Faculty of Allied Health Sciences

Syllabus

Master of Science in Nutrition & Dietetics (Clinical Nutrition)

2020

Gurugram

PREAMBLE:

Nutrition and Dietetics is a subject of growing importance in many aspects of healthcare, lifestyle and industry. It focuses on the interface between human nutrition and food science, an area of increasing importance to educators, health department, consumers, government and the food industry. It builds on major concepts of human biochemistry and physiology, nutrition and food science to discuss the roles of all nutrients, nutritional contents of food and diet in health and disease. The program includes all the units of study to ensure that the students acquire competence including public health, medical nutrition therapy, food service management, communication, management, research and evaluation.

GOALS:

The overall goal of the department of is to contribute to the health and wellbeing of the Human across the globe. The primary goal of the department is to train Nutrition experts with the latest knowledge, leadership and skills to become active partner in healthcare development and provide professional Nutrition services in a wide variety of settings including academic, government, corporate and military & community based organizations.

PROGRAM EDUCATION OBJECTIVES:

1. To impart knowledge and develop capacities of the students through higher education in the areas of human nutrition viz. food science, food safety quality control and food product development.

2. To develop students to become health care professionals for services in various fields of clinical nutrition and medical nutrition management and related areas such as hospitals academics, research, industry, clinical nutrition department, training, extension and community service.

3. To develop capacities and abilities and enable them to pursue higher education and research in Nutrition and Dietetics.

4. To enable the understanding of etiology, physiology and metabolic anomalies of acute and chronic diseases and patient needs.

5. To demonstrate competence in basic concepts of research methodology used in clinical and public health nutrition; and therapeutic aspect of various diseases.

6. To enable the understanding the basis of human nutritional requirements and recommendations through the life cycle and translate the knowledge into practical guidelines for dietary needs.

7. To practice evidence based therapeutic nutritional care and management backed by scientificknowledge.

8. Be familiar with the special nutritional support techniques and feeding formulations essential for nutritional care and support.

9. To exercise empathy and a caring attitude and maintain professional integrity,honesty and high ethical standards.Plan and deliver comprehensive therapeutic nutritional support using the principles of dietetics.

10. To enable the understanding of basis of human nutritional requirements and recommendations through the life cycle and translate the knowledge into practical guidelines for dietary needs.

11. Be familiar with the recent advances in nutrition and dietetics and applies this knowledge in planning for public health programmers.

12. Be well versed with various aspects of food science, product modification and product development enriched with multiple nutrients and evaluating its nutritive and sensory qualities.

13. Be familiar with the use of information technology tools and carry out research work– field, laboratory and clinical, with the aim of publishing the work and presenting the findings at indexed national and international scientific journals.

No limit can be fixed and no fixed number of topics can be prescribed as course contents. The student is expected to know his subject in depth; however, emphasis should be on the nutritional assessment/care in relation to health and diseases most prevalent in that area of nutrition & dietetics. Knowledge of recent advances in nutrition sciences as applicable to his/her specialty should get high priority.

Program Education Outcomes

- Enhanced professional competencies in the areas of Nutrition and Dietetics, which will help the students to improve the health and nutrition status of the population and community they will serve.
- Enable students' acquisition of practical laboratory and field analytical skills and competencies relevant to theory and practice of nutrition.
- Support students to acquire appropriate transferable key skills including research methodology, communication and information technology and other competencies to enable to meet benchmarking criteria for the nutrition and dietetics profession.
- Prepare students with effective professional competencies necessary for employment in industries, institutes and organizations related public health nutrition, clinical nutrition, food science and technology or sports nutrition..
- Students will be enabled to critically evaluate the safety of food both for individuals and for specific populations.

- Efficiently and effectively undertake the research in emerging issues in the areas of nutrition and dietetics as well as aimed at improving the quality of life of individuals and communities.

- Able students to establish entrepreneurial activities in the areas of Nutrition and Dietetics.
- Disseminate nutrition advisory and consultancy services and nutrition education to the public.

SEMESTER-I

Nutritional Biochemistry (Theory)

Paper Code: 05380101

Periods/week	Credits	Max. Marks: 100
L: 3 T:1 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. Classify and explain the nutritional aspect of different bio molecules of food, and its requirements.
2. Understand the biochemical basis for nutrition and health.
3. Get an insight into inter-relationships between various metabolic pathways.
4. Understand the mechanisms adopted by the human body for regulation of metabolic pathways.
5. Identify people living with different forms of disorders.

Unit 1: Macronutrients and Micronutrients: Introduction and types of dietary carbohydrates, lipids, Protein (Amino Acid), Vitamins and Minerals.

Unit 2: Chemistry of Enzymes: Classification, properties, mechanism of Enzyme action, factors affecting enzyme activity, vitamins and minerals as coenzymes and co-factors.

Unit 3: Carbohydrate metabolism: Energy from dietary carbohydrate through Glycolysis, Tricarboxylic Acid cycle. Utilization of glycogen. Gluconeogenesis. Significance of Pentose phosphate pathway and glucoronic acid pathway. Effect of starvation in Carbohydrate metabolism (in brief).

Unit 4: Lipid metabolism: Oxidation of fatty acid, Biosynthesis of fatty acids, utilization and storage of body fat. Effect of starvation in Lipid metabolism (in brief).

Unit 5: Protein & Amino acid Metabolism: Urea Biosynthesis (Transamination and Deamination, Nitrogen excretion and the Urea cycle), Essential and Non essential Amino Acid, Biosynthesis of the Nutritionally Nonessential Amino Acids. Effect of starvation in Protein metabolism (in brief)

Unit 6: Nucleotides Metabolism: Purine and Pyrimidine in brief, salvage pathways for purine and pyrimidine, Disorders of nucleic acid metabolism.

Unit 7: Detoxication, Free Radicals & Antioxidants: Definition of Detoxication, Xenobiotics, Type of Detoxication mechanism, Introduction of free radicals and Antioxidants, Role of Free radical and Antioxidants in living body.

Nutritional Biochemistry (Practical)
Paper Code: 05380102

Periods/week			**Credits**	**Max. Marks:** 50
L:	T:0	P:4	2	Internal : 30
				External : 20

Course Outcomes:

On successful completion of this course, students will able to:

1. Explain the principles of biochemical methods used for the analysis of food and biological samples.
2. Perform biochemical analysis with accuracy and reproducibility.
3. The students will be proficient in biochemical analysis.
4. Use developed skills in diagnostic labs.

