

VIMALA COLLEGE (AUTONOMOUS)
THRISSUR
(Affiliated to University of Calicut)



M Sc DEGREE PROGRAMME IN
HOME SCIENCE
(NUTRITION AND DIETETICS)

CREDIT AND SEMESTER SYSTEM (CBCSS PG-2019)

SYLLABUS

2019 ADMISSION ONWARDS

PROGRAMME SPECIFIC OUTCOME FOR M Sc NUTRITION AND DIETETICS

1. Understand the functioning of various organ systems in human body and study the importance of nutrition during various developmental stages of lifecycle.
2. Understand the role and metabolism of nutrients and the relevance of various food groups and functional foods.
3. Understand the dietary management and principles of diet counselling ,and biochemical changes during various therapeutic conditions.
4. Understand the relevance of nutrition in relation to community and understand various strategies developed in overcoming malnutrition.
5. Understand the techniques of research and develop skills in conducting research and applying statistical procedures.
6. Understand the various aspects of quantity food production and service in various institutions.

M SC HOME SCIENCE (NUTRITION AND DIETETICS)

COURSE STRUCTURE AND SCHEME OF EXAMINATION UNDER CBCSS

SI No	CORE COURSE	TITLE OF THE COURSE	INSTRUCTION HRS /WK		CREDIT	EXAM HRS	SCHEME OF EVALUATION	
			T	P			EE weight (80%)	IE weight (20%)
I	HND1 C01	HUMAN PHYSIOLOGY	5		4	3	4	1
	HND1 C02	NUTRITION THROUGH LIFE CYCLE	5		4	3	4	1
	HND1 C03	ADVANCED FOOD SCIENCE	5		4	3	4	1
	HND1 C04	MACRO NUTRIENTS	4		4	3	4	1
	HND1 C05	RESEARCH METHODS & STATISTICS	6		4	3	4	1
	TOTAL			25		20		
II	HND2 C06	ONCOLOGY NUTRITION	5		4	3	4	1
	HND2 C07	FOOD SERVICE MANAGEMENT	5		4	3	4	1
	HND2 C08	CLINICAL AND THERAPEUTIC NUTRITION	6		4	3	4	1
	HND2 C09	NUTRITIONAL MANAGEMENT IN LIFE STYLE DISEASES	5		4	3	4	1
	HND2 L01	PRACTICAL- CLINICAL AND THERAPEUTIC NUTRITION		4	4	3	4	1
	TOTAL					20		
III	HND3 C10	VITAMINS AND MINERALS	6		4	3	4	1
	HND3 C11	COMMUNITY NUTRITION	6		4	3	4	1

	HND3 E01 HND3 E02 HND3 E03	ELECTIVE COURSES PAEDIATRIC NUTRITION GERIATRIC NUTRITION FUNCTIONAL FOODS AND NUTRACEUTICALS	5		4	3	4	1
	HND3 E04 HND3 E05 HND3 E06	ELECTIVE COURSES SPORTS NUTRITION ENTREPRENEURIAL DEVELOPMENT NUTRITIONAL COUNSELLING AND EDUCATION	4		4	3	4	1
	HND3 L02	HOSPITAL INTERNSHIP AND COMMUNITY NUTRITION EDUCATION PROGRAMME		4	4	3	4	1
	TOTAL		25		20			
IV	HND4 C12	METABOLIC AND BIOCHEMICAL CHANGES IN DISEASES	5		4	3	4	1
	HND4 L03	PRACTICAL- METABOLIC AND BIOCHEMICAL CHANGES IN DISEASES		4	4	3	4	1
	HND4 E07 HND3 E08 HND3 E09	ELECTIVE COURSE DIABETIC CARE AND MANAGEMENT FOOD SAFETY AND QUALITY CONTROL PUBLIC NUTRITION AND HEALTH	6		4	3	4	1
	HND4 P01	PROJECT		10	4		4	1
	HND4 V01	COMPREHENSIVE VIVA VOCE			4		4	1
	TOTAL		25		20			
	TOTAL CREDITS (CORE, ELECTIVES, PROJECT AND VIVA)			80				
I	HND1 A01	AUDIT COURSE I AEC- INDUSTRY TRAINING/SEMINAR			4	2		

		PRESENTATION				
II	HND2 A02	AUDIT COURSE I PCC- SPSS		4	2	

GRADING AND EVALUATION

(1) Minimum Credits for pass

Accumulated minimum credit required for successful completion of the course shall be 80.

(2) A project work of 4 credits is compulsory and it should be done in III & IV semesters. Also a comprehensive Viva Voce may be conducted by external examiners at the end of IV Semester and carries 4 credits.

(3) Evaluation and Grading:

Evaluation: The evaluation scheme for each course shall contain two parts; (a) Internal /Continuous Assessment (CA) and (b) External / End Semester Evaluation (ESE).

Of the total, 20% weightage shall be given to Internal evaluation / Continuous assessment and the remaining 80% to External/ESE and the ratio and weightage between Internal and External is **1:4**.

Primary evaluation for Internal and External shall be based on 6 letter grades (**A+, A, B, C, D and E**) with numerical values (Grade Points) of **5, 4, 3, 2, 1 & 0** respectively.

Grade Point Average: Internal and External components are separately graded and the combined grade point with weightage **1** for Internal and **4** for external shall be applied to calculate the **Grade Point Average (GPA)** of each course. Letter grade shall be assigned to each course based on the categorization based on Ten point Scale.

Evaluation of Audit Courses: The examination and evaluation shall be conducted by the college itself either in the normal structure or MCQ model from the Question Bank and other guidelines provided by the University/BoS. The Question paper shall be for minimum 20 weightage and a minimum of 2 hour duration for the examination. The result has to be intimated / uploaded to the University during the Third Semester as per the notification of the University.

For all courses (Theory & Practical)/Semester/Overall Programme, Letter grades and **GPA/SGPA/CGPA** are given on the following way :

- a) First Stage Evaluation for both Internal and External done by the Teachers concerned in the following Scale :

GRADE	GRADE POINT
A+	5
A	4
B	3
C	2
D	1
E	0

b) The Grade Range for both Internal & External shall be :

Letter Grade	Grade Range	Range of Percentage (%)	Merit / Indicator
O	4.25 – 5.00	85.00-100.00	Outstanding
A+	3.75 – 4.24	75.00-84.99	Excellent
A	3.25 – 3.74	65.00-74.99	Very Good
B+	2.75 – 3.24	55.00-64.99	Good
B	2.50 – 2.74	50.00-54.99	Above Average
C	2.25 – 2.49	45.00-49.99	Average
P	2.00 -2.24	40.00-44.99	Pass
F	< 2.00	Below 40	Fail
I	0	-	Incomplete
Ab	0	-	Absent

'B 'Grade lower limit is 50% and 'B+' Grade lower limit is 55%

(4) Weightage of Internal and External valuation:

The evaluation scheme for each course shall contain two parts (1) internal evaluation (2) external evaluation. Its weightage are as follows:

Evaluation	Weightage
Internal	1 (or 20%)
External	4 (or 80%)

Both internal and external evaluation will be carried out using Direct Grading System

A) Theory: Every Semester

Pattern of question Paper -**External marks distribution**

Division	Type	No. of Questions	Weightage	Total Weightage
Part A	Short Answer	4 out of 7	2	8
Part B	Short Essay	4 out of 7	3	12
Part C	Essay	2 out of 4	5	10
Total Weightage				30

Internal marks distribution

Sl.No	Criteria	Weightage
1	Attendance	1
2	Assignments	1
3	Seminar	1
4	Test papers-2-	2
Total		5

B) PRACTICAL

Internal marks distribution

Sl.No	Criteria	Weightage
1	Lab skill	4
2	Record	3
3	Practical test	3
Total		10

External marks distribution**HND2 L01 PRACTICAL –CLINICAL AND THERAPEUTIC NUTRITION**

Sl . No	Criteria	Weightage
I	Diagnosis	2
	Dietary Guidelines	3
II	Menu Plan	5
	Preparation and serving	2
	Taste	1
	Time	1
	Cleanliness	1
	Presentation	1
	Discussion	2
	RDA	2
	Calculation	5
	Record	5
TOTAL		30

HND3 L02 HOSPITAL INTERNSHIP AND COMMUNITY NUTRITION EDUCATION PROGRAMME

Sl . No	Criteria	Weightage
I	Performance in Hospital Internship	10
	Case study presentation	3
II	Weekend Hospital Training	5
	Case study presentation	2
III	Diet Counseling Report	2
IV	Community Nutrition Camp	6
	Community Nutrition Camp-report	2
Total		30

HND4 P03 PRACTICAL – METABOLIC AND BIOCHEMICAL CHANGES IN DISEASES

Sl . No	Criteria	Weightage
1	Principle	4
2	Procedure	6
3	Calculation	4
4	Graph	4
5	Result	2
6	Record	4
7	Viva- Clinical Significant	6
Total		30

VPND4 PR -PROJECT

Internal Marks distribution

Sl.No	Criteria	Weightage
1	Relevance of the topic and statement of problem	2
2	Methodology and analysis	2
3	Quality of report and presentation	2
4	Viva- Voce	4
Total		10

External marks distribution

Sl.No	Criteria	Weightage (Total 40)
1	Relevance of the topic and statement of problem	8
2	Methodology and analysis	8
3	Quality of report and presentation	8
4	Viva- Voce	16
Total		40

VPND4V- Viva Voce

Internal Marks distribution

Sl.No	Criteria	Weightage
1	Preparation	1
2	Presentation	2
3	Knowledge	2
4	Total	5

External marks distribution

Sl.No	Criteria	Weightage
1	Preparation	10
2	Presentation	10
3	Knowledge	10
4	Total	30

SEMESTER I
HND1 C01 HUMAN PHYSIOLOGY

Hours per week: 5

Credit: 4

Objectives

1. To enable students to understand the metabolic changes in health and different disease conditions.
2. Gain knowledge about the relationship between nutrition and human system.

Course Outcomes

SI No	Course Outcome	Pos/ PS Os	CL	KC	Class Sessions	Lab/ Field study
CO1	Understand structure, component and functions of all systems of the human body	PO5 /PS O1	U	F	25	
CO2	Explain how to cope with disorders and other environmental factors	PO5 /PS O2	U	C	5	
CO3	Elaborate on common tests used to analyze different disorders	PO5 /PS O2	R	F	7	
CO4	Outline the role of central nervous system in controlling voluntary and involuntary activities of the human body	PO5 /PS O2	U	F	9	
CO5	Illustrate the role of endocrine system in the regulation of body activities	PO5 /PS O2	U	F	9	
CO6	Identify the causes of Infertility and Methods of contraception	PO5 /PS O2	U	C	6	
CO7	Comprehend blood group system and common facts related to the same	PO5 /PS O2	U	C	6	
CO8	Apply resuscitation methods in emergency situations	PO5 /PS O2	Ap	P	7	1
CO9	Illustrate the mechanism to maintain normal water, electrolyte and pH balance	PO5 /PS	R	F	7	

		O2				
CO10	Understand the adaptation of the body to unfavourable condition, stresses, physical activity and diseases	PO5 /PS O2	U	C	8	
Total hours of Instruction					89	1

UNIT I BLOOD

Blood and its composition, Functions and structure of each constituents of blood, Formation and Destruction, Blood group, Rhesus factor, Erythroblastosis foetalis, ESR, Hemostasis.

UNIT II CARDIOVASCULAR SYSTEM

Structure and Functions of Heart. Blood vessels and its type, Special conducting tissues of Heart, Properties of cardiac muscle, Heart rate. Cardiac cycle, Heart sound, Cardiac output, Pulse, Tachycardia and Bradycardia. ECG & its significance. Hemorrhage, compensatory changes after hemorrhage. Blood Pressure, Cardiovascular modification during exercise. Different types of circulation- foetal circulation, pulmonary, hepatic, capillary. Techniques to identify cardiovascular disorders –angioplasty, angiogram.

