M	S	S	S	M	M	S	S

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Value added courses

Course Code & Title	**DRUG AND NUTRIENT INTERACTIONS**		
P21NDV11	**Semester-I**	**Credits:2**	**-**
Cognitive Level	**K2: Understand** **K3: Apply** **K4 Analyze**		
Learning Objectives	The Course aims to 1. Discuss the significance of food and drug interactions in the present clinical scenario. 2. Apply this knowledge in prescribing individualized dietary regimen for various therapeutic conditions in order to optimize drug efficacy. 3. Analyze clinically possible interactions between drugs and nutrients in patients who are on enteral and parenteral nutrition. 4. Explain the importance of nutritional genomics in improving health outcomes. 5. Compile knowledge of pharmacology, gene- nutrient and drug-nutrient interactions into the nutrition care process.		

Unit I Overview of drug nutrient interactions

Overview of drug nutrient interactions: Drug- definition, Dosage forms (powders, capsulses, tablets, liquids, rectal dosage forms, topical agents, injections), routes for drug delivery (enteral, parenteral and topical). Basic concepts of Pharmacokinetics - absorption, Factors affecting absorption, distribution, metabolism and elimination; Pharmacodynamics- mechanism of drug action, combined effect of drugs (synergism and antagonism), Factors modifying drug action; Pharmacogenomics.

Unit II Influence of nutritional status on drug disposition and effect

Influence of nutritional status on drug disposition and effect: Effect of malnutrition on drug disposition. Influence of food or nutrients on drug disposition and effect. Interactions of frequently used drugs with nutrients- Analgesics, antibiotics, hypoglycemic agents,

cardiovascular agents (diuretics, anticoagulants, antihypertensives, antihyperlipidemics), antacids, respiratory agents (bronchodilators, corticosteroids), immunosuppressants, psychotropic agents.

Unit III Drug nutrient interaction by life stage

Drug nutrient interaction by life stage: Drug–Nutrient Interactions in Infancy and Childhood, Drug–Nutrient Interaction considerations in Pregnancy and Lactation, Drug–Nutrient Interactions in the elderly. Drug–Nutrient Interactions in Nutrition support - (Enteral and parenteral Nutrition).

Unit IV Nutrigenomics

Nutrigenomics: Basics of Nutrigenomics, Tools of Nutrigenomics- Genomics, Transcriptomics, Proteomics, Metabolomics. Interaction between nutrient and gene- direct interactions, epigenetic interactions, genetic variations. Chronic disease and nutritional genomics. Role of nutrigenomics in coronary heart disease.

Unit V Drug nutrient interactions in specific conditions

Drug nutrient interactions in specific conditions: HIV/AIDS, organ transplantation, impact on mineral status and cancer. Safety measures of drugs in different disease conditions, special care in drug intake. Diet counseling to prevent food and drug interactions, Computers in Nutrient-Drug Interaction management.

References:

1. Joseph I. Boullata, Vincent T. Armenti,, Handbook of Drug-Nutrient Interactions, Humana Press, Totowa, 2004.

2. Beverly J. McCabe, Eric H. Frankel and Jonathan J. Wolfe, Hand book of food and drug interactions, CRC press, 2003.

3. Tripathi K.D, Essentials of medical Pharmacology, Ed 5, Jaypeebrothers , Medical publishers Pvt., Ltd., 2003.

4. Srilakshmi B, Nutrition Science, Ed 5, New Age International (P) Ltd.,2008

5. Sumathi R. Mudambi, M.V. Rajagopal. Fundamentals of food, nutrition and diet therapy, Ed. 6, New Age International (P) Ltd, 2009.

Course Code & Title	SCIENTIFIC WRITING

P21NDV42	Semester-IV	Credits:2	-
Cognitive Level	**K2: Understand** **K3: Apply** **K4 Analyze**		
Learning Objectives	The Course aims to ➢ Learn some basic concepts of research writing ➢ Gain knowledge on research process and report preparation		

Unit I Scientific writing basics

Scientific Writing as a means of communication: concepts and importance. Role of scientific writing in research and its applications. Different forms of scientific writing- Articles in Journals, Research notes and reports , review articles, Monographs, Dissertations, Bibliographies.

Unit II Methods of writing

The reasons for preparing outlines- As a guide for plan of writing- As skeleton for the manuscript. Kinds of outline - Topic outlines, - Conceptual outline, - Sentence outlines - Combination of topic and sentence outlines. Importance and scope of preparing outlines or manuscript plan.

Unit III Drafting methods

Methods of drafting in articles: Titles, Sub Titles, Tables, Illustrations - Tables as systematic means of presenting data in rows and columns and lucid way of indication relationships and results. - Formation Tables : Title, Body stab, Stab, Column, Spanner and Box Head - Appendices : Use and guidelines

Unit IV Writing process

The Writing Process – role of writing process in research writing, getting started: Use outline as a starting device - Drafting, Reflecting, Re-reading: Checking organization, headings, content, clarity, Grammar,- Brevity and precision in writing, Drafting and Re-drafting based on critical evaluation

Unit V Supportive measures in scientific writing

Clearly state the question to be addressed, Rationale and importance of the Empirical and theoretical conceptualization, Presenting pilot study / data, Research proposal and time frame,

Clarity, specificity of method, Clear organization, Outcome of study and its implications, Budgeting, Available infra-structure and resources, Executive summary. Software used reference preparation (Mendeley, End Note. Read Cube Papers.EasyBib.com Zotero Cite This For Me (formerly RefME) Sciwheel. RefWorks) plagiarism checking, grammar checking and citation.

References

1. Gurumani N, Scientific Thesis Writing and Paper Presentation. MJP Publishers,Chennai, 2016.

3. Mathews JR and Mathews RW, Successful Scientific Writing: A step by stepguide for the Biological and Medical Sciences, Fourth Edition, Cambridge University Press, 2014.

4. Rahim Abdul. Thesis Writing, A Manual for Researchers, New Age International Pvt Ltd, 2007.

5. Ramadass, P and Aruni, A.W, Research and Writing Across the Discipline,MJP Publishers, Triplicane,2009.