- Identification of Carbohydrate, Protein and Lipid.
- Determination of pH (in acids, alkalis and buffers using pH meter and indicators).
- Quantitative determination of protein by Biuret Method
- Separation Technique-Chromatography(paper and column), Centrifugation andElectrophoresis
- Estimation of Hb by Cyanmethoemoglobin method or Sahli's method.
- Estimation of ascorbic acid (titrimetric/ colorimetric method/)
- Estimation of calcium (titrimetric method/)
- Estimation of iron(wong's method)

References:

1. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. HarpersBiochemistry. Macmillan Worth Publishers.
2. Nelson, D.L. and Cox, M.M. (2000): 3rd Ed. Lehninger's Principles of Biochemistry,Macmillan Worth Publishers.
3. Devlin, T.M. (1997): 4th Ed. Text book of Biochemistry with Clinical Correlations, WileyLiss Inc
4. Stryer, L. (1998): 4th Ed. Biochemistry, WH Freeman and Co.
5. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines ofBiochemistry, John Wiley and Sons.
6. Voet, D. Voet, J.G. and Pratt, C.W. (1999). Fundamentals of Biochemistry.
7. Tietz, N.W. (1976) Fundamentals of Clinical Chemistry. WB Saunders Co.
8. King, E.J. and Wootton, I.D.P. (1956). 3rd ed. Micro-Analysis in Medical Biochemistry. Jand A Churchill Ltd.
9. Plummer, D.T. (1987). 3rd ed. An Introduction to Practical Biochemistry. McGraw-Hill

Advanced Nutrition (Theory)
Paper Code: 05380103

Periods/week	**Credits**	**Max. Marks:** 100
L: 4 T:0 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. Learn human nutritional requirements and recommendations through the life cycle.
2. Describe the nutritional significance of macro and micronutrients and changing trends in dietary intake.
3. Describe the role of nutrition in special conditions

Unit 1: Human Nutritional Requirements: Human Nutritional Requirements, methods determining human nutrient needs. Description of basic terms and concepts in relation to human nutritional requirements, guidelines and recommendation.

Unit 2: Body Composition: Significance of body Composition, Methods of assessment and factors affecting body composition.

Unit 3: Energy: Components of energy requirement- factors affecting energy expenditure and requirement. Methods of estimation of energy expenditure and requirement.

Unit4: Carbohydrates: Types, sources, role and mechanism of ation. Dietary fibre, glycemic index.

Proteins: evaluation of protein quality and methods of assessment of proteins.

Fats: Nutritional significance of fatty acids-SFA, MUFA, PUFA- functions and deficiency.

Unit 5: Water soluble and Fat soluble Vitamins: Functions, storage, bioavailability, sources, deficiency, toxicity and RDA.

Unit 6: Macrominerals and Microminerals: Calcium, phosphorus, magnesium, sodium, potassium, chloride, iron, copper, manganese, iodine, fluoride, zinc, selenium, cobalt, chromium, molybdenum- Functions, storage, bioavailability, sources, deficiency, toxicity and RDA.

Unit 7: Nutrition in Special Conditions- Space travel, high altitudes, low temperature and submarines

Advanced Nutrition (Practical)
Paper Code: 05380104

Periods/week	**Credits**	**Max. Marks:** 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this course, students will able to:

1. Learn the quantitative analysis of macro and micronutrients.
2. Learn the methods of assessment of energy expenditure to be applied in diet planning.
3. Critically evaluate the dietary guidelines and recommendations.

Practical

1. Critical review of dietary allowances of micronutrients for all age groups
2. Critically evaluate national and international dietary guidelines
3. Methods of estimation of protein quality.
4. Quantitative analysis of macronutrients.
5. Methods of calculating energy expenditure for assessing energy requirement.
6. Enlisting high and low glycemic index rich foods.
7. Quantitative analysis of micronutrients

References:

1. Annual Reviews of Nutrition. Annual Review Inc, California, USA.

2. Shils, M.E.; Olson, J.; Shike, M. and Roos, C. (1998): Modern Nutrition in Health and Disease. 9th edition. Williams and Williams. A Beverly Co. London.

3. Bodwell, C.E. and Erdman, J.W. (1988) Nutrient Interactions. Marcel Dekker Inc. New York

4. World Reviews of Nutrition and Dietetics.

5. WHO Technical Report Series.

6. Indian Council of Medical Research. Recommended Dietary Intakes for Indians - Latest Recommendations.

7. Indian Council of Medical Research. Nutritive Value of Indian Foods – Latest Publication.

Nutritional Management (Theory)
Paper Code: 05380105

Periods/week	**Credits**	**Max. Marks:** 100
L: 4 T:0 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. The students will establish relationship between food, nutrition, health and disease.
2. Conceptualize improvements and enhancements of nutritional quality of human diets.
3. Acquire knowledge about the nutritional needs of an individual in diseased conditions.

Unit 1: Nutritional care Process for people at various activity levels and socioeconomic status. Nutritional screening/ assessment and identification of nutritional problem. Nutritional Intervention and Diet Modification based on interpretation nutrition Education and Counselling Nutrition Monitoring and Evaluation.

Unit 2: Food pyramid, use of exchange list and advantages and limitations of exchange list. Delivery of Nutritional Support-Meeting nutritional needs through enteral tube Feeding, Parenteral Nutrition.

Unit 3: Nutrition for weight management, etiology and disorders of energy Balance.
Obesity- Components of body weight, adipose tissue structure, regional distribution and storage.

Unit 4: Types and causes of obesity, diatary management of obesity, maintenance of Reduced weight. Underweight/Excessive Leanness-Causes, assessment and diatary management. Nutritional management of eating disorders-Anorexia Nervosa, Bulimia Nervosa.

Unit 5: Nutrition and infection, defence mechanism of the body. Classification and etiology of fever/infection, metabolic changes during infection
Acute and chronic fever and nutritional management: Typhoid, Tuberculosis andMalaria.

Unit 6: Nutritional care and diet therapy in Diseases of esophagus; esophagitis, Hiatus hernia, Disorders of stomach: Gastritis, Gastric and duodenal ulcers.Common Symptoms and nutritional management in -Flatulence, Constipation and Diarrhoea, Diverticulosis, irritable bowel syndrome, inflammatory bowel disease. Malabsorption Syndrome/ Diseases of Small intestine- Celiac (Gluten –induced) sprue, tropical sprue, intestinal brush border enzyme deficiencies, Lactose intolerance, protein- losing enteropathy

Unit 7: Dietary care and management in viral hepatitis (different types), cirrhosis of liver, hepatic encephalopathy, Wilson's disease. Dietary care and management in diseases of the gall bladder and pancreas -cholelithiasis, cholecystitis, cholecystectomy, pancreatitis.

Nutritional Management (Practical)
Paper Code: 05380106

Periods/week	Credits	Max. Marks: 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this course, students will able to:

1. The students will to plan and prepare nutritionally adequate diets for different age, sex and activity groups, physiological conditions, diseases, regional and socio economic categories.
2. Acquaint students with the methods of estimating nutrient requirements

Planning and Preparation of the following diets:

1. Exchange list as a tool in planning diets :

-Interpretation of patient data and diagnostic tests and drawing up of patient diet prescription, using a case study approach.

- Follow up – acceptability of diet prescription, compliance, discharge diet plan for each of the diseases listed below.

- Obesity, Assessment of obesity, Management of obesity
- Underweight– Assessment, - Dietary Management
- Fever and Infectious Diseases -typhoid, tuberculosis
- Upper Gastrointestinal tract Diseases /Disorders
- Gastric and duodenal ulcers
- Constipation, Irritable bowel syndrome
- Viral hepatitis (different types) , cirrhosis of liver
- Cholelithiasis, pancreatitis

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. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10 Th Edition, Churchill Livingstone.

5. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.