UNIT III RESPIRATORY SYSTEM

Organs & functioning, Mechanism of respiration, Gaseous exchange in lungs and tissues. Regulation of respiration, Lung volumes and capacities. Apnea, Hypoxia, dyspnea, asphyxia, hyperpnoea, Resuscitation and its methods.

UNIT IV DIGESTIVE SYSTEM

Structure and functions of Alimentary tract (Mouth, Stomach, Small Intestine, Large Intestine), Functions and composition of various secretions and juices- Saliva, Gastric, Bile, Intestinal, Pancreatic secretion. Mechanism of swallowing, Phases of secretion of digestive juices and its regulation, movements of gastrointestinal tract, defecation, Regulation of appetite.

Liver, gall bladder, pancreas, spleen – anatomy & physiology Functions of bile salts.

UNIT V URINARY SYSTEM

Structure and functions of kidney, structure of nephron, Urine formations, GFR, composition of normal and abnormal urine, regulation of reabsorption, Role of Kidney in maintaining pH of Blood, Micturition.

UNIT VI NERVOUS SYSTEM

Structure of neuron, conduction of nerve impulse, nervous transmission, synapse, reflex action, classification of nervous systems (only the parts and general functions- CNS and SNS), common test in neurological disorders- EEG , EMG, MRI, NCV

UNIT VII ENDOCRINE SYSTEM

Endocrine glands, secretions, functions, regulation of secretions.

UNIT VIII REPRODUCTIVE SYSTEM

Male Reproductive system (structure, functional anatomy, and spermatogenesis) and female reproductive system (structure, functional anatomy, Oogenesis). ovarian and uterine cycle's, fertilization, conception, implantation. Male and female contraception's- Etiology of male and female infertility

RELATED EXPERIENCE

1. Measurement of pulse and blood pressure.
2. Demonstration of blood group determination.
3. Microscopic examination of blood.

REFERENCES

1. Chatterjee.C.C, Human Physiology (11th edition), vol 1 & 2, Medical Allied Physiology (2016).
2. Guyton and Hall Textbook of Medical Physiology, 12e (Guyton Physiology), by John E. Hall PhD (Author) , Hardcover – Import, Publishers- Saunders; 12 edition 19 Jul 2010
3. Ross and Wilson Anatomy and Physiology in Health and Illness: With access to Ross & Wilson website for electronic ancillaries and eBook, Publisher: Churchill Livingstone; 11 edition, 2010

SEMESTER I

HND1 C02 NUTRITION THROUGH LIFE CYCLE

Hours per week: 5

Credit: 4

Objectives

1. Understand the role of nutrition in different conditions.
2. Develop competency in planning diets to meet the nutritional requirements of different socio economic levels.

Course Outcomes :

Sl No	Course Outcome	Pos/ PSO s	CL	KC	Class Sessions	Lab/F ield study
CO1	Understand the role of food in daily life.	PO2, PSO 2	U	C,P	4	
CO2	Compare the nutritional requirement in different age groups.	PO3, PSO 1	An, E	P	14	
CO3	Understand nutrition related problems in life cycle.	PO6, PSO 1	U	C	14	
CO4	Understand national and international health programmes to prevent malnutrition.	PO6, PSO 4	U	C	10	
CO5	Plan balanced diets for different age groups.	PO6, PSO 1	C	P	12	10
CO6	Develop competency in planning diets to meet the nutritional requirements of different socio economic levels.	PO6, PSO 1	C	P	5	5
CO7	Understand the need of nutrition in special events.	PO6, PSO 1	U	C	12	
CO8	Understand Growth monitoring and immunization schedule.	PO3, PSO 4	U	C,P	4	
Total hours of instruction					75	15

UNIT I NUTRITION AND DIET IN HEALTH

Vital link between nutrition and health. Review –concept of adequate nutrition, and malnutrition. Different food groups – guide in menu planning. Balanced diets.

UNIT II NUTRITION IN PREGNANCY

Physiological changes during Prgnancy, Nutritional need during Pregnancy, Maternal Nutrition and foetal outcome, complications of pregnancy, Management of High risk Pregnancies, LBW babies – causes and complications, tests during pregnancy, prenatal and postnatal care.

UNIT III NUTRITION IN LACTATION

Physiology of lactation, Malnutrition- effects on milk and effects on mothers,Nutritional requirement and dietary management, .

UNIT IV NUTRITION IN INFANCY

Nutritional status of the infants, rate of growth as the indicator. Nutritional allowances for the infants, breast feeding Vs formula feeding, food square, weaning foods suitable for infants, feeding the premature infants and LBW infants, interventions to prevent malnutrition.

UNIT V NUTRITION IN PRESCHOOL AGE

Growth and development of preschool children, food habits and nutrient intake of preschool children. Dietary allowances – supplementary foods, reasons for under 5 MR. Nutritional problems and Interventions to prevent malnutrition.

UNIT VI GROWTH AND HEALTH MONITORING

Growth Monitoring- Importance, Growth Chart- ICDS, WHO. Immunization Schedule

UNIT VII NUTRITION DURING SCHOOL AGE

Physical development, nutritional status of school going children, food habits, nutritional requirements, nutrition and academic performance, Nutritional disorders, interventions to prevent malnutrition.

UNIT VIII NUTRITION DURING ADOLESCENCE

Physical, physiological and psychological changes in adolescents, sexual maturity rating. Nutritional needs,Nutritional Problems, changes needed to prevent malnutrition.

UNIT IX NUTRITION FOR THE ADULTS

Nutrition for the adult-Nutritional requirements according to the mode of activity.
Nutrition and health of women-general nutritional problems of women, anemia, osteoporosis, pre and post menopausal syndrome, hormonal changes during menopause .Infertility –risk factors, prevention, methods of detection.

UNIT X NUTRITION IN OLD AGE

Theories of ageing – physiological changes during ageing, changes in body composition, techniques for assessing body composition and Nutritional requirement and Dietary Modifications.

UNIT XI NUTRITION IN SPECIAL EVENTS

Sports nutrition – Energy systems, nutritional requirements, carbohydrate loading, role of water and electrolytes, ergogenic aids.

Nutrition in high altitude

Nutrition in Disaster Management- requirements, major nutritional deficiency diseases in emergency monitoring assessment, surveillance of nutritional status and Relief measures in emergencies.

Space nutrition – space food formulation

RELATED EXPERIENCE

Planning diets to meet the requirements at different economic level- low, middle and high income for the following conditions.

1. Pregnancy
2. Lactation
3. Preschool age
4. School age
5. Adolescents
6. Adult
7. Old people
8. Athletes

REFERENCES

1. Mahan. L.K and Stump SE, Krause's Food, Nutrition and Diet Therapy, WB Saunders Company, 10th edition, 2001

SEMESTER I
HND1 C03 ADVANCED FOOD SCIENCE

Hours per week: 5

Credit: 4

Objectives

1. To understand the nutritive value of foods.
2. To understand the principles and chemistry of foods and apply the principles during preparation & cooking

Course Outcomes

Sl No	Course Outcome	Pos/PS Os	CL	KC	Class Sessions	Lab/Field study
1	Understand the structure and composition of different foods	Po5/ PSO2	U	F	15	
2	Assess the functional properties of food	PSO2	U	F	15	
3	Compare the methods of cooking	PSO6	An E	C	33	
4	Analyse the reasons and prevention of browning in vegetables and fruits	PSO2	C	C	10	
5	Develop different nutritious recipes with different foods	PSO6	Cre	C		5
6	Judge the organoleptic evaluation of foods	PSO6	Eva	P		5
7	Detect adulterants present in foods	Po5/ PSO6	E	P	10	
8	Discuss the emerging trends in food science	Po5/ PSO2	C	C	15	
Total hours of instruction					80	10

UNIT I FUNCTIONAL PROPERTIES OF FOODS

Definition and properties of colloids, solution, sol, gel, emulsion, food dispersion. Enzymes- definition, classification, specificity of enzymes, enzyme inhibition, allosteric enzymes, application of enzymes in food industry. Sensory tests. Types of tests. Procedures for determination and monitoring of shelf life

UNIT II CEREALS & MILLETS

Cereal- Structure and composition.Parboiling, germination.Cereal cookery — effect of moist and dry heat, gluten- factors affecting gluten formation, Starch granules structure and characteristics.nonstarch poly saccharides- (fibres,cellulose, hemicellulose, pecticsubstances,gums, carboxy methyl cellulose(CMC))Application in food industry batters and dough, breakfast cereals , fermented products

UNIT III PULSES, NUTS AND OILSEEDS

Nutritive value, Importance of germination & fermentation, protein concentrates and isolates, Anti nutritional factors present in pulses.

UNIT IV VEGETABLES AND FRUITS

Nutritional importance,pigments and acids in vegetables and fruits, browning reactions- enzymatic and non-enzymatic browning

UNIT V FLESH FOODS

Meat - Composition, post-mortem changes in meat

Fish – Composition, importance of fish.

Egg- Structure and nutritive value ,Effect of heat on egg proteins, Quality of egg , and egg products.

Milk - Composition, physical properties and processing, effect of heat, milk products.

UNIT VI FOOD ADDITIVES AND EMERGING TRENDS IN FOOD SCIENCE

Food additives , FSSAI , HACCP, Principles of food packaging and labeling.Food Fortification, GM foods, novel foods, SCP, Leaf Protein, Nanotechnology in foodindustry.

UNIT VII NUTRACEUTICALS

Classification, probiotics, prebiotics, --health effect .Classification , sources andimportance of polyphenols, Foods with nutraceutical effects- green tea grape seed,wheat grass, *Garciniacambogia*and aloe vera.

RELATED EXPERIENCE

1. Microscopic examination of different starch granules and effect of heat on starch (cake and bread making) Determination of gluten content of different flours
2. Preparation of stable emulsion (mayonnaise)
3. Stages of sugar cookery, crystalline and non-crystalline candies- Fondant, fudge, marshmallow.
5. Preparation of foam and effect of additives on stability, Meringue.
6. Effect of heat on milk / scum formation. Preparation of any 3 products.
7. Changes in pigments due to different cooking methods.
8. Enzymatic browning of fruits and vegetables.
9. Sensory evaluation of foods.
10. Product development- preparation and standardization of novel nutritious recipes.
11. Market survey on new processed items available in the local markets.
12. microbiological test for foods

REFERENCES

1. Potter, N. Hotchkiss, H.J, Food Science, 5th edition, CBS publishers and distributors, New delhi, 1996.
2. Srilakshmi, B, Food Science, New Age International Pvt. Ltd., Chennai, 2006
3. Beckhan. C.G & Graves.H.J, Foundations of food preparations, Macmillan Publishing Co, New Delhi, 1979.

