DETAILED SYLLABUS

WITH CO-PO MAPPING (PG)

Department of Applied Nutrition and Dietetics,

Sister Nivedita University, Kolkata.

Programme: M.Sc. in Nutrition and Dietetics

SEMESTER I

Advanced Nutritional Science

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. in Nutrition and Dietetics
Programme code: 29

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Advanced Nutritional Science	**1290020101**	**Post Graduation**	**Sem**	**4**

Semester-I

Course title: Advanced Nutritional Science

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Theory	1290020101	4	4						40
Practical	1290020202	4			4				30

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

A. THEORY

Learning objectives*: Students will be able to interpret and apply concepts of human anatomy to improve their understanding of the different physiological systems. This will give them an understanding of medical conditions such as cardiovascular disease, kidney disease, liver disease etc. and better apply the knowledge of medical nutrition therapy for the treatment of these conditions therapeutically. Also under special circumstances, how modifications in diet can help save the situation, students will gather an understanding of the same.*

Prerequisite: Basic knowledge of physiology and nutrition.

Total contact hour	Contact hour/week
40	*4*

Course content/Syllabus:

Module no.	No of lecture/Contact hour	Weightage (%)
Unit 1: Nutritional biochemistry Macro nutrients (Carbohydrates, Protein, Fat): Metabolism and regulation, Digestion, Absorption, Transport and Storage. Micro nutrients (Vitamins): Fat soluble and Water-soluble vitamins- Sources, functions, requirements, Transport, utilization and storage, metabolites, deficiencies and toxicity. Micro nutrients (Minerals: Sodium, Potassium, Magnesium, Calcium, Phosphorous, Iron, Zinc, Fluorine and Iodine)- Metabolic functions, sources, regulation (Homeostatic balance), Absorption, storage and transport, recommended dietary allowances, effect of deficiency and Toxicity due to over load. Importance of water and roughage in diet. Water & electrolytes balance. Regulation of water balance and Acid-Base Balance. Emerging Concepts in Human Nutrition, Ongoing nutrition transition and its implications. Changing trends in life style patterns in population groups and their implications.	8	20
Unit 2: Applied physiology Body Composition: Methods of estimating body composition, Measurement of muscle mass and body fat percentage, Variations in LBM and fat, Influence of nutrition and other factors on body composition. Digestive System: Mechanism of HCI secretion– physiological, nutritional and pharmacological aspects. Absorption of fat, minerals, vitamins. Bile formation and secretion; Nature of exo- and endopeptidases and their mechanism of action in protein digestion; Role of mucosal associated lymphocytes in health and disease; Neuroendocrine control of hunger and satiety. Physiology of obesity and starvation. The genomics of leptin mediated responses-obesity and its regulation Excretory System: Renal mediated maintenance of fluid osmolarity, Respiratory	8	20

and renal mechanism mediated maintenance of Acid-Base balance. Clinical imbalance of acid-base imbalance. Endocrine System and Reproductive System: Mechanism of action—Steroid and Protein hormones, Gastro-intestinal hormones: Site of origin, chemical nature and mode of action. Immune System: Cells and organs of Immune system. Innate immunity and Acquired immunity, Antigen, hapten and allergen. Immunoglobulins- different isotypes. Antigen-Antibody interactions. T cell cytotoxicity. Cell-mediated effectors function, Cytokines, Hypersensitivity reactions. Autoimmunity- autoimmune diseases, Immunodeficiency.		
Unit 3: RDA Definitions, recommended dietary Allowances-Factors affecting RDA, General principles of deriving RDA, Determination of RDA of different nutrients, Requirements and practical applications of RDA.	8	20
Unit 4: Energy Metabolism Energy Balance-Units, Direct & Indirect Calorimetry, Determination of energy value of food, Relation between oxygen required and calorimeter value. Total Energy Requirement. Basal Metabolic Rate (BMR): Measurement of Basal Metabolism-Direct, calorimetry and Indirect calorimetry, resting energy expenditure, Factors effecting Physical activity, Factors affecting Basal metabolic Rate, Thermic Effect of Food (Definition and factors affecting), Non-Exercise Activity Thermogenesis – NEAT (Definition and factors affecting)	8	20
Unit 5: Nutrition in special condition Space nutrition: Classification of space food, processing of food for space flight, planning and serving food, Weight management (Different types of diets in fashion), Nutrition in stress, Nutritional needs in extreme environmental conditions (high altitude), Disaster management (famine, drought, war).	8	20

Course learning outcome*:*

1. *The students will be able to summarise the concept of macro and micro nutrients and their different functions, also develop an understanding of the Emerging Concepts in Human Nutrition.*
2. *The students will be able to outline the concepts of major physiological systems of the human body like the digestive system, endocrine system, immune system etc.*
3. *The students will be able to understand and apply the concept of Recommended Dietary Allowance, learn about the Factors affecting RDA and the General principles of deriving RDA.*
4. *The students will be able to illustrate the concept of Total Energy Requirement and Basal Metabolic Rate (BMR).*
5. *The students will be able to learn and analyse nutrition in special conditions like nutrition in space, nutrition under stress, nutrition in high altitudes which will help them to handle special situations 'therapeutically'.*

Pedagogy for Course Delivery*: PowerPoint presentations, interactive lectures, group discussion, notes.*

List of Professional Skill Development Activities (PSDA)*: interactive seminars and field visits*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

B. <u>PRACTICAL</u> (total contact hours, hr/week), if applicable

Learning objectives*: The students will be able to interpret the knowledge of food science and nutrition in evaluating protein quality, calculate calcium and nitrogen balance. Students will be able calculate BMR and Energy Expenditure