6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2 Nd Edition, W.B. Saunders Co.

7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.

Journals and Other Reference Series

1. Nutrition Update Series

2. World Review of Nutrition and Dietetics

3. Journal of the American Dietetic Association

4. American Journal of Clinical Nutrition

5. European Journal of Clinical Nutrition

6. Nutrition Reviews

Human Physiology (Theory)

Paper Code: 05380107

Periods/week	Credits	Max. Marks: 100
L: 3 T:1 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. The students will have enhanced understanding of some of the relevant issues and topics of human physiology, which will help them to understand the general physiological problems.
2. They will be able to understand the integrated functions of all systems and the grounding of nutritional science in physiology, which they can implement in diet planning.
3. They will understand the alterations of structure and function in various organs and systems in disease conditions which will help them in effective planning of diets.

Unit 1 : Basic concepts of Physiology

- Cell structure and function , fluid and electrolyte
- Brief review of transport across cell membrane
- Genetics, applied genetics
- Immunity
- Homeostasis

Unit 2 : Haematology

- Blood, formation , composition
- Erythropoesis
- Haemostasis
- Blood grouping, cross matching , Rh incompatibility
- Anemia's and clinical manifestations
- Thallesemia and haemoglobinopathies

Unit 3 : Cardiovascular system

- Structure and function of heart, blood vessels
- Cardiac output
- Blood pressure
- Alteration of cardiovascular functions
- Heart failure , hypertension

Unit 4 : Respiratory system :

- Transport of gases
- Mechanics of respiration
- Cardio respiratory response to exercise and effects of training.
- Alteration of pulmonary function –signs and symptoms of pulmonary diseases, asthma, ILD

Unit 5 : GIT

- Secretory , digestive & absorptive functions
- Role of liver, pancreas & gall bladder
- Manifestations of GI dysfunction
- Inflammatory bowel diseases

Unit 6: Excretory system and Endocrine System:

Urine formation

- Role of kidney in maintaining acid base balance
- Mechanisms of hormone regulation
- Endocrine glands and their disorders
- Emphasis on physiology of diabetes and stress hormones

Unit 7 : Nervous system :

Conduction of nerve impulse synapse

- Organisation of CNS & PNS
- Hypothalamus and its role in body functions- obesity, sleep, memory
- Disorders CNS
- Cerebellum & basal ganglia

References:

1. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B. Saunders Co.
2. Concise medical Physiology - Chaudhari
3. API textbook of medicine
4. Winwood (1988) - Sear's Anatomy and Physiology for nurses- London, Edward Arnold.
5. Wilson (1989) –Anatomy and Physiology in Health and illness, Edinburgh, Churchill Livingstone.
6. Chatterjee Chandi Charan (1988) – Textbook of Medical Physiology, London, W.B. Saunder's C

Research Methodology and Biostatistics (Theory)

Paper Code: 05380108

Periods/week	Credits	Max. Marks: 100
L: 4 T:0 P:0	2	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. Understand the significance of Statistics and research methodology in nutrition research.
2. Understand the types, tools and methods of research.
3. Develop the ability to construct data gathering instruments appropriate to the research design.
4. Understand and apply the appropriate statistical technique for the measurement/ scale and design

Unit 1: The Research Process

- Scientific approach to enquiry in comparison to native, common sense approach
- Knowledge, theory and research
- Role, need and scope of research in Nutrition andDietetics
- Introduction to Statistics
- Definition, conceptual understanding of statistical measures, popular concepts and misuse of statistics

- Steps in the Research Process

- Identifying interest areas and prioritizing
- Selection of the topic and considerations in selection
- Review of related literature and research
- Concepts, hypotheses and theories
- Research Design
- Research questions, objectives and assumptions (with examples to be brought by students as exercise)

Unit 2: Types of Research

- Basic and applied research, Qualitative and Quantitative research (brief review of differences)
- Historical research
- Descriptive research methods – survey, case study, correlation study, content analysis, causal-comparative resea
- rch
- Analytic studies- pre-experimental, experimental research, quasi experimental research
- Qualitative research, ethnography
- Evaluative research- general characteristics, use of qualitative methods in enquiry (Exercise to be based on actual research papers published in accredited journals)
- Results, Discussion, Conclusion, Summary, Abstract, Bibliography and Appendices

Unit 3: Test of Significance

Hypothesis- meaning, attributes of a sound hypothesis, Stating the hypothesis and types of hypothesis, Hypothesis testing- null & alternative hypotheses, sampling distribution, standard errors, level of significance, critical regions, Type-I and Type II errors (Hypothesis formations and research questions from Research readings – students identify hypothesis/research questions –Discussion)

- Variables- types of variables including discrete and continuous variable**(**
- **Tools for Data Collection :**Primary and secondary methods of data collection
- Different types of questionnaires, rating scales, check lists, schedules, attitude scales, inventories, standardized tests, interviews, and observation validity of tools.

Unit 4: Probability Distributions and its Properties

- Normal distribution
- Binomial distribution
- Probability, use of normal probability tables, area under normal distribution curve

Unit 5: - Sampling:

- Concept ofpopulation and sample, and utility.
- . Types of sampling methods and generalizability of results
- Probability sampling- simple random sample, systematic random sample, stratified random sampling etc.-random and non-random samples, random numbers and use

- Non-probability sampling-purposive samples, incidental samples, quota samples, snowball samples (Based on Journal contents discuss types of Research with Examples)

Unit 6: Data Management and Analysis:

- Quantitative analysis, descriptive statistics, inferential statistics: Uses and limitations Summation sign and its properties

Method of scaling

- Measures of central tendency-mean, median, mode arithmetic mean and its uses, mid – range, geometric mean, weighted mean, measures of dispersion /variability- range, variance, standard deviation, standard error, coefficient of variation, Kurtosis, Skewness (practical aspects of grouped data-frequency distribution, histogram, frequency polygons, percentiles .

Unit 7: Data Analysis:

Coding of data

- Use of statistical computation tools
- Practical approach : Use of statistical programs
- Spread sheets: MS Excel and R-Spread sheet
- Introduction to R programming language for statistical analysis and graphics / SPSS

Unit 8: Large and Small Sample tests, its interpretation and practical approach:

- Z-test for single proportions and difference between proportions
- Large sample test for single mean and difference between mean
- Small sample tests- One & Two – Sample t-tests, Paired t – test, F – test.

Unit 9: Chi square test and its interpretation practical approach General features of Chi square tests, goodness of fit. Test for Independence of attributes. Correlation and Regression, its interpretation and practical approach . Basic concepts

Correlation

Pearson's correlation

(i) Rank Correlation,

Linear regression

(i) Simple and Multiple Linear Regression, and its interpretations.

Calculation of regression coefficint and Prediction

Unit 10: Analysis of Variance and its interpretation, practical approach:

- One-way analysis of variance
- Introduction Randomized Designs
- Introduction to Factorial design

References

1. Bell, J. (1997): Doing Your Research Project: A Guide for First-time Researchers in Education and Social Science, Viva Books, New Delhi

2. Bell, J. (1997): How to Complete Your Research Project Successfully: A Guide for First-time Researchers, UBSPD, New Delhi.