SEMESTER I
HND1 C04 MACRO NUTRIENTS

Hours per week: 4

Credit: 4

Objectives

1. Obtain depth on the study of major nutrients and
2. Develop competence for undertaking nutritional investigations.

Course Outcomes

SI No	Course Outcome	Pos/ PS Os	CL	KC	Class Sessions	Lab/ Field study
CO1	Understand the concepts of Sports Nutrition	PO5 /PS O2	U	F	4	
CO2	Analyze nutrient requirement of an athlete	PO5 /PS O2	An	P	4	3
CO3	Explain the importance of Nutrition among Sports Personnels	PO5 /PS O2	U	C	6	
CO4	Comprehend changes in food after consumption	PO5 /PS O2	U	C	8	
CO5	Determine nutritional status of individuals with varying activity levels	PO5 /PS O2	E	P	4	4
CO6	Apply knowledge of metabolism and nu	PO5 /PS O2	Ap	C	8	
CO7	Understand the need and benefits of nutrients present in the food	PO5 /PS O2	U	C	8	
CO8	Apply the benefits of non nutritional components of food in different stages of life	PO5 /PS O2	Ap	C	7	1
CO9	Analyze calorimetry, work capacity and its efficiency	PO5 /PS O2	An	C	12	

CO10	Explain control of food intake and metabolic consequences of starvation	PO5 /PS O2	U	C	3	
Total hours of Instruction					64	8

UNIT I UNDERSTANDING NUTRITION

Nutrition science: Basic concepts, Latest concepts, Methods for studying the nutrient requirements.

UNIT II CARBOHYDRATES

Classification, Properties, Functions, Digestion, & absorption, Food sources & RDA. Metabolism: Glycolysis, gluconeogenesis, TCA cycle, HMP shunt, glycogenesis, glycogenolysis, bioenergetics. Regulation of blood glucose concentration, threshold for glucose, abnormal levels in blood glucose. Glycemic index (Factors affecting GI). Dietary Fiber (Classification, functions) & Resistant starch (Classification, functions) , Modification of carbohydrate intake for specific disorder. Deficiencies and Toxicity

UNIT III PROTEINS

Classification (Protein and Amino acid), Properties, Functions, Digestion, absorption, Food sources & RDA. Metabolism: General catabolism of amino acids, deamination, transamination, decarboxylation, urea cycle. Protein quality evaluation, Protein turnover, amino acid balance, Deficiency and toxicity.

UNIT IV FATS AND LIPIDS

Classification (Fatty acids and Lipids), eicosanoids- importance. Properties, Functions, Digestion. Absorption, transportation & utilization. Food sources & RDA. Metabolism of lipids: biosynthesis and oxidation of saturated and unsaturated fatty acids, biosynthesis cholesterol and regulation, Toxicity and Deficiency. Plasma lipoproteins and their significance and ketone body formation.

UNIT V ENERGY

Definition. measurement of energy, Direct and indirect calorimetry. Determination of Energy value of food- Bomb Calorimeter. Physiological value of food, Gross calorific value, Total energy Expenditure, Components of energy expenditure- Resting Energy

Expenditure, Thermic Effect of Food, Energy expended in Physical Activity. Methods of estimation of energy expenditure, BMR- definition its determinants & factors affecting BMR, factors affecting energy requirement, Recommended dietary allowances, factors affecting RDA, Indian reference man and woman, Energy Requirements. Estimating energy requirement of individuals and group, energy balance. Nutrition and work capacity- factors affecting physical work capacity and efficiency.

UNIT VI INTERMEDIARY METABOLISM AND REGULATION OF NUTRIENT METABOLISM

Interrelationship between carbohydrates, proteins, and fats.

Regulation of body weight, Control of food intake, role of hunger and satiety centre, metabolic consequences of starvation.

UNIT VII WATER

Functions. Water distribution in our body. Water balance. Regulation of water balance, Requirements of water. Disturbances in fluid balance- dehydration and oedema.

REFERENCES

1. Mahan.L.K and Stump.S.E , Krause's Food, Nutrition and Diet Therapy, W.B Saunders Company, USA.
2. Nix.S, William's Basic Nutrition and Diet Therapy, Mosby, India.
3. Sreelakshmi.B, Nutrition Science, New Age International, New Delhi.
4. Bamji, MS, Rao,MP; Reddy.V, "Textbook of human Nutrition", Oxford and IBH Publishing Co, New Delhi.

SEMESTER I

HND1 C05 RESEARCH METHODS AND STATISTICS

Hours per week: 6

Credit: 4

Objectives

1. Understand the methodology of research and techniques
2. Develop skills in conducting research from planning a study to report Writing
3. Apply statistical procedure to analyse numerical data draw inferences

Course Outcome

Sl No	Course Outcome	Pos/PS Os	CL	KC	Class Sessions	Lab/Field study
1	Outline of research concepts	Pos1	R	F	10	
2	Compare different types of research methods	PSOs 5	U	P	12	
3	Construct research design or proposal for future project works	PSOs 5	A	P	22	
4	Examine various sampling techniques and measurement scales	Pos1	U	F	20	
5	Develop report writing or presentation skills	PSOs 5	C	P	12	
6	Choose right statistical techniques to be used with various research methods	PSOs 5	R	P	15	
7	Interpret statistical literature, research articles, the claims made on the basis of statistics	PSOs 5	E	F	17	
	Total hours of Instruction				108	

PART A: RESEARCH METHODS

UNIT I FUNDAMENTAL CONCEPT OF RESEARCH

Meaning, definition, objectives and characteristics of Research –basic research (fundamental research): applied research, action research, ex post facto research, evaluation research, historical research, exploratory research, industrial research, developmental research.

UNIT II DEFINING RESEARCH PROBLEM

Definition and selection, necessity of defining the problem, technique involved in defining a problem

UNIT III RESEARCH DESIGN / PROPOSAL

Meaning and purpose of a research design or proposal, research problem definition, identification, statement of research problem, criteria for selection, definition of concepts (operational definition). Variables - types of variables, independent and dependent variables, control and intervening variables. Hypothesis - Meaning and importance, types. Finding related literature: Significance, source, role taking

UNIT IV METHODS OF DATA COLLECTION

Collection of primary data – observation method, Interview method, collection of Data through questionnaires and schedules, other methods of data collection, collection of secondary data

UNIT V MEASUREMENTS AND SCALING TECHNIQUES

Measurement in research, Measurement scales, Sources of error in measurement, Technique of developing measurement tools, scaling-meaning, classification and techniques

UNIT VI SAMPLING

Census and sample method ,theoretical basis for sampling, methods of sampling ,size of sample merits and limitations of sampling ,sampling and non sampling errors ,reliability of sampling.

UNIT VII REPRESENTATION OF DATA

Significance of diagrams, graphs, types of diagrams and graphs, limitation of diagrams and graphs, meaning and advantage of statistical presentation of data

UNIT VIII RESEARCH REPORT WRITING

Principles of report writing ,basic components, preliminaries, text of reports, bibliography, foot notes, spacing ,margins, indentations , quotations , writing a scientific paper. Project proposal

RELATED EXPERIENCE

1. Prepare a project proposal for M.Sc dissertation.
2. Make a power point presentation of the project proposal.

PART B: STATISTICS

UNIT I DESCRIPTIVE STATISTICS

1. Measures of central tendency-mean ,median, mode
2. Measures of variability –range, quartile deviation, mean deviation Standard deviation
3. Correlation coefficients, rank order correlation, product moment correlation – regression and prediction
4. Normal probability curve –properties, practical applications

UNIT II SAMPLING STATISTICS

1. Statistical inference and central limit theorem
2. Null hypothesis and tests of significance
3. The chi-square
4. Testing difference between mean, proportions, standard deviations and correlations.

UNIT III INTRODUCTION TO STATISTICAL PACKAGE FOR SOCIAL SCIENCES (SPSS)

RELATED EXPERIENCE

1. Construct a research tool.
2. Prepare a research tool.
3. Present abstract of a research report.
4. Preparation of diagrams/ graph

REFERENCES

1. Kothari.C.R, Research Methodology, Wiley Eastern Ltd, New Delhi, 2000.
2. Best W L & Khan V, Research in Education, 7th edition, prentice hall Private, New Delhi.
3. Roul L, Methodology of Educational Research, 2nd edition, Vikas Publishing House Ltd, New Delhi.
4. Gupta.SC &Kapur VK, Fundamentals of mathematical statistics, Sulthan Chand &Sons,NewDelhi

SEMESTER I

HND1 A01- AUDIT COURSE- I

**Ability Enhancement Course-
Industry
Training/Seminar
Presentation**

Credit: 4

Criteria for Seminar Presentation	Weightage
Selection of the topic	5
Presentation	5
Review Collection	5
Interaction	5
Total	20
Criteria For Industry Training	Weightage
Selection of the topic	5
Participation	5
Report	5
Knowledge/Exam	5

SEMESTER II

HND2 C06-ONCOLOGY NUTRITION

Hours per week: 5

Credit: 4

Objectives

1. To gain knowledge about different types of cancer
2. Understanding about the nutritional management in cancer

Course Outcomes

Sl No	Course Outcome	Pos/PS Os	CL	KC	Class Sessions	Lab/Field study
1	Understand general information about onset and diagnosis of cancer	PO7/ PSO 3	U	C	6	
2	Interpret general biochemical changes occurs in cancer	PO5/ PSO 3	U	F	10	
3	Extend knowledge in medical nutrition therapy for different types of cancers	PO7/ PSO 3	U	F	19	
4	Interpret nutritional care for prevention, treatment and survivors of cancer	PO5/ PSO 3	U	F	18	
5	Explain about nutritional management during and after treatment of cancer	PO7/ PSO 3	U	F	20	
6	Understand about different cancer supporting groups	PO7/ PSO 3	R	F	11	
7	Understand role dietitian in nutritional care for cancer patients and prevention approaches	PO5/ PSO 3	U	F	8	
Total hours of Instruction					90	

UNIT 1 Introduction to oncology

Cancer biology, Classification of cancer, Risk factors-environmental, hereditary & nutritional factors, Epidemiological data on cancer incidence, Standards for diagnosing malnutrition, Cancer Cachexia, Biochemical changes in cancer in general

UNIT 2 Nutrition Support for Oncology Patients

Medical nutrition therapy- Head and Neck Cancer, Breast and Reproductive Cancer, Prostate Cancer, Lung Cancer, Oral cancer, Esophageal cancer, Gastric cancer, Colon cancer, Pancreatic cancer, Hematologic Malignancies,

Enteral and parenteral nutrition in cancer, Nutrient supplementation in cancer Role of nutrition and exercise in cancer survivorship, Roles of vitamins, minerals, phytochemicals, herbal and botanical supplements in cancer prevention and treatment , Role of alcohol, sugar, salt and caffeine in cancer, Palliative Care- Role of nutrition in palliative and hospice care

UNIT 3 Nutritional Management of Cancer

Nutritional implications in chemotherapy and radiation therapy–Anorexia and Other Gastrointestinal Toxicities Associated with Cancer Treatments, Surgical Oncology-Pre and post operative nutrition in cancer, Immunotherapy, Bone marrow transplantation, Interactions between cancer therapies and nutrient, Cancer support groups- governmental and non-governmental organizations

UNIT 4 Role of Dietitian in Cancer Care

Cancer prevention approaches- Children, adults and elderly, Patient support and management during therapy ,Patient support and management during survivorship

PRACTICALS:

Case studies in Oncology Nutrition.

Visit to a major cancer research centre

Development of standardized recipes for cancer patients

REFERENCE:

1. Mary Mariyan, Susan Roberts, Clinical Nutrition for Oncology Patients, Jones and Bartlett Publishers, 2010

2. Vincent T De Vita Jr., Theodore S Lawrence, Steven A Rosenberg, Cancer, Principles and Practice of Oncology, Wolters Kluwer And Lippincott Williams & Wilkins Publications, 9th Edition, 2011
3. Laura Elliott, Laura L. Molseed, Paula Davis McCallum, The Clinical Guide to Oncology Nutrition, Oncology Nutrition Dietetic Practice Group, American Dietetic Association, Second Edition, 2006
4. Mohan, L.K. and Shump, S.E. Krause's Food Nutrition & Diet therapy, W.B. Saunders Company, XII edition, 2001
5. David L Katz, Rachel S C Friedman, Nutrition in Clinical Practice, Wolters Kluwer Publishers, Third Edition, 2015

SEMESTER II

HND2 C07 FOOD SERVICE MANAGEMENT

Hours per week: 5

Credit: 4

Objectives

1. Understand the objectives of different types of food service institutions.
2. Apply knowledge in space allocation of food plants
3. Gain knowledge in menu planning preparation of recipes in large scale and serving and in food costing.