3. Bulmer, M.C. (1984): Sociological Research Methods: An Introduction, Macmillan, Hong Kong.

4. Festinger, L. and Katz, D. (ed.) (1977): Research Methods in the Behavioral Sciencess, Amerind Publishing, New Delhi.

5. Holloway, I. (1997): Basic Concepts of Qualitiative Research, Blackwell Science, London.

6. Jain, G. (1998): Research Methodology: Methods and Techniques, Mangal

Statistics

1. Gupta, S. (2001) “Research Methodology and Statistical Techniques”,Deep and Deep, New Delhi,

2. Hooda, R.P. (2003) “Statistics for Business and Economics”, 3rd ed., Macmillan India Ltd., Delhi,.

3. Dey, B.R. (2005) “Textbook of Managerial Statistics”, Macmillan India Ltd., Delhi,

4. Fleming, M.C. & Nellis, Joseph G. (1997) “The Essence of Statistics for Business”, Prentice-Hall of India, New Delhi,

5. Sarma, K.V.S. (2001) “Statistics made Simple: Do it yourself on PC”, Prentice-Hall, New Delhi.

Critical Research Appraisal (Practical)

Paper Code: 05380109

Periods/week	**Credits**	**Max. Marks:** 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this course, students will able to:

1. Appreciate and understand importance of review of research papers.
2. Develop competence in writing and abstracting skills.
3. Understand the various forms of writing.

The student is expected to read and critically evaluate minimum of 5 papers and present the inference of every part in a clear and precise manner in the form of a report and short seminar at the end of semester based on which the student will be evaluated.

The critical appraisal of health-related literature by healthcare professionals is a multi-step process that requires:

1. Formulation of a question that is important for improving patient health while advancing scientific and medical knowledge;
2. Searching the relevant literature to find the best available evidence;
3. Appraising research critically to evaluate quality and reliability, as well as applicability to the formulated question;
4. Applying the evidence to practice;
5. Monitoring the interventions to ensure the outcomes are reproducible and effective.

SEMESTER-II

Clinical Nutrition and Dietetics (Theory)

Paper Code: 05380201

Periods/week	Credits	Max. Marks: 100
L:4 T:0 P:	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. Understand the problems and changes that occur in various acute and chronic diseases and the patients need.
2. Perform the dietary and nutritional changes according to the diseased condition.
3. Have increased knowledge regarding the care needed to prevent or treat the disease condition

Unit 1: Long term complication- pathophysiology, diagnosis, types treatment and diet therapy in Macrovascular and Microvascular Diabetes.

Unit 2: Nutrition in Hypertension- Blood pressure regulation, short-term (sympathetic nervous system) and long-term (kidneys) Hypertension – classification (secondary and essential), Risk Factors for hypertension, Dietary management-DASH approach.

Unit 3: Etiology, Clinical Manifestation and Dietary Management of the following Cardiovascular Diseases:

(1) Hyperlipidemia and Hyperlipoproteinemia
(2) Atherosclerosis
(3) Coronary Heart Disease
(4) Angina Pectoris and Myocardial Infarction

Unit 4: Etiology, Clinical Manifestation and Dietary Management of the following Renal Diseases: GlomeruloNephritis**,** Nephrotic Syndrome**,** Uremic Renal Failure**,** Acute renal failure**,** Chronic Renal Failure, Nephrolithiases

Unit 5: Nutritional Therapy for Rheumatic disorders (of the musculoskeletal system): Physiology of inflammation inRheumatic Diseases- Osteoarthritis, Rheumatoid Arthritis, Gout

Unit 6: Nutrition in Diseases of other Endocrine organs -Adrenal gland, Thyroid, Parathyroid gland. Hypo and Hyperthyroidism (goiter), Hypocalcaemia.

Clinical Nutrition and Dietetics (Practical)

Paper Code: 05380202

Periods/week	Credits	Max. Marks: 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this course, students will able to:

1. The students will be able to plan and prepare suitable therapeutic diets based on patient needs for various diseases/disorders
2. They will be able to provide dietary counseling for prevention / treatment of various diseases / disorders
3. They will be able to develop skills to prepare special therapeutic / health food

Practical:

1. Market Survey of Commercial nutritional supplements: -Collection of information on commercial food formulae available in the market and their evaluation.
2. Preparation of Aids for Diet Counseling
3. Planning and preparation of diets in the following disease conditions:

- Diabetes Mellitus and hypoglycaemia
- Cardiovascular Diseases and Hypertension
- Rheumatic disorders (of the musculoskeletal system)- Osteoarthritis, Rheumatoid Arthritis, Gout
- Renal Diseases- GlomeruloNephritis, Nephrotic Syndrome, Acute Renal Disease, Chronic Renal Disease

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, 9thEdition, Williams and Wilkins.

3. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4thEdition, Williams and Wilkins.

4. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10th Edition, Churchill Livingstone.

5. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.

6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2 nd Edition, W.B. Saunders Co.

7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.

8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B. Saunders Co.

9. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.

10. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill.

11. World Cancer Research Fund (1997). Food, Nutrition and the Prevention of Cancer- A Global perspective, Washington E.D.WCRF.

Journals and Other Reference Series

1. Nutrition Update Series

2. World Review of Nutrition and Dietetics

3. Journal of the American Dietetic Association

4. American Journal of Clinical Nutrition

5. European Journal of Clinical Nutrition

6. Nutrition Reviews

Applied Food Science and Product Modification (Theory)

Paper Code: 05380203

Periods/week	**Credits**	**Max. Marks:** 100
L:3 T:1 P:	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1) Understand the various aspects of food product development including Food Science and Technology, Marketing and Consumer Research, Finance and Communication.
2) Develop commercially and nutritionally viable products which meet consumer needs.
3) Recognize the potential for entrepreneurship through marketing.
4) Justify the processes of food product development and manufacture in terms of market, technological and environmental considerations.

Unit 1: Introduction to sensory analysis and uses of sensory tests: Recognition tests for 4 basic tastes, odour and aroma. Objectives, type of food panels, characteristics of panel member, layout of sensory evaluation laboratory, sensitivity tests, threshold value, paired comparison test, duo-trio test, triangle test, hedonic scale.

Unit 2: Energy density& Applications of fermentation, germination, malting

Unit 3: New Food Products: Definition, Classification, Characterization Factors shaping new product development-Social concerns, health concerns impact of technology and market place influence. Planning, standardizing, nutritional content and testing the product.

Unit 4: Specialty food products Use of different food ingredients for development of health foods – artificial sweeteners, modified starches, fat replacers, increasing fibre content, low sodium food adjuncts, protein concentrates, whey. Health foods-Medical foods-Therapeutic foods-Herbal foods-Fortified foods. Infant foods- Geriatric foods-Sports drinks. Functional foods- Designer foods and Neutraceuticals. Prebiotics and probiotics.

Unit 5: Product Commercialization and Marketing

- Entrepreneurship – Financial review, Costing and Pricing, Test Market, Product launching and Commercialization.
- Ethics in food product development.
- Intellectual property/ Patents.

Applied Food Science and Product Modification (Practical)

Paper Code: 05380204

Periods/week	**Credits**	**Max. Marks:** 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this course, students will able to:

1. Understand concepts and use different sensory methods for evaluation of food.

2. Analyse and interpret sensory evaluation data.

3. Develop products which meet consumer needs, and are nutritionally and commercially viable

4. Skilled in the various aspects including shelf life assessment, testing of quality parameters and acceptability, packaging and labeling of a product

Practical:

- Sensory analysis: Different types of sensory tests for basic taste and sensory attributes of products.
- Project on different sensory techniques and responses utilizing prepared products analysis and presentation of sensory data.
- Stepwise development of a new food product, standardization, acceptability studies and submission of project report.
- Market Survey to identify Repositioning of Existing Products, New form, Nutrition products, Therapeutic products, Specialty products, Technology Driven products New form, Reformulation, New packaging, Innovative products and Creative Products.

References:

1. Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (1992): Guidelines for Sensory Analysis in Food Product Development and Quality Control. Chapman and Hall, London.

2. Amerine, M.A.; Pangborn, R.M.; Roessler, E.B. (1965): Principles of Sensory Evaluation. Academic Press, New York.
3. Kapsalis, J.G. (1987): Objective Methods in Food Quality Assessment. CRC Press, Florida.
4. Martens, M.; Dalen, G.A.; Russwurm, H. (eds) (1987): Flavour Science and Technology. John Wiley and Sons, Chichester.
5. Moskowitz, H.R. (eds) (1987): Food Texture: Instrumental and Sensory Measurement. Marcel Dekker Inc. New York.
6. Lawless, H.T. and Klein, B.P. (1991): Sensory Science Theory and Applications in Foods. Marcel Dekker Inc.
7. Jellinek, G. (1985): Sensory Evaluation of Food Theory and Practice. Ellis Horwood, Chichester.
8. Piggott, J.R. (ed) (1988): Sensory Analysis of Foods. Elsevier Applied Science, London.
9. Meilgaard, M.; Civille, G.V.; Carr, B.T. (1987): Sensory Evaluation Techniques, Vols. I and II, CRC Press, Florida.

Food Microbiology (Theory)

Paper Code: 05380205

Periods/week	Credits	Max. Marks: 100
L:4 T:0 P:	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. Gain knowledge of the role of micro organisms in humans and environment.
2. Understand the importance of micro organisms in food spoilage
3. The students will learn basic techniques used in food preservation.

Unit 1: Introduction and scope of food microbiology: Understand basic concepts of food microbiology. Iintrinsic and extrinsic factors affect the growth and survival of microorganisms in foods. Beneficial effects of microorganisms and its relevance to everyday life. General characteristics of bacteria, fungi, virus, protozoa, and algae. Microbes of industrial importance.

-Identification of microorganisms

Intrinsic Factors (Substrate Limitations)

- nutrient content
- pH and buffering Capacity
- redox potential, Eh
- antimicrobial barriers and
- constituents
- water Activity-

-Extrinsic Factors (Environmental Limitations)

- relative Humidity
- temperature
- gaseous atmosphere

Unit 2: Contamination and spoilage of cereal, pulses and their processed products. Contamination and spoilage of vegetables & fruits and their products, eggs and poultry, milk and milk products.

Unit 3: Food borne illness : Bacterial and non-bacterial. Investigation of food borne disease outbreaks and preventive measures.

Unit 4: Use of Biotechnology for food preservation and processing: Role of biotechnology in food preservation and processing, enhancing nutritional quality; Genetically modified foods. Us of biotechnological tools in

-Food products

- Alcoholic drinks
- Dairy products

-Products from microorganisms

- Enzymes

Need for GM foods – The food challenges. Potential benefits in agriculture, Crop engineered for input and output traits, nutritional improvement, animal foods, -issues of concern, safety of GM foods. Indian fermented foods – Historical perspective, mechanism of fermentation, fermented products: bread, Beer, Wine, Vinegar and Cheese. Oriental fermented products and fermented vegetables

Unit 5: Indian fermented foods – Historical perspective, mechanism of fermentation, – Historical perspective, mechanism of fermentation, effect on nutritional value.

Fermented products: bread, Beer, Wine, Vinegar and Cheese. Oriental fermented products and fermented vegetables

Unit 6: Good manufacturing practices, HACCP, Food control agencies: FDA, USDA, NMFS. Introduction: Overview of Good manufacturing practices, HACCP. Understanding concepts of microbiological criteria for foods.

Food control agencies: FDA, USDA, NMFS, FAO, FSSAI, AGMARK, BIS

Unit 7: Microorganisms as food: Use of microbes as food: SCP, probiotics, mushroom; microbial enzymes. Overview on SCP production, probiotics, mushroom production.

- Industrial important enzymes in food

- amylases,
- invertase,
- proteolytic enzymes,
- cellulose,
- lactase

Food Microbiology (Practical)

Paper Code: 05380206

Periods/week	Credits	Max. Marks: 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this course, students will able to:

1. Microbiologically analyze the various food stuffs for quality and safety.
2. Understand the latest procedures adopted in various food operation.
3. Study spoilage microorganisms and their effects on food.

Practical

1. Study of common equipments in a microbiology lab.
2. Preparation of media and culturing, sub culturing of bacteria.
3. Staining of bacteria: gram-staining and study of colony morphology
4. Isolation of spoilage microbes from bread
5. Study of Shelf life of specific food item- raw, cooked, packaged.
6. Study of food borne bacteria and viruses – morphology and structure (Photographic)
7. Preparation of Dahi/curd using specific starter culture.
8. Microbiological identification of important molds and yeasts.
9. Visit (at least one) to food processing units or any other organization dealing with advanced methods in food microbiology.

References:

1. Banwart GJ. (1987) *Basic Food Microbiology* . CBS Publishers and Distributors.
2. Frazier WC, Westoff DC. (1998*). Food Microbiology. 4th ed*. Tata McGraw-Hill Publishing Co. Ltd.
3. Garbutt J. (1997). *Essentials of Food Microbiology*. Arnold London.
4. Jay JM, Loessner DA, Martin J. (2005) *Modern Food Microbiology. 7th ed.* Springer
5. Speck, Marvin, (1984). Compendium of Methods for Microbiological examination of Foods. American Public Health Association
6. Harry W. Seeley, Paul J. VanDemark (1962). Microbes in action.

Nutrigenomics (Theory)

Paper Code: 05380207

Periods/week	**Credits**	**Max. Marks:** 100
L:4 T:0 P:	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. Have knowledge of how diet and underlying genetics interact to increase susceptibility to disease.
2. Appreciate for the methods and strategies used to study complex trait genetics and nutrition.
3. Students will gain knowledge to apply Nutragenomics and to design nutritional strategies for prevention of chronic diseases such as cardiovascular disease, obesity, type-2 diabetes and cancer.
4. In addition, students will work in groups and/or individually on several class/home assignments and write a research grant application

Unit 1 Molecular Biology: Structure and functions of Nucleic Acids: The beginning of Molecular Biology: DNA: A carrier of genetic information, chemical structure of DNA and base composition, biologically important nucleotides, Watson Crick Model, structure of different types of nucleic acids.