Course Outcomes

Sl No	Course Outcome	Pos/PS Os	CL	KC	Class Sessions	Lab/Field study
CO 1	Apply best practices and standards related to protocol and promotion in the food service industry	P06/PS06	Ap	C,P	15	6
CO 2	Develop organization chart to change and enhance wellness in diverse individuals and groups	P06/PS06	Ap	P	8	
CO 3	Identify use and operation of major food service equipment and relationship for efficient product flow	P06/PS06	Ap	C	8	
CO 4	Apply the principles of human resource management to different situations in Hospitality Industry	P06/PS06	Ap	C	8	
CO 5	Construct management and business theories and principles for the development of programs or services.	P06/PS06	C	C	8	
CO 6	Evaluate budget, food cost control and interpret financial data	P06/PS06	E	C	8	
CO 7	Use effective and professional oral and written communication and documentation.	P06/PS06	Ap	C	1	
CO 8	Study hygiene and sanitation in the food service industry	P06/PS06	E	C,P	6	3
CO 9	Build a kitchen layout using the available physical facilities	P06/PS0	C	P	8	1

		6				
CO 10	Ensure the patients receive their best possible nutritional intake whilst in hospital	P06/ PS0 6	An	C,P	5	3
Total hours of Instruction					75	15

UNIT I FOOD SERVICE INDUSTRY

Scope of food industry: food industry segmentation, Types of Hotel

UNIT II ORGANISATION & ADMINISTRATION OF FOOD SERVICE INDUSTRY

Organization –types, organization structure and management

UNIT III PHYSICAL FACILITIES AND LAYOUT

Size and Type of Kitchen, Work simplification, Designing Kitchen, Layout of Kitchen, Work centres in Kitchen layout

UNIT IV FOOD SERVICE EQUIPMENT

Classification, selection, care and maintenance

UNIT V QUANTITY FOOD PREPARATION

Types of menu, purchasing, storage, method of food production, conventional and non conventional sources of energy, Standardization and portion control.

UNIT VI TYPES AND STYLES OF SERVICE

Self service, waiter-waitress service, vending and mobile food service system, counter service, English service, French service, American service, Russian service and service techniques.

UNIT VII SANITATION AND HYGEINE

Hygiene & sanitation, Hygiene in foods handling, personal hygiene, Product standards. HACCP.

UNIT VIII HUMAN RESOURCE MANAGEMENT

Recruitment & selection, induction, training, performance appraisal, leadership, communication, employee benefits, laws governing food service establishment.

UNIT IX FINANCIAL MANAGEMENT

Budgets, records for control, factors affecting food cost control, concepts and behavior of cost. Menu Pricing- Factor method, Prime cost method and Actual cost method. Break even analysis.

UNIT X MARKETING

Definition, marketing mix in food service.

RELATED EXPERIENCE

1. Standardization of 10 selected recipes.
2. Quantity preparation of any 2 food item.
3. Visit to any food service institution / flight kitchen.
4. Table setting.

REFERENCES

1. Marian C Spears; Food Service Organization; III Edition, Prentice Hall Inc., USA. 1995
2. Lendal. H. Kotschever, Richard Donnely, "Quantity Food Purchasing, Mac Millan Publishing Company, New York, IV Edition, 1993.
3. West and Woods, Introduction to Food Service, Macmillan Publishing

SEMESTER II

HND2 C08 CLINICAL AND THERAPEUTIC NUTRITION

Hours per week: 6

Credit: 4

Objectives

1. Understand the physiology, metabolism and special requirements of critically ill.
2. Know the effect of various diseases on nutritional status and nutritional and dietary Requirement.

Course Outcomes

Sl No	Course Outcome	Pos/PS Os	CL	KC	Class Sessions	Lab/Field study
1	Discuss the nature and scope of Clinical and therapeutic nutrition and identify circumstances where diet may need modifications	PO7/P SO3	C	C,P	15	12
2	Take part in supervised practical activities like diet plan that addresses a select client's disease that incorporate the client's cultural preferences.	PO5/P SO3	An	C, M	15	20
3	Understand the physiology, metabolism and special requirements of critically ill patients.	PO7/P SO3	U	C	10	10
4	Explain different types of Food allergy and intolerance and provide information on diagnosis, clinical symptoms and appropriate dietary modifications	PO5/P SO3	U	C	10	10
5	Develop professional ethics of dietitian in different situations	PO7/P SO3	C	M	10	-
6	Demonstrate sufficient problem – solving skills to assess multifactorial aspects of nutritional care and organize and prioritize necessary tasks within time constraints	PO7/P SO3	U	C	34	10
7	Illustrate the effect of various metabolic disorders on nutritional status and its dietary adjustments.	PO5/P SO3	U	C	14	10
Total hours of instruction					108	72

UNIT I ROLE OF DIETITIAN IN THE HOSPITAL AND COMMUNITY

Dietitian- definition, scope, role, qualifications, professional ethics and obligations. Nutritional care process- assessment, diagnosis, intervention, monitoring and evaluation.

UNIT II ROUTINE HOSPITAL DIETS

Regular diet, light diet, soft diet, full liquid diet, clear liquid diet and tube feeding. Enteral and parenteral feeding –composition, monitoring and complications. Transitional feeding.

UNIT III MODIFICATIONS OF DIET IN FEBRILE CONDITIONS

Acute, chronic and recurrent fevers, typhoid, rheumatic fever, tuberculosis, malaria, H1N1, dengue fever and chikungunya

UNIT IV GASTROINTESTINAL DISORDERS

Esophagitis, cancer of oral cavity, ulcer, indigestion, gastritis, carcinoma of the stomach, gastric surgery and dumping syndrome. Diarrhoea, constipation, flatulence, celiac disease, tropical sprue, steatorrhea. Irritable bowel disease (IBD) – Crohn's disease, ulcerative colitis, Irritable bowel syndrome (IBS), diverticulitis, colitis and colon cancer.

UNIT V LIVER, GALL BLADDER AND PANCREAS DISORDERS

Cirrhosis of liver, hepatitis, hepatic coma, cholecystitis, cholelithiasis and pancreatitis

UNIT VI METABOLIC DISORDERS

Hypothyroidism, hyperthyroidism, gout, phenylketonuria and lactose intolerance

UNIT VII RENAL DISORDERS

Acute and chronic glomerulonephritis, nephrosis, acute and Chronic Renal Failure, and nephrolithiasis and Dialysis.

UNIT VIII - FOOD ALLERGY

Definition, types, tests, dietary management and prevention

UNIT IX - DISEASES OF MUSCULO-SKELETAL SYSTEM

Arthritis, Osteoporosis-dietary management

UNIT X - NEUROLOGICAL DISORDERS

Alzheimer's disease, Parkinson's disease and epilepsy -dietary management and prevention.

UNIT XI - DIET DURING METABOLIC STRESS

Burns, sepsis and trauma. Surgical conditions- CV complications, stroke and surgery, respiratory failure, hepatic failure, multi organ failure, GI tract (surgery and complications) and neurosurgery.

REFERENCES

1. Antia FP, Clinical Dietetics and Nutrition, Oxford University Press, New Delhi, 4th edition, 1997.
2. Davidson, Pasmore P and Break LP, Human Nutrition and Dietetics, English language book society, Livingstone, 1986.
3. Robinson, normal and Therapeutic Nutrition, Oxford & LBM Publishing, Calcutta, Bombay, 17th edition, 1990.
4. Garrow.JS & James W.P.T, Human Nutrition and Dietetics, Church Hill Living Stone, 1993.
5. Mahan.L.K and Stump SE, Krause's Food, Nutrition and Diet Therapy, WB Saunders Company, 10th edition, 2001.

SEMESTER II

HND2 C09 NUTRITIONAL MANAGEMENT IN LIFE STYLE DISEASES

Hours per week: 5

Credit: 4

Objectives

1. Gain knowledge about the principles of diet therapy and different therapeutic diets
2. Develop aptitude for taking up dietetics as a profession.

Course Outcomes :

Sl No	Course Outcome	Pos/ PSO s	CL	KC	Class Sessions	Lab/F ield study
1	Understand the risk factors associated with life style diseases	PO5, PSO 3	U	C	10	
2	Understand the symptoms associated with life style diseases	PO5, PSO 3	U	F	10	
3	Explain the management of life style disorders	PO6, PSO 3	Ap	P	10	3
4	Develop skills to plan appropriate diet for life style disorders	PO6, PSO 3	C	P	12	10
5	Develop the capacity of health professionals in management of the life style diseases	PO6, PSO 3	Ap	P	12	
6	Understand the complications of life style diseases	PO6, PSO 3	U	F	12	
7	Understand the foods which helps to reduce degenerative diseases	PSO 2	U	C	10	
8	Discuss modification in life style with patients to reduce the complications in future	PO6, PSO 3	Ap	P	4	2
Total hours of instruction					80	15

UNIT I STRESS

Stress – definition, types, physiological and psychological impact. Stress enhancing food, antistress foods and nutrients. Dietary guidelines.

UNIT II NUTRITION FOR WEIGHT MANAGEMENT.

Body composition and maintenance. Obesity-types, causes, assessment and complications. Theories of obesity. Weight reduction techniques-dietary, surgical, lifestyle modification, under weight-causes, complications and dietary management.

UNIT III DIABETES MELLITUS

Classification, causes, symptoms, diagnosis and complications and management – dietary and lifestyle.

UNIT IV CARDIOVASCULAR DISEASES.

Risk factors, Blood lipids-Classification, assessment, dyslipidemia and hypercholesterolemia, Atherosclerosis-disease progression, causes, symptoms and clinical findings. Management-dietary and lifestyle. Hypertension - classification, causes, complications and dietary management. Dietary management in angina pectoris, myocardial infarction and cardiac failure and CABG.

UNIT V NUTRITION IN ONCOLOGY

Classification, development of cancer, risk factors-environmental, hereditary & nutritional factors.. Medical Nutritional Management in Oral cancer, Breast cancer, Esophageal cancer, Lung cancer, Uterus cancer, Colon cancer, Stomach cancers, Pancreas cancer, Renal cancer . Nutritional problems related to chemotherapy, radiation therapy, surgery, Immuno therapy, and marrow transplantation. Role of food in the prevention of cancer. Nutrient supplementation in cancer therapy and its need.

UNIT VI MEDICAL NUTRITION THERAPY FOR HUMAN IMMUNODEFICIENCY VIRUS (HIV) DISEASE

Etiology, Pathophysiology and classification. Stages, opportunistic infections, complications and Malnutrition. Medical Nutrition therapy.

RELATED EXPERIENCE

1) Study the weight reduction techniques followed by various health centres.

2) Case study report of the patient with related disease.

REFERENCE

1. Mohan, L.K. and Shump, S.E. Krause's Food Nutrition & Diettherapy, W.B. Saunders Company, XII edition, 2001.. Shills, E.m., Olson, S.J. and Shiks, M.C. Modern Nutrition in health and disease, Lea and Febringer, Philadelphia, 8th edition, 1994

SEMESTER II

HND2 L01 PRACTICAL - CLINICAL AND THERAPEUTIC NUTRITION

Hours per week: 4

Credit: 4

Objectives

To enable students to obtain knowledge on different therapeutic diets and their preparation

UNIT I PREPARATION OF HOSPITAL DIETS.