Unit 2 DNA Replication and Repair: Unit of replication, enzymes involved, fidelity of replication, DNA damage and repair mechanisms.

RNA synthesis and processing: Structure and function of RNA polymerases. Transcription factors and machinery, formation of initiation complex, transcription activators and repressors, RNA processing, editing and splicing. Structure and functions of different types of RNA, RNA transport.

Unit 3: Introduction to Gene-diet interactions: **Nutrigenomics:** Scope and Importance to Human Health and Industry. Transporter gene polymorphisms -interaction with effects of micronutrients in humans. Polymorphisms in genes affecting the uptake and transport of omega-6 and omega-3 polyunsaturated fatty acids: interactions with dietary lipids and

chronic disease risk. Nutrigenomics approaches to unraveling physiological effects of complex foods.
The intestinal microbiota - role in nutrigenomics.

Unit 4: Modifying disease risk through nutrigenomics: Modulating the risk of following diseases through Nutrigenomics:

- Cardiovascular disease
- Diabetes
- Inflammatory bowel diseases
- Obesity
- Cancer
- Malnutrition

Unit 5: Technologies in Nutrigenomics:

Genomics techniques: Different sequencing approaches, Microarray, Mass array, SNP genotyping, PCR and RT-PCR techniques.

Proteomics techniques: 1-D, 2-D gel electrophoresis, DIGE, novel peptide identification, peptide sequencing methods.

Metabolomics techniques: Chromatography and mass spectrometry techniques, Discovery and validation of biomarkers for important diseases and disorders

Computational approaches: Introduction to different types of public domain databases, data mining strategies, primer designing.

Unit 6: Bringing nutrigenomics to Industry, Health professionals, and the Public:

Bringing nutrigenomics to the food industry: Industry-Academia partnerships as an important challenge; Bringing nutrigenomics to the public: Is direct-to-consumer testing the future of nutritional genomics? Interaction with health professionals in bringing nutrigenomics to the public; Is contemporary society ready for nutrigenomic
science? Public health significance of nutrigenomics and nutrigenetics.

Reference Books:

• Journal Nutrients 2012, 4, 1898-1944; Molecular Nutrition Research—The Modern Way Of Performing Nutritional Science.

- Journal Nutrients 2013, 5, 32-57; Nutrigenetics and Metabolic Disease: Current Status and Implications for Personalized Nutrition
- J Nutrigenetics Nutrigenomics 2011;4:69–89; Nutrigenetics and Nutrigenomics: Viewpoints on the Current Status and Applications in Nutrition Research and Practice.
- J Am Diet Assoc. 2006;106:569-576; Nutrigenomics: From Molecular Nutrition to Prevention of Disease.
- The Journal of Nutrition; Nutritional "Omics" Technologies for Elucidating the Role(s) of Bioactive Food Components in Colon Cancer Prevention.
- Nutrition 25 (2009) 1085–1093; Proteomics at the center of nutrigenomics: Comprehensive molecular understanding of dietary health effects.
- http://www.ga-online.org/files/Antalya2011/WS2-Daniel.pdf.
- http://www.authorstream.com/Presentation/winingneeraj01-1272374-nutritional-genomics.

Human Value & Professional Ethics (Theory)

Paper Code: 05380208

Periods/week	Credits	Max. Marks: 100
L:4 T:0 P:	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. To promote positive changes and to equip students with skills to empower them to make positive lifestyle choices.
2. Instill confidence and coping skills for stress and strains of modern life.
3. Acquire social sensitivity and secular outlook

Unit 1: Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

Unit 2: Value Education- Definition - relevance to present day - Concept of Human Values - self introspection – Self-esteem - Family values-Components, structure and responsibilities of family- Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concern.

Unit 3: Meaning and definition of clinical nutritionists and dietetic practices. Registered dieticians- rights and duties of medical professionals and dieticians. Role of Indian dietetic Association (IDA) and its power and functions- registration as registered dietician.

Unit 4: Medical profession and consumer protection- medical negligence, standards of proof, individual and joint liability.

Unit 5: Nutritional and medical ethics- autonomy of the patients, medical confidentiality of medical records, patients and physician / dietician interaction and decision making- judicial trends.

Unit 6: Ethical issues in human and animal research.

References:

1. John S Mackenjie: A manual of ethics.
2. The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today .
6. Maitra, S.K: Hindu Ethics.
7. William Lilly: Introduction to Ethics .
8. Sinha: A Manual of Ethics.
9. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.

Project Development (Practical)

Paper Code: 05380209

Periods/week	**Credits**	**Max. Marks:** 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this course, students will able to:

1. Appreciate and understand importance of writing scientifically.
2. Develop competence in writing and abstracting skills.
3. Understand the various forms of writing.

In this semester the student is expected to work on finalising the topic and methodology with a detailed review of literature work to be submitted in the form of a synopsis along with a seminar to be held. Allotment of guide will also be carried out. It will involve a comprehensive literature survey of the chosen research area. Through regular meetings, the student and advisor discuss this literature in detail and the topic for research project.

SEMESTER III

CLINICAL NUTRITION

Medical Nutrition Therapy (Theory)

Paper Code: 05380309

Periods/week	Credits	Max. Marks: 100
L:4 T:0 P:	4	Internal : 40
		External : 60

Unit 1: Introduction to Medical Nutrition Therapy: Definitions and Role of Dietitians in Health Care**,** The Nutritional Care Process (NCP)**,** Importance of coordinated Nutritional and Rehabilitation services, Patient Care and counseling

Nutritional Anaemia: Erythropoiesis, Classifications of Anemias , Erythropoiesis and haemoglobin synthesis, nutrients involved in Erythropoiesis. Classifications of Anemias- Normocytic anemia – aplastic anemia, Megaloblastic anemia, Microcytic anemia, Sickle cell anemia and Thalassemia, Hemolytic anemia and Nutritional Care

Unit 2: Food Allergies:

Definition, Symptoms and mechanism of food Allergy

Diagnosis – Biochemical, immune testing (brief), history and food record, Elimination diets, Food Selection.

Food allergy in infancy (milk sensitive enteropathy, colic prevention of food allergy)

Unit 3: Nutrition in Pulmonary Disease: Effects of Malnutrition on Respiration**,** Chronic Obstructive Pulmonary Disease**,** Etiology and Pathogenesis**,** Respiratory Failure and Nutritional Care

Unit 4: Nutrition and Cancer: Carcinogens in foods**,** Chemoprevention of Cancer: nutrient and non-nutrient dietary components**,** Etiology and Pathogenesis of carcinogenesis**,** Metabolic and Nutritional Alterations in Malignancy**,** Interrelationships of nutritional status and systemic effects of cancer**,** Nutritional impacts of cancer therapy, Types of therapy**,** Nutritional support of the Cancer patient.

Unit 5: Nutritional Care in Hyper metabolic Conditions: Burns, Sepsis and Surgery

Unit 6: Drug- Nutrient Interactions: Effects of diet and nutritional status on drug absorption, disposition metabolism and action, Effects of drugs on food intake, body weight, nutrient requirements and growth. Drug induced maldigestion and malabsorbption. Effects of drugs on vitamin and mineral status, requirements and activity, demographics, disease state and risk of drug-nutrient and drug- nutritional status interactions.