Visit to dietary kitchen, preparation of routine hospital diets-regular diet, soft diet, full fluid diet and preparation of tube feeding blends.

UNIT II DIET IN FEBRILE CONDITIONS.

Acute & chronic fevers – typhoid, tuberculosis.

UNIT IV DIET IN GASTRO INTESTINAL DISORDERS.

Peptic ulcer, gastritis, diarrhoea, constipation, malabsorption syndrome.

UNIT V DIET IN LIVER, GALL BLADDER AND PANCREAS DISORDERS

Cirrhosis, hepatitis, cholelithiasis and pancreatitis.

UNIT VI DIET IN METABOLIC DISORDERS.

Diabetes mellitus, hypothyroidism, hyperthyroidism, gout, phenyl ketonuria, Lactose intolerance.

UNIT VII DIET IN RENAL DISORDERS.

Glomerulonephritis, nephrosis, nephrolithiasis & diet in dialysis.

UNIT VIII DIET IN OBESITY AND UNDERWEIGHT.

UNIT IX DIET IN CARDIOVASCULAR DISORDERS.

Atherosclerosis, hypercholesterolemia, hypertension, myocardial infarction.

UNIT X DIET IN NUTRITIONAL DEFICIENCY DISEASES.

Anaemia, protein calorie malnutrition, vitamin A deficiency.

UNIT XI DIET IN CANCER.

UNIT X DIET FOR CRITICALLY ILL

Diet in Surgical conditions – stroke, multi organ disorders and burns.

SEMESTER II

HND2 A02- AUDIT COURSE- II

Professional Competency Course (PCC)- SPSS

Credit: 4

Objectives:

- SPSS software was designed to perform statistical analysis on quantitative data. In plain English, SPSS software is used for complex calculations to analyze numerical data.
- SPSS software is used in nonprofit agencies, educational institutions and even in business to analyze numerical data. It performs several statistical and econometric analyses.
- It has wide applications in the field of Social Sciences, Life Sciences, finance, Marketing, Education and other fields where statistical analysis is required.
- The use of SPSS is very much essential for research work. Academic institutions, Research Institutes, NGO and other such organization are also required to make use of this statistical package.

UNIT 1: Entering and Editing Data

Importing from Excel

Characteristics of Variables

Adding Value Labels

Grouping Data

Transforming Variables

Selecting a Subset

UNIT 2: Producing summary statistics

Frequencies

Percentages

Averages

Measures of spread

UNIT 3: Charts

Bar Charts

Histograms

Pie Charts

Boxplots

Cluster Bar Charts

Scatter Diagrams

UNIT4: Tables

Presentation

Two Way Tables

UNIT 5: Analysis

Interpreting Output

Drawing Conclusions

Exporting to Word and PDF

SEMESTER III

HND3 C10 VITAMINS AND MINERALS

Hours per week: 6

Credit: 4

Objectives

- 1) To gain knowledge about different micro nutrient deficiencies.
- 2) Obtain depth on the study of major nutrients.

Course Outcomes:

SI No	Course Outcome	Pos/P SOs	CL	KC	Class Sessions	Lab/ Field study
CO1	Understand the chemistry of minerals & vitamins	PSO2, PO3	U	C,F	11	
CO2	Understand the food sources and factors affecting absorption of vitamins and minerals	PSO2, PO3	U	C	15	
CO3	Understand the functions of vitamins and minerals	PSO2, PO3	U	C,F	15	
CO4	Understand the metabolism of vitamins and minerals	PSO2, PO3	U	C	15	
CO5	Understand the nutritional requirement of various vitamins & minerals	PSO2, PO3	U	C	10	
CO6	Study the states of deficiency & toxicity of vitamins & minerals	PSO2, PO3	U	C	16	
CO7	Understand the interrelationship between various micronutrients	PSO2, PO3	U	C	16	
CO8	Estimate the levels of nutrients in various food sources	PSO2, PO3	An	P	10	
Total hours of Instruction					108	

UNIT I FAT SOLUBLE VITAMINS

Vitamin A,D,E,K- Functions, absorption, transport, utilization, storage and excretion.

Dietary sources, RDA, deficiency and toxicity

UNIT II WATER SOLUBLE VITAMINS

Vitamin C and B complex- Functions, absorption, transport, utilization, storage and excretion. Dietary sources, RDA, deficiency .

UNIT III CALCIUM AND PHOSPHORUS

Functions,distribution,absorption,transportation,utilisation,storage&excretion,sources,RDA.Calcium – Phosphorus ratio, calcium balance, deficiency & toxicity, interrelationship between calcium and vitamin D

UNIT IV MAGNESIUM, SULPHUR, SODIUM, POTASSIUM

Functions,distribution,absorption,transportation,utilisation,storage&excretion,sources,requirements, deficiency and toxicity. Electrolyte balance.

UNIT V IRON

Functions, distribution, absorption – role of other nutrients, transport, utilization, storage & excretion, sources andRDA.Bioavailability of iron, deficiency and toxicity.

UNIT VI IODINE & FLOURINE.

Functions ,distribution ,absorption ,transport ,utilization ,storage & excretion, sources andrequirements, deficiency and toxicity.

UNIT VII ZINC AND OTHER TRACE ELEMENTS

Functions, distribution, absorption,utilisation, storage & excretion, sources,requirements, deficiency& toxic effects of Zinc, Copper, Selenium and other trace elements.

RELATED EXPERIENCE

Estimation of Protein

Estimation of Vitamin C

Estimation of β Carotene

Estimation of Calcium

REFERENCES

1. Mohan,L.K. and Shump,S.E.Krause's Food Nutrition&Diettherapy,W.B.SaudersCompany,XII edition,2001.

2. Shills,E.M.,Olson,S.J. and Shiks,M.C. Modern Nutrition in health and disease,Lea andFebringer,Philadelphia,8th edition,1994
3. Srilakshmi,B. Nutrition science, New Age International(P)Ltd,Chennai,2006.
4. Bamji,M.S,Rao,P.R. and vinodini,R. Text book of Human Nutrition,oxford and IBH,PublishingCo.Pvt.Ltd,NewDelhi,1996.
5. Berdanier,C.D. Advanced Nutrition-Micronutrients ,CRC Press,Washington,D.C.1998.
6. Wardlaw, G.M.Contemporary nutrition – issues and insights, 2003, New York, McGraw HillCompanies.

SEMESTER III

HND3 C11 COMMUNITY NUTRITION

Hours per week: 6

Credit: 4

Objectives

To enable the students:

1. Gain insight in to the national nutritional problems and their implications and
2. Understand the international contribution towards nutritional improvements in India.
3. Develop skills in organizing and evaluating nutrition projects in the community.

Course Outcome

Sl No	Course Outcome	Pos/PSOs	CL	KC	Class Sessions	Lab/ Field study
1	Identify nutrition assessment techniques	Po3, PSOs4	A	P	5	8
2	Recall the nutrition status of the country	Po3	R	C	23	
3	Apply nutrition intervention programmes	Po3, Po8, PSOs4	A	C	20	
4	Construct tools for the conduct of nutrition education programmes	Po3	A	C	15	12
5	Recall various food production methods	Po3	R	F	15	
6	Understand the role of various organizations in compacting malnutrition	Po3, Po8,	U	F	30	
Total hours of Instruction					88	20

UNIT I ASSESSMENT OF NUTRITIONAL STATUS

Nutritional assessment in community- methods used in individual, households and institutional level, direct-anthropometry, biochemical methods, clinical examination, dietary survey and indirect methods - Vital statistics.

UNIT II PREVALENCE OF MALNUTRITION IN INDIA

Ecological, socio- cultural, economic and demographical factors of malnutrition. Nutritional disorders-anaemia, Vitamin A deficiency, Iodine Deficiency Disorder, PEM- Etiology, prevalence, symptoms and preventivemeasures. Measures to overcome malnutrition in India. Need for an integrated approach to solve the problems of malnutrition.

UNIT III NUTRITION INTERVENTION PROGRAMMES

Nutrition intervention programmes and policies. Importance and impact evaluation. SLP, SNP, ANP, NIPCCD, and other programmes organized by governmental and non governmental agencies for the vulnerable sections of the population. public health nutrition .Nutritional surveillance.

UNIT IV ROLE OF NATIONAL AND INTERNATIONAL ORGANIZATIONS TO COMBAT MALNUTRITION

International organizations concerned with food and nutrition, FAO, WHO, UNICEF, UNESCO, CARE, AFPRO, World Bank and others, National organizations concerned with food and nutrition- ICMR, ICAR, CHEB, CSWB, SSWB, ICAR, NIN, NNMB, CFTRI

UNIT V NUTRITION EDUCATION

Meaning, importance and methods of nutrition education to the community. Nutrition education programmes-planning, execution and evaluation. Problems of nutrition education programmes.

UNIT VI FOOD PRODUCTION

Food production in India – history, current status, Green Revolution, Blue Revolution, White Revolution and Yellow Revolution. Food and nutritional securities of India, indicators of food security, importance of PDS, FCI.

RELATED EXPERIENCES

1. One week community nutrition camp & report.
2. Assessment of nutritional status through anthropometry and dietary survey.
3. Planning, conducting and evaluating nutrition education programmes.
4. Evaluation of School Lunch programmes and nutrition awareness for the beneficiaries.

REFERENCES

1. Reddy.V; Rao.P.N; Sastry.G and Nath.K.K, Nutrition trends in India, NIN, Hyderabad.
2. Bamji, MS, Rao,MP; Reddy.V, “Textbook of human Nutrition”, Oxford and IBH Publishing Co,New Delhi.
3. Jeliffee.D.B, “Assessment of Nutritional Status of the community”, World Health Organisation, Geneva.
4. Swaminathan.M, “Principles of Nutrition and Dietetics”, Bangalore publishing companyLtd, Bangalore.
5. Park.K, “Park’s textbook of preventive and social medicine”, 16th edition, M/S , BanarsidasBhanot publishers, Jabalpur.

ELECTIVE COURSES

SEMESTER III

HND3 E01 PAEDIATRIC NUTRITION

Hours per week: 5

Credit: 4

Objectives

1. Realize the importance of nutritional care and Nourishment of children.
2. Understand the specific needs of children and the effects of various diseases on nutritional status and nutritional requirements.

Course Outcome

Sl No	Course Outcome	Pos/P SOs	CL	KC	Class Sessions
1	Demonstrate a thorough knowledge of the theory of human nutrition and dietetics as it applies to paediatrics.	PO7/ PSO1	U	F	10
2	Understanding the aetiology, pathophysiology and clinical features of paediatric diseases and conditions that require dietary modifications.	PO2/ PSO3	U	C,P	28
3	Apply knowledge of food, health, nutrition and dietetics to the nutritional care of children.	PO6/ PSO3	Ap	C	30
4	Identify resources for promoting good nutrition for children in the community.	PO2/ PSO4	Ap	C	20
5	Identify newborns with abnormalities.	PO7/ PSO3	Ap	C	10
6	Understand the need for immunization during various life stages.	PO6/ PSO4	U	F	4
7	Identify children with special conditions and their nutritional management.	PO7/ PSO4	Ap	C,P	6
Total hours of instruction					108

UNIT I INFANCY

Physical and Physiological development, Growth measurement. Nutritional and food requirements for infants.

UNIT II IMMUNIZATION SCHEDULE.

Immunization schedule during pregnancy, infancy and childhood

UNIT III NUTRITIONAL MANAGEMENT OF PREMATURE, LBW BABIES AND CHILDREN WITH DEVELOPMENTAL DISABILITIES

Definition, causes and complications, management- feeding practices

UNIT IV IDENTIFICATION OF SICK NEWBORN

Detection of abnormal signs- cyanosis, jaundice, respiratory distress, bleeding, seizures, refusal to feed, abdominal distention, failure to pass meconium and urine.

UNIT V NUTRITIONAL MANAGEMENT IN MALNUTRITION

PEM, anaemia, scurvy, rickets, vitamin A deficiency, childhood obesity and underweight - short term and long term consequences, management.

UNIT VI NUTRITIONAL MANAGEMENT OF INFECTIOUS DISEASES

Diarrhoea, typhoid, TB and hepatitis.

UNIT VII NUTRITIONAL MANAGEMENT IN GASTRO INTESTINAL DISORDERS

Lactose intolerance, celiac disease, inflammatory bowel disease, constipation and other condition- causes, symptoms and management.

UNIT VIII NUTRITIONAL MANAGEMENT FOR CHILDREN WITH SPECIAL CONDITIONS

Autism and ADH (Attention Deficit Hyperactivity disorder), epilepsy and AIDS.

RELATED EXPERIENCE

Measuring, recording and plotting growth of infants

REFERENCES

1. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
3. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
4. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.

5. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
6. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B. Saunders Co.
7. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
8. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill.
9. Textbook of pediatric nutrition- Book review, Stephen J Rose, Arch Dis Child, 1995.
10. Nutrition in pediatrics: Basic Sciences & clinical Applications, W. Allan Walker, John B Watkins & Christopher Duggan, 2003. BC Decker Inc, Hamilton, Ontario. Journals
 1. American Journal of Clinical Nutrition,
 2. Archives of Diseases in Childhood,
 3. Indian Journal of Pediatrics
 4. Journal of Pediatric Gastroenterology and Nutrition

ELECTIVE COURSES

SEMESTER III

HND3 E02GERIATRIC HEALTH CARE MANAGEMENT

Hours per week: 5

Credit: 4

Objectives:-

-On completion of the course, the student will be able to describe and concretise the meaning of -physiological, psychological and social aging -symptom, diagnosis and treatment in common geriatric diseases

1. Ageing Process, Ageing theories, Biology of ageing

The Key changes that occur during aging: - body composition, hormonal changes, , bone and muscle loss, , hearing/ vision decline etc.

2. Psychosocial aspects of ageing

Psychological theories, personality changes, social changes, changes in family and living arrangement, depression, coping with psychosocial changes of aging.

3. Nutritional need of Elderly

The different dietary recommendations for macronutrients, fluids, vitamins and minerals

4. Common diseases of elderly

Fever, Anaemia, Syncope, Vertigo, Anorexia, Loss of memory, Respiratory disease, Heart disease, Kidney disease, Stroke, Metabolic disorders, Musculoskeletal disorder, CNS related health Problem, Digestive problem, Vision, Hearing, Sleep disturbances, Perimenopausal problem, Genitourinary problem, CancerCancer:- The impacts of aging on cancer onset, progression, and survival.

How dietary intervention can slow aging and the progression.

5. Rehabilitation of the elderly –

-retirement plans, physical fitness, to age with grace and dignity etc.

ELECTIVE COURSES

SEMESTER III

HND3 E03FUNCTIONAL FOODS AND NEUTRACEUTICALS

Hours per week: 5

Credit: 4

Objectives

1. Gain knowledge about functional foods and nutraceuticals
2. Have thorough understanding about the health effects
3. Be familiar with applications in industry.

Course Outcomes :

Sl No	Course Outcome	Pos/ PSO s	CL	KC	Class Sessions	Lab/F ield study
1	Understand the concept of nutraceuticals, probiotics and prebiotics	Po5/ PSO 2	U	C	20	
2	Discover different foods which have nutraceutical properties	Po5/ PSO 2	An	C	15	
3	Identify nutraceuticals that have effect on human health	Po5/ PSO 4	Ap	P	25	
4	Discuss marketing and regulatory issues for Nutraceuticals	Po4/ PSO 6	C	C	10	
5	Analyse the opportunity for functional food market growth	Po8/ PSO 6	A	C	4	
Total hours of instruction					72	

UNIT I INTRODUCTION

Definition– phytochemicals, functional foods and nutraceuticals, Types of classification, Role of nutraceuticals in disease prevention and treatment. Significance in the present scenario.

UNIT II PROBIOTICS

Definition, Important features of probiotic micro- organisms. Health effects of probiotics including mechanism of action. Probiotics in various foods: fermented milk products, non-milk products etc. Quality Assurance of probiotics and safety.

UNIT III PREBIOTICS

Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases (therapeutic benefits), perspective for food applications for the following- Non-digestible carbohydrates/oligosaccharides(FOS), Dietary fibre, Resistant starch, Gums, fructans.

UNIT IV OTHER FOOD COMPONENTS WITH POTENTIAL HEALTH BENEFITS

Definition, chemistry, sources, bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food applications for the following:

Polyphenols: Flavonoids, catechins, isoflavones, tannins, Phytoestrogens, Phytosterols, Glucosinolates ,Pigments : Lycopene, Curcuminetc, Organosulphur compounds, Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins. Active biodynamic principles in spices,condiments

UNIT V FOOD AND NUTRIENTS WITH NEUTRACEUTICAL EFFECT

Proteins, Conjugated linoleic acid and n-3 fatty acids, – green tea, grapeseed, wheat grass, Garciniacambogia and Aloe vera.

UNIT VI MARKETING AND REGULATORY ISSUES FOR FUNCTIONAL FOODS AND NUTRACEUTICALS

Regulatory aspects -, labelling. -Opportunities for functional food market growth.

REFERENCES

1. Cho S. S. and Dreher, M.L. (2001): Handbook Dietary Fibre, Marcel Dekker Inc., NewYork.

2. Yurawecz, M.P., M.M. Mossoba, J.K.G. Kramer, M.W. Pariza and G.J. Nelson eds (1999) *Advances in Conjugated Linoleic Acid Research*, Vol. 1. AOCS Press, Champaign.
3. Wildman, R.E.C. ed. (2000) *Handbook of Nutraceuticals and Functional Foods*, CRC Press, Boca Raton.
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5. Fuller, R. ed. (1997) *Probiotics Applications and Practical Aspects*, London: Chapman and Hall, New York.
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8. Wood, B.J.B. ed. (1992): *The lactic acid bacteria in health and disease*, Elsevier Applied Science, London.
9. Gibson, G., Williams, C. eds (2000): *Functional Foods*. Woodhead Publishing Ltd. U.K.
10. Young, J. (1996): *Functional Foods: Strategies for successful product development*. Management Report Pearson Professional Publishers, London.
11. Frei, B. (1994): *Natural antioxidants in human health and disease*. Academic Press, San Diego.
12. Tannock, G.W. (1999): *Probiotics: A critical review*, Horizon Scientific Press.

Related experiences

Survey of major nutraceutical (probiotic and prebiotics) foods and supplements available in the market

ELECTIVE COURSES
SEMESTER III
HND3 E04SPORTS NUTRITION

Hours per week: 4

Credits: 4

Objectives

1. To enable the students to understand nutritional requirements of sports person
2. To understand the energy expenditure for different sports events

Course Outcomes

Sl No	Course Outcome	Pos/PSOs	CL	KC	Class Sessions	Lab/Field study
1	Understanding sports nutrition	Pos6/PSOs 1	U	C	7	
2	Understanding the energy requirements of athletes	Pos6/PSOs 2	R	C	8	
3	Understanding the nutritional requirements of athletes	Pos6/PSOs 2	U	C	22	
4	Identification of various sports supplements	Pos6/PSOs1	A	C	12	
5	Identification of common disorders of athletes	Pos6/PSOs3	A	C	10	
6	Understanding ergogenic aids and its importance in a sports person	Pos6/PSOs1	U	C	13	
	Total hours of Instruction				72	

Unit II Introduction to sports nutrition

1. Introduction to sports nutrition: History, goals and importance. Recommended Dietary Allowances for athletes, ICMR recommendations, Reference sports man and woman – requirement specifications for different sports activities. Pre and Post exercise Diet.
2. Energy requirements of athletes, components and conversion of energy. Energy metabolism in athletes– factors influencing energy requirements of athletes. Requirements for different age groups and athletes.

Unit II Nutritional requirements of athletes,

1. Carbohydrates – Role in different sports activities. CHO loading- metabolic changes – supplements.
2. Proteins – Importance in anaerobic activities, metabolic changes – requirements for sports activities – supplements and high protein diets.
3. Lipids - Role in different sports activities – special reference to swimming – metabolic changes and utilization during exercise – Fat loading – importance.
4. Vitamins and minerals – Role in sports person, fat and water soluble vitamins. Ca, Fe, Zn & Mg. Factors influencing requirements – influence of deficiencies – supplementation.
5. Fluid and electrolytes for athletes – Distribution- Fluid balance – Fluid requirements – Dehydration effects . Water intoxication – Practical indices of hydration status – Sports drinks.

Unit III :-Diet related problems of athletes AND Ergogenic aids and sports supplements

1. Diet related problems of athletes – female athlete triad – Weight control – Weight maintenance – Diabetic athletes, disabled athletes, GI stress, cramps and stitches.
2. Ergogenic aids and sports supplements - classification, types - drugs, nutritional ergogenic aids - effects and safety concerns.

PRACTICALS:

1. Principles of diet planning for sports persons with special reference to nutrients and water needs
2. Concept of energy expenditure and calculation of EE
3. Planning a day's diet for the following sports activities for different age groups and sexes: Gymnastics, Athletics, Swimming, Cricket, Football, Diet considerations for female sports persons
4. Fitness assessment - height, weight and body composition. Body fat determinations by different methods
5. Determination of aerobic capacity - pulse rate, blood pressure, THR zone for exercise and VO₂max (demonstration)
6. Determination of muscle strength and endurance (demonstration)
7. Exercise Management: Importance of warming up / cool down / stretching, Work out - aerobic and strength training /cross training, Sports injury

References

1. B Srilakshmi, V Suganthi and C Kalaivani Ashok (2017) Exercise physiology Fitness and Sports nutrition, New Age International New Delhi.
2. Brouns Fred and Caustan – Cargill (2002) Essentials of Sports Nutrition – 2nd edition John Wiley and Sons, England.
3. Burke Louse and Deakin Vicky (2006) Clinical Sports Nutrition, McGraw – Hill Pvt. Ltd. Australia.
4. Summerfield Lianne M (2001), Nutrition Exercise and Behavior An integrated approach to weight management, Belmont (USA). Wadsworth/Thompson Learning.

ELECTIVE COURSES

SEMESTER III

HND3 E05 ENTREPRENEURIAL DEVELOPMENT

Hours per week: 4

Credit: 4

Objectives

1. To promote entrepreneurship skills among students.
2. To enable students to understand the need and relevances of entrepreneurship.
3. To understand the process and procedure of setting up small enterprises / self employment schemes.

UNIT I ENTREPRENEURSHIP

Definition, characteristics, meaning of entrepreneur, functions, types, importance of entrepreneurs in economic development factors affecting entrepreneurial growth.

UNIT II ENTREPRENEURIAL DEVELOPMENT PROGRAMME

Meaning and need, objectives, steps, qualities of successful entrepreneur, contents of training programmes, institutions conducting EDP.

Unit III WOMEN ENTREPRENEURS

Concept, need for women entrepreneurship, problems, measures taken for the development of women entrepreneurship in India.

UNIT IV AGENCIES FOR ENTREPRENEURSHIP

Agencies for training, infrastructure, financial help, marketing- DIC, SIDO, NSIC, TCO, SISI, STEP, STED, KITCO, CIDCO, KVIC.

UNIT V SMALL INDUSTRIES

Concept, definition, characteristics, objectives, problems, measures taken for the promotion of SSI, industrial estates.

UNIT VI PROJECT FORMULATION

Project, meaning, types, project identification, generation of project idea, sources of project, screening, project formulation – steps involved.

UNIT VII PROJECT REPORT PREPARATION

Definition, objectives, importance, contents

RELATED EXPERIENCE

1. Visits to agencies involved in development of entrepreneurship.
2. Visit to one or two units related to trade.
3. Interaction with one or two entrepreneurs

REFERENCES

1. Gupta.C.B&Sreenivasan N.P, Entrepreneurship Development in India, New Delhi, Sultan Chand, 1987.
2. Desai.V, Dynamics of entrepreneurial development & management, Mumbai, Himalaya publishing house, 1997.
3. Khanka .S.S., entrepreneurial development, S Chand & Co Ltd., Ram Nagar, New Delhi, 1999.
4. Jain, N.K &Varshney.R.L, Entrepreneurship Development-RBSA publications, Jaipur, 1999.

ELECTIVE COURSES

SEMESTER III

HND3 E06 NUTRITIONAL COUNSELLING AND EDUCATION

Hours per week: 4

Credit: 4

Objectives

1. To understand the principles and methods of counseling.
2. To apply counseling methods to patients with different diseases

Course Outcomes :

Sl No	Course Outcome	Pos/PS Os	CL	KC	Class Sessions	Lab/Field study
1	Define counseling and nutritional counselling	Po5/ PSO4	R	F	5	
2	Classify types of counselling		R	F	15	
3	Interpret different theories of counselling		U	C	13	
4	Identify the person who needs counselling	Po7/ PSO4	Ap	C	10	
5	Take part in nutrition education	Po7/ PSO4	A	P	13	
6	Interview persons who needs counselling	Po7/ PSO4	A	P	10	6
Total hours of instruction					72	

UNIT I COUNSELLING -6

Introduction, Definition, Objectives, Skills, and Techniques, Professional Ethics in Counselling

UNIT II COUNSELLING PROCESS -10

Stages, Types- Crisis, facilitative, preventive and Developmental

Theories- Psychoanalysis, Behaviour, Client Centered, gestalt, Reality

UNIT III NUTRITION COUNSELLING-10

Definition , Objectives Nutritional Counsellors Skills, Techniques of Nutrition Counselling

UNIT IV NUTRITION COUNSELLING FOR DIFFERENT AGE GROUP-10

Children. Adolescents, pregnancy Lactation , Old Age

UNIT V NUTRITION COUNSELLING FOR DIFFERENT LIFE STYLE DISEASES-10

Cancer Diabetes HIV / AIDS Osteoporosis, Coronary Heart diseases

UNIT VI NUTRITION EDUCATION-8

Methods, Different Education Material. Type of Nutrition Education- Individual And Group Counselling

RELATED EXPERIENCE

Give counseling for 5 patients of different age groups - Report.

REFERENCES

1. Currie, Joe, Barefoot counselling: A premier in building helping relationships. Asian Trading Cooperation, Bangalore. 1976.
2. Bhatia, K.K., Principles of guidance and counselling, Kalyani Publishers, Ludhiana. 2002.
3. Nelson – Jones, Richard, Practical counselling and helping skills, Better Yourself Books, Bombay. 1994.
4. Narayan Rao. S., Counselling, Tata McGrawHillBartlet, Hariot.M, Social work practice in Health Field: National Association of Social Work, New Delhi.
5. Banarjee G.R.: Social Service Department in a Hospital, TISS, Bombay.
6. Bowel A.H. and Gardner L. : The Young Handicapped Child: Edinburgh, E and S Livingston Ltd Cooperation, Bangalore. 1976.

7. May, Rollo, Art of counselling: A practical guide with case studies and demonstrations. Abingdon Press, New York. 1967
8. Prashantham B.J., Indian case studies in therapeutic counselling, Christian Counselling Centre, Vellore. 1978
9. Bhatia, K.K., Principles of guidance and counselling, Kalyani Publishers, Ludhiana. 2002.
10. Narayan Rao. S., Counselling and Guidance, McGrawHill Education Publishing Company Ltd, New York 1981

SEMESTER III
HND3 L02 HOSPITAL INTERNSHIP AND COMMUNITY NUTRITION
EDUCATIONPROGRAMME

Hours per week: 4

Credit: 4

Objectives

To enable students to:

1. Get an exposure to the working situation of the dietary department of a reputed hospital.
 2. Develop skills in diet counseling and feeding of patients.
 3. Develop capacity for taking dietetics as a profession.
 4. Get an exposure for Planning, conducting and evaluating nutrition education programmes.
1. One month internship in a reputed hospital – Report& 3 Case study
 2. Hospital training once in a week for a period of 4 months (15 days) OR 15 days internship in a cancer centre– Report& 2 Case study
 3. Diet counseling for the sports students and mothers of pre- school children/ elderly person(5+5=10No.) – Report
 4. Community Nutrition education camp in the areas vulnerable to malnutrition/chemical disaster or disaster prone/tribal /coastal /slum areas etc.

SEMESTER IV

HND4 C12 METABOLIC AND BIOCHEMICAL CHANGES IN DISEASES

Hours per week:5

Credit: 4

Objectives

To enable the students to understand the biochemical and physiological changes in diseases.

Course Outcome

Sl No	Course Outcome	Pos/ PSO s	CL	KC	Class Sessions	Lab/F ield study
1	Outline advanced integrated knowledge and understanding normal cell processes and physiologic effects adapting general principles.	PO5/ PSO 1	U	F	6	-
2	Explain the role of drug, food and nutrient interactions in human body.	PO5/ PSO 2	E	F	10	-
3	Utilize the underlying principles of inherited or other metabolic disorders with special references.	PO5/ PSO 3	Ap	C	7	8
4	Discuss the influence of dietary factors on the developments of diseases and methods of detection.	PO7/ PSO 3	C	C	15	12
5	Predict how metabolic changes in both physiological and pathological states may affect human nutritional requirements.	PO7/ PSO 3	C	C,M	13	10
6	Analyze informations from relevant scientific literature on the applications of biophysics relevant to nutrition.	PO7/ PSO 2	An	C	9	30
7	Estimate clinical diagnosis methods for endocrinological abnormalities by examining mode of action, enzymes and hormones.	PO7/ PSO 3	C	P	25	30
Total hours of instruction					90	90

UNIT I NORMAL CELLULAR PROCESS

Normal cellular process., cellular adaptations. – Cell injury-Causes. Necrosis and Apoptosis. Body fluids; extracellular and intra cellular- CFC, Serous fluids-, peritoneal, pleural and pericardial – Transudates and exudates – Synovial fluids

UNIT II DRUG, FOOD AND NUTRIENT INTERACTION

Action of some common drugs, Effect of drugs on food intake, nutrient absorption, metabolism and requirements, effect of food and nutrients on absorption and metabolism

of drugs. Effect of drug on the nutritional status.

UNIT III BIOCHEMICAL CHANGES IN DISEASES

Metabolic disorders, diseases of endocrine glands and inborn errors of metabolism

Disorders associated with hyperglycemia, hypoglycemia, Hyper and hypothyroidism. atherosclerosis, dyslipidemia, obesity & fatty liver. Inborn errors of carbohydrate, lipid and protein metabolism.

Infectious Diseases

Fever, typhoid, TB, Chicken Gunea, and Dengue fever

Non infectious diseases

Hepatitis Renal calculi, alzheimer's, PCOD

Musculo-skeletal problems

Arthritis, Osteoporosis

Organ function tests

Liver, kidney, thyroid, pancreatic and gastric function tests.

UNIT IV BODY ELECTROLYTES

Law of electron neutrality, maintenance of pH, buffer system in the body, regulation of acid base balance, respiratory control and renal control, role of sodium, potassium & chlorine, estimation of body electrolytes (principles).

UNIT V MODE OF ACTION OF ENZYMES AND HORMONES

Enzymes-Intracellular distribution, factors affecting enzyme activity, enzymes in clinical diagnosis. Hormones -Mode of action, regulation of metabolism, hormonal status in different stages of life, endocrinological abnormalities and clinical diagnosis.

UNIT VI BIOPHYSICS

Principles involved in estimating calorimetry, chromatography, flame photometry, electrophoresis, ion selective electrodes, radioimmunoassay, ELISA test.

REFERENCES

1. Mukerjee, K.L, Medical Laboratory technology, Tata McGraw Hill Publishing Company, Co-Ltd, New Delhi.
2. Chatterjee, M.N and Shinde R, Textbook of Medical Biochemistry, Jaypee Brothers Medical Publishing Pvt Ltd, New Delhi.
3. Lehninger A L, Nelson DC and Cox MM, Principles of biochemistry, CBS Publishers and distributors, Jain Bhavan, Bhalanagar.

SEMESTER IV

HND4 L03 METABOLIC AND BIOCHEMICAL CHANGES IN CLINICAL DISEASES- PRACTICAL

Hours per week: 4

Credit: 4

Objectives

To enable students to acquire skills to estimate selected body metabolites.

1. Qualitative analysis of urine for
 - a. Albumin
 - b. Sugar
 - c. Acetone and acetoacetic acid.
 - d. Bile pigment.
2. Quantitative analysis of urine for protein.
3. Quantitative estimation of blood

- a. Sugar
 - b. Blood urea
 - c. Serum Creatinine
 - d. Cholesterol
 - e. Calcium
 - f. Phosphorus
4. Demonstration experiment on serum bilirubin, SGOT, SGPT, Alkaline Phosphatase and Vitamin A.

ELECTIVE COURSES

SEMESTER- IV

VPND 4 E07 DIABETIC CARE AND MANAGEMENT

Hours per week: 6

Credit: 4

Objectives

1. Obtain in-depth knowledge about Diabetes Mellitus (DM)
2. To make the students aware of various complications during Diabetes Mellitus
3. To gain knowledge about the management of Diabetes Mellitus through diet, exercise and medication

Course Outcomes :

Sl No	Course Outcome	Pos/ PSO s	CL	KC	Class Sessions	Lab/F ield study
1	Understand the prevalence of Diabetes Mellitus	PO2, PSO 3	U	F	5	
2	Understand the anatomy and physiology of pancreas	PO3, PSO 3	U	F	10	
3	Understand the pathological changes in Diabetes Mellitus	PO3, PSO 3	U	F	9	
4	Understand the symptoms and diagnosis of Diabetes Mellitus	PO3, PSO 3	U	C	6	
5	Understand the micro and macro vascular complications of Diabetes Mellitus	PO5, PSO 3	U	C	19	
6	Understand the co –morbid conditions of Diabetes Mellitus	PO5, PSO 3	U	C	10	
7	Understand the management of Diabetes Mellitus	PO6, PSO 3	U	C	15	
8	Plan diets according to the insulin	PO6,	C	P	10	6

requirement	PSO 3				
Total hours of instruction				90	

UNIT I BASICS OF DIABETES MANAGEMENT

Introduction, definition, classification of Diabetes Mellitus, Prevalence- International, national and state, risk factors and symptoms.

UNIT II ANATOMY AND PHYSIOLOGY OF PANCREAS

Pancreas – functional anatomy, Secretion, synthesis of insulin, Mechanism of action of Insulin, Effect of Insulin. regulation and utilization of insulin, glucagon and somatostatin. Glucose Homeostasis.

UNIT III PATHOPHYSIOLOGICAL CHANGES IN PANCREAS, BETA CELLS AND ALPHA CELLS

Pathological changes in metabolism. Pathophysiology of Diabetes Mellitus.

UNIT IV DIAGNOSIS AND ROUTINE INVESTIGATIONS

Monitoring the blood glucose level, Urine testing for the presence of sugar, random blood glucose, GTT and Glycosylated Hb (Hb A1C).