Medical Nutrition Therapy (Practical)

Paper Code: 05380310

Periods/week	**Credits**	**Max. Marks:** 50
L:0 T:0 P:4	2	Internal : 30
		External : 20

Assessing and planning diets for patients in the following disease conditions:

1. Nutritional Anaemia
2. Food Allergy
3. Nutrition in Pulmonary Disease
4. Nutrition and Cancer
5. Nutritional Care in Hyper metabolic Conditions- burns, sepsis and surgery.

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. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10 Th Edition, Churchill Livingstone.
5. Williams, S.R. (1993): Nutriion and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.
6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.
7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9thEdition, W.B. Saunders Co.
9. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
10. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14th,Edition, McGraw Hill.
11. World Cancer Research Fund (1997). Food, Nutrition and the Prevention of Cancer- A Global perspective, Washington E.D. WCRF.

Journals and Other Reference Series

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

Food Service Management (Theory)

Paper Code: 05380311

Periods/week	**Credits**	**Max. Marks:** 100
L:4 T:0 P:	4	Internal : 40
		External : 60

Unit 1: Introduction, Definition of food service industry, principles of food service industry, objectives, types of food service industry. Hospitals, school meals, hostels, Industrial canteens, commercial hotel, canteens Institutions catering to different types of handicapped personnel.

Unit 2: Theories of management and approaches -Classical or traditional theory, Neoclassical approach, Quantitative approach, MBO approach, System approach, Behavioural and Human relations, Contingency approach, JIT approach, Total quality management approach, Management science or operation research.

Unit 3: Developing objectives and goals -Definition, importance, types of goals, Policies, procedures, rules. Principles and procedures of management-Definition of management, organization & interaction at work •principles of management, functions of management , Managerial roles & responsibilities, the manager& leadership quality.

Unit 4: Tools of management –Definition, classification: - tangible tools, intangible tools, Organization chart,structure,function, work improvement techniques.

Unit 5: Personnel management -Definition, scope, concept of personnel management, approaches of personnel management, personnel policies, staff employment, training, placement, promotion, personnel records, and work appraisals.

Unit 6: Material management, Quantity food preparation and service- Definition. Principles of quantity food purchase- selection, buying and accounting of different foods. Inventory management- assessing requirements, receiving of stock, release of stocks. Record maintenance. Factors in menu planning for large groups, systems for maintaining quality in food preparation and service. Kitchen control and maintenance of Kitchen records.

Unit 7: Financial management-Definition, scope of financial management, financial accounting, management accounting, budgeting, costing, cost control, accounting.

Unit 8: Hygiene and sanitation in preparation and serving area -Personal hygiene, types, sourcesof contamination, prevention, safety measures, methods of controlling infestation, methods of dish washing.

Food Service Management (Practical)

Paper Code: 05380312

Periods/week	**Credits**	**Max. Marks:** 50
L:0 T:0 P:4	2	Internal : 30
		External : 20

1. Market survey of all food groups to find out the cost.
2. Standardization of recipes- costing of recipes.
3. Visit to different types of food service institutions and studying the following: Organization, Physical Plan and Layout, Food Service equipment, Sanitation and Hygiene. Submit report for the same.
4. Planning and preparation of a cafeteria.

Reference Books:

(1) Sathe, A.Y., A First Course in Food Analysis,1999.

(2) Sethi, Mohini, Catering Management :An Integrated Approach,2015.

(3) Sethi, Mohini, Fasting and Feasting - Then and Now,2008.

(4) Sethi, Mohin, Institutional Food Management,2004

Public Health Nutrition (Theory)

Paper Code: 05380313

Periods/week	Credits	Max. Marks: 100
L:4 T:0 P:	4	Internal : 40
		External : 60

Unit 1: Concept of public nutrition, Introduction to public nutrition & health. Relationship between health and nutrition. Role of public nutritionists in the health care Delivery. Sectors and Public Policies relevant to nutrition &health.

Unit 2: Primary Health Care of the Community, National Health Care Delivery System. Determinants of Health Status. Indicators of Health.

Unit 3: Approaches for improving nutrition and health status of the community. Programmatic options- their advantages and demerits, Feasibility Political support Available resources (human, financial, infrastructural). Health based interventions including immunization, provision of safe drinking water/ sanitation, prevention and management of diarrhoeal diseases. Food based interventions including food fortification, dietary diversification, supplementary feeding and biotechnological approaches. Education based interventions including growth monitoring and promotion (GMP), health nutrition related social and behaviour change communication.

Unit 4: Food and Nutrition Security: Food Security, Food production Access, Distribution, Availability, Losses consumption. Socio-cultural aspects and Dietary Patterns: Their implications for Nutrition and Health

Unit 5: Nutritional Status: Determinants of nutritional status of individual & populations, Nutrition and Non-nutritional indicators, Socio-cultural, Biological Environmental, Economic Assessment of nutritional status of individuals of different ages- MUAC, Wt for age, Ht for age, Wt for ht, Ponderal index, BMI.

Unit 6: Major nutritional Problems: Etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: Macro and micro nutrient deficiencies, Other nutritional problems like lathyrism, dropsy, aflatoxicosis and fluorosis. Overweight, obesity and chronic degenerative diseases.

Unit 7: National Food, Nutrition and Health Policies: Plan of action and programmes

Public Health Nutrition (Practical)

Paper Code: 05380314

Periods/week	Credits	Max. Marks: 50
L:0 T:0 P:4	2	Internal : 30
		External : 20

1. Study of various public health nutrition problems trend of the Nation and review it critically.
2. Study of various existing programmes of public health nutrition and review it critically.
3. Assessment of nutritional status of a group of students based on anthropometry
4. Study about various clinical sign and symptoms used in nutritional assessment
5. Study of various dietary approaches used in nutritional assessment
6. Study about various software and applications used in nutritional assessment
7. To study existing national food security system and report writing

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. Banarasidas Bhanot, 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.

Critical Care in Nutrition (Theory)

Paper Code: 05380315

Periods/week	**Credits**	**Max. Marks:** 100
L:4 T:0 P:	4	Internal : 40
		External : 60

Course outcome:

1. Students will understand physiology and metabolism in critical conditions.

2. To develop critical thinking skills and apply evidence based nutrition principles

3. Understand the theoretical basis for nutrition intervention strategies with the anatomical, physiological and/or biochemical changes that occur in diseases conditions covered in this course

4. Integrate the theories and principles of nutrition therapy into clinical practice

Unit 1: Overview of critical care units

1.1 Overview of critical care.
1.2 Nutrition guideline in critical care.
1.3 Basic principles of enteral/parenteral nutrition

Unit 2: Enteral Nutrition: Enteral Nutrition formulations, routes and regimens of enteral feeding, monitoring of nutrition support, nutrition risk assessment, enteral nutrition orders, national and international guidelines.

Unit 3: Parenteral Nutrition: Indications and contraindications for parenteral nutrition, venous acess, parenteral solutions, administering parenteral nutrition, complications associated with it. National and international guidelines.

Unit 4: Sign and symptoms, diagnosis, patho-physiology and dietary management of critical conditions

2.1 Acid/Base Abnormalities

2.2 Electrolyte/Fluid Abnormalities

2.3 Ventilator Support, ventilator associated pneumonia/ nasocomal pneumonia/ Aspiration pneumonia

Unit 5: Patho- physiological, clinical and metabolic aspects, special nutritiona requirements, nutritional goals, nutritional screening and nutritional status assessment of the critically ill, role of immune enhancers in:

Respiratory failure, Multi organ failure, hepatic failure. Review of evidence based guidelines for the above conditions. Discussion and presentation on evidence based guidelines.

References:

1. Peter Faber, Mario Siervo (2014). Nutrition in Critical Care. Cambridge university press, Newyork..

2. Rajkumar Rajendram, Victor R (2015). Preedy, Vinood B. Patel Diet and Nutrition in Critical Care. Springer New York.

3. Pierre Singer (2013). Nutrition in Intensive Care Medicine: Beyond Physiology. Karger Medical and Scientific Publishers.

4. Mahan, L. K. and Escott Stump. S. (2008) Krause's Food & Nutrition Therapy 12th ed. Saunders-Elsevier.

Technical Writing and Seminar - Practical

Paper Code: 05380308

Periods/week	**Credits**	**Max. Marks:** 100
L: T:0 P:8	4	Internal : 60
		External : 40

Course Outcomes:

On successful completion of this course, students will able to:

1. Understand the process of scientifically research proposal writing
2. Develop competence in research writing,abstracting and presentation
3. Understand the ethical approval process of a research proposal

In this semester each student must finalize the research topic and methodology with a detailed review of literature.The planned research work must submitted in the form of a synopsis along with a seminar to be held. Each student must submit synopsis to the university with the signed approval of the advisor, a thesis proposal defining the thesis project, the methods and design of the experiments needed for completion, the progress to date and plans for completion in the fourth semester.

SEMESTER IV

Internship (Practical)

Paper Code: 05380402

Periods/week	Credits	Max. Marks: 150
L: T:0 P:12	6	Internal : 75
		External : 75

Course Objectives:

1. Assess nutritional status and dietary pattern of individuals.
2. Plan therapeutic diets for patients.
3. Develop skills in feeding patients.
4. Develop skills in diet counseling.
5. Understand principles of planning, organizing and controlling food service departments.
6. Learn to apply principles of sanitation and hygiene in food service.
7. Gain experience in managing dietetic department of a hospital.

Aspects to be covered:

1. Placements in hospital dietary departments and diet clinics /Food Industries /NGO's / International Organisation to gain knowledge to:

(a) Establish rapport with patients- assess the nutritional status and dietary history of patients.

(b) Plan diet sheets after careful study of the patients case sheets-prepare and provide guidance in the production of therapeutic diets.

(c) Supervise preparation of diets- assist and guide in tray setting with special emphasis on portion control and therapeutic modifications.

(d) Supervise delivery of trays to the patients.

(e) Get feedbacks from patients regarding diets.

(f) Discuss/consult with doctors for modifications.

(g) Undertake case study at hospital situations

(h) Visits to different dietary departments of various hospitals

(i) Updating knowledge by presentations and participation through seminars and projects

(j) Gain experience in the administrative set up of a dietary department

2. Placements in Food Industries to enhance skills related to:

(a) Food product development

(b) Food analysis

(c) Food regulatory issues (food laws)

(d) Food safety and quality systems

(e) Nutrition research

(f) Nutrition- related marketing and public relations

(g) Consumer and health professional education

3. Placements in NGOs/ International Organizations to explore arena of *:*

(a) Programmes and policies

(b) Nutrition and socio economic development

(c) Scope of programmes and health administration

(d) Training and HRD aspects of programmes

(e) Community participation

(f) Surveillance

Dissertation (Practical)

Paper Code: 05380403

Periods/week	Credits	Max. Marks: 300
L: T:0 P:24	12	Internal : 180
		External : 120

Submission of Dissertation

The research project is to be carried out over a period of approximately 6 months and will be carried out in the lab/ hospitals, subject to approval by all concerned. Students will select research project with their respective supervisors. The projects will be selected such that a student can reasonably be expected to make an original contribution to the chosen area of research within the time period allotted. The purpose of the project is to provide the student with training in academic research and acquisition of practical skills, including the design of a research project, planning of experiments, dealing with practical problems, recording of, presenting and analyzing data.

Unit I- Thesis Proposal Development is an independent tutorial conducted by the student's advisor, and involves a comprehensive literature survey of the chosen research area. Through regular meetings, the student and advisor discuss this literature in detail and the topic for research project will be finalized in the third semester.

Unit II- Thesis proposal Each student must submit to the university with the signed approval of the advisor, a thesis proposal defining the thesis project, the methods and design of the experiments needed for completion, the progress to date and plans for completion in the third semester.

Unit III – Thesis preparation: This is involving preparation of the thesis. The thesis must include a cover page, abstract, table of contents, introduction of the thesis topic with a comprehensive review of literature, appropriately organized methods, results and discussion section for the experiment performed and final conclusions section summarizing the outcome of the project. The student should submit a draft of the thesis to the advisor by the end of the fourth semester.

Management of Nutrition Related Disorders (Theory)

Paper Code: 05380404

Periods/week	**Credits**	**Max. Marks:** 100
L:4 T:0 P:	4	Internal : 40
		External : 60

Course Outcomes:

1. The student will be aware of the less familiar nutrition related disorders in the community and the resources to cure or prevent them.
2. The student will have better understanding of biochemical and clinical manifestations, preventive and therapeutic measures of the nutrition related disorders.

UNIT 1: **Nutrition management in Diseases of nervous system and musculoskeletal system:**

- Dysphagia
- Epilepsy
- Hyperkinetic behavior syndrome

UNIT 2: Nutrition in AIDS

- AIDS: Introduction
- Signs and Symptoms
- Transmittal Routes
- Nutritional Care

UNIT 3: Inborn Errors of Metabolism:

Metabolic defect, clinical symptoms and management:

- Phenylketonuria
- Galactosemia
- Maple Syrup Urine Disease
- Homocystineuria
- Familial Hypercholesterolemia
- Wilson’s disease

UNIT 4: Etiology, clinical symptoms and dietary management of:

- Malabsorption Syndrome
- Chronic Alcoholism:
  - Nutritional Effects of Alcohol
  - Complications
  - Nutritional Therapy

UNIT 5: Nutritional Care of the Terminally Ill

- The dying process
- Palliative versus curative care
- Dietary Management for Symptom Control.

Recommended Readings:

1 Mahan, L. K. and Escott Stump. S. (2008) Krause's Food & Nutrition Therapy 12th ed. Saunders-Elsevier

2 Shils, M.E.,Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.

3 Gibney MJ, Elia M, Ljungqvist&Dowsett J. (2005) Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company.

4 World Cancer Research Fund & American Institute for Cancer Research (2007) Food, Nutrition, Physical Activity and the Prevention of Cancer-

5 A Global Perspective.Washington E.D. WCRF.

6 Lee RD & Neiman DC. (2009). Nutritional Assessment.. 5th edition. Brown & Benchmark.