UNIT V MANAGEMENT OF DIABETES MELLITUS

- 1) Dietary Management- Role of carbohydrate, protein, fat and fiber in Diabetes Mellitus. Glycemic index. Alcohol and diabetic diet, fruits and diabetes, refined sugar and alternative sweeteners and dietary supplements.
- 2) Physical activity and exercise- Physiological changes occurring during exercise, Benefits of exercise in patients with Diabetes, Potential adverse effect of exercise in patients with Diabetes, Type of Physical Activity (SAFE)
- 3) Medication and Diabetes- Oral agent for diabetes. Main group of OHA'S, general aspects in OHA therapy, Insulin therapy in Diabetes Mellitus- types of Insulin and time activity characteristics. Practical aspects of insulin therapy- storage, sterilization, injection sites, timing. Factors that affecting rate of insulin absorption, Complications of insulin Therapy, Commonly seen side effects.

UNIT VI COMPLICATION OF DIABETES MELLITUS AND THEIR MANAGEMENT

1) Hyperglycaemia- definition and clinical manifestation- treatment, prevention and clinical levels of hyperglycaemia, prevention and hyperglycaemia awareness.

Ketoacidosis-definition and causes- clinical manifestation.

Non- Ketotic Hyper osmolar coma and Lactic acidosis.

2) Macrovascular complications: Cardio vascular complications and dyslipidemia- Definition, clinical manifestation, prevention and Treatment.

UNIT VII PREVENTION AND MANAGEMENT OF LONG TERM DIABETIC COMPLICATIONS/ MICROVASCULAR COMPLICATIONS

Diabetic retinopathy- Epidemiology, Risk factors, Classification and Features of Diabetic Retinopathy, Complication and Management.

Neuropathy- definition, Classification, pathogenesis, prevention and treatment. Importance of early diagnosis, diagnosis, the feet and diabetes.

Diabetic nephropathy- definition, etiology, stages, risk factors for the development of diabetic nephropathy, diagnosis, Pathogenesis, Treatment and prevention.

UNIT VIII MANAGEMENT OF CO- MORBID CONDITION

Hypertension, dyslipidaemia, obesity, metabolic disorders.

RELATED EXPERIENCE

- 1) Analysis of urine blood sugar
- 2) Detection of blood glucose by using glucometer.
- 3) Case study of two diabetic patients (complicated cases)

REFERENCES

1. TC Raghuram et al., Diet and Diabetes, NIN, ICMR
2. PG Raman and LC Gupta, Step by Step Management of Diabetes, JayPee Brothers Medical Publishers (P) LTD
3. FrennyBillimoria and Surinder W, The Diabetics Look Book,

4. MMS Ahuja, Diabetes Care In Clinical Practise, Jaypee Brothers, Medical Publishers (P) LTD, New Delhi
5. M D Mnams et al., Diabetes, Jaypee Brothers Medical Publishers (P) LTD
6. Rudy B and Richard D, Hand book of Diabetes, A John wiley and sons, LTD

ELECTIVE COURSES

SEMESTER IV

HND4 E08 FOOD SAFETY AND QUALITY CONTROL

Hours per week: 5

Credit: 4

Objectives

1. Understand the common organisms associated with food borne illness
2. Apply the principles & methods of storage and preservation of various foods.
3. To study about the food safety methods.

UNIT I FOOD SAFETY-BASIC CONCEPTS

Food safety and importance of safe food. Factors affecting food safety- physical hazards, biological hazards, chemical hazards. Role of microorganisms in food- bacteria, fungi, yeasts, moulds, viruses, parasites. Denaturation of bacteria.

UNIT II MICROBIOLOGY OF NATURAL PRODUCTS

Water: sources, bacteriology of water supplies, bacteriological examination and purification of water.

UNIT III FOOD SPOILAGE

Causes, Factors affecting spoilage, Spoilage of perishable and non perishable foods.

UNIT IV FOOD BORNE DISEASES AND THEIR OUT BREAK.

UNIT V FOOD PRESERVATION

Objectives, principles and methods of food preservation. .

UNIT VI FOOD ADDITIVES AND FOOD ADULTERATION

Food additives – classification & Food adulteration – definition, types, common adulterants and prevention.

UNIT VII FOOD PACKAGING

Packaging :concepts ,significance and functions. Classification of packaging materials-flexible packages, rigid packages, retail or shipping containers.Packaging methods.Moisture sorption properties of foods and selection of packaging materials.Interactions between packaging and food toxicity hazards.Biodegradable material and environmental issues.Labelling requirements and bar coding- Nutrition labeling and nutrition claims, coding of food products. Packaging laws and regulations

UNIT VIII FOOD LAWS AND STANDARDS

Mandatory measures-PFA, Essential commodities act, 1955. Voluntary standards and certification system- Bureau of Indian standards, AGMARK. Consumer protection act, 1986. Food standardization and regulation agencies in India-CCFS, CFL.International standards- Codex alimentarius, ISO, WHO, FAO, WTO, HACCP.

RELATED EXPERIENCE

1. Visit and study the various food preservation techniques applied in the industries/units.
2. Demonstration of food adulteration
3. Preparation of preserved foods by using different preservation methods.

REFERENCES

- 1.Roday,S 1999. Hygiene and Sanitation in Food Industry. Tata McGraw Hill Publishing Company Ltd., New Delhi
- 2.Frazier,W.C&Westhoff, D.C. Food Microbiology. Tata MC Graw –Hill Publishing Company Ltd., New Delhi, 5th Edition, 1997
3. Adams,M.R and Moss ,M.O .Food Microbiology .New Age Intenational (P) Ltd., Publishers.1996
4. Anna K.Joshua, Microbiology. Popular Book Dept. Publishers. 1994
New Delhi , 1996
- 5.Potter,N.Hotchkiss, H.J. Food Science (5th edition) CBS Publishers and Distributors, New Delhi , 1996
6. Srilakshmi B. Food Science. 4th Edition . New Age International Private Limited, New Delhi, 2008

7. Shakuntala M.N., Shadaksharaswamy M. Foods –Facts and Principles. New Age International Publishers, New Delhi, 2002

ELECTIVE COURSES

SEMESTER IV

HND4 E09 PUBLIC NUTRITION AND HEALTH

Hours per week: 5

Credit: 4

Objectives

It will enable the students to:

- Develop a holistic knowledge base and understanding of the nature of important nutritional problems and their prevention and control for the disadvantaged and upper socio-economic strata in society
- Understand the causes /determinants and consequences of nutritional problems in society
- Be familiar with various approaches to nutrition and health interventions, programmes and policies.

UNIT I CONCEPT OF PUBLIC NUTRITION

Relationship between health and nutrition, role of public nutritionists in the health care delivery

UNIT II SECTORS AND PUBLIC POLICIES RELEVANT TO NUTRITION AND HEALTH.

UNIT III PRIMARY HEALTH CARE OF THE COMMUNITY

National Health Care Delivery System, determinants of Health Status, indicators of Health

UNIT IV POPULATION DYNAMICS

Demographic transition, population structure, fertility behavior, population policy, fertility, interrelationship between Nutrition and quality of Life.

UNIT V FOOD AND NUTRITION SECURITY

Food production – access, distribution, availability, losses, consumption. Food Security. Sociocultural aspects and Dietary Patterns - their implications for Nutrition and Health

UNIT VI NUTRITIONAL STATUS

Determinants of nutritional status of individual and populations. Nutrition and Non-nutritional indicators - socio-cultural, biologic, environmental, economic. Assessment of nutritional status of individuals of different ages- MUAC, Wt for age, Ht for age, Wt for ht, Ponderal index, BMI. Applications and limitations in different field situations - choice of an indicator.

UNIT VII MAJOR NUTRITIONAL PROBLEMS

Etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: Macro and micro nutrient deficiencies. Other nutritional problems like lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis. Overweight, obesity and chronic degenerative diseases

UNIT VIII NATIONAL FOOD, NUTRITION AND HEALTH POLICIES

Plan of action and programmes

UNIT IX APPROACHES AND STRATEGIES FOR IMPROVING NUTRITIONAL STATUS AND HEALTH

Programmatic options- their advantages and demerits – feasibility, political support, available resources (human, financial, infrastructural). Case studies of selected strategies and programmes: their rationale and context, how to select interventions from a range of possible options. Healthbased interventions, food-based interventions including fortification and genetic improvement of foods, supplementary feeding, and Nutrition education for behaviour change.

UNIT X HEALTH ECONOMICS AND ECONOMICS OF MALNUTRITION

Its impact on productivity and national development. Cost-Benefit, cost effectiveness, cost efficiency

REFERENCES

1. Owen, A.Y. and Frankle, R.T. (1986): Nutrition in the Community, The Art of Delivering Services, 2nd Edition Times Mirror/Mosby.
2. Park, K. (2000): Park's textbook of preventive and social medicine, 18th Edition, M/s. BanarasidasBhanot, Jabalpur.
3. SCN News, UN ACC/SCN Subcommittee on Nutrition.
4. State of the World's Children, UNICEF.
5. Census Reports.
6. Berg, A. (1973): The Nutrition Factor, the Brookings Institution, Washington.
7. Beaton, G.H. and Bengoa, J.M. (Eds) (1996): Nutrition in Preventive Medicine, WHO.
8. Bamji, M.S., Rao, P.N., Reddy, V. (Eds) (1996): Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
9. Gopalan, C. and Kaur, S. (Eds) (1989): Women and Nutrition in India, Nutrition Foundation of India.
10. Gopalan, C. and Kaur, S. (Eds) (1993): Towards Better Nutrition, Problems and Policies, Nutrition Foundation of India.
11. Gopalan, C. (Ed) (1987): Combating Undernutrition – Basic Issues and Practical Approaches, Nutrition Foundation of India.
12. Achaya, K.T. (Ed) (1984): Interfaces between agriculture nutrition and food science, The United Nations University.
13. National Family Health Survey I & II (1993, 2000): International Institute for Population Studies, Mumbai.
14. National Plan of Action on Nutrition (1995): Food & Nutrition Board, Dept. Of WCD, Govt. of India.
15. National Nutrition Policy (1993): Dept. of WCD, Govt. of India.
16. Nutrition Education for the Public (1997): FAO Food and Nutrition Paper, 62, FAO.

17. Allen, L. and Ahluwalia, N. (1997) Improving Iron Status Through Diet: The Application of Knowledge Correcting Dietary Iron Bioavailability in Human Populations. OMNI/USAID, Arlington, VA, USA
18. Nestel, P. (ed) (1995). Proceedings: Interventions for Child Survival. OMNI/USAID Arlington, VA, USA
19. Documents and Reports published by the International Vitamin A Consultative Group
20. Documents and Reports of the International Nutritional Anemia Consultative Group
21. Howson, C.; Kennedy, E. and Horwiz, A. (eds) (1998). Prevention of Micronutrient Deficiencies: Tools for Policymakers and Public Health Workers. Committee on Micronutrient Deficiencies, Board on International Health, Food and Nutrition Board, National Academy Press, Washington D.C. USA.
22. Micronutrient Initiative (1998) Food Fortification: to end Micronutrient Malnutrition. The Micronutrient Initiative, Ottawa, Canada.
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SEMESTER IV
HND4 P01 PROJECT

Hours per week: 10

Credit: 4

1. Development of research Programme
2. Collection of Review
3. Conduct Pilot Study in the field
4. Conduct of work in the lab/ hospital/ community
5. Analysis of Data
6. Writing for the thesis and submission

SEMESTER IV
HND4V01COMPREHENSIVE VIVA VOCE

Credit: 4

Based on

1. Course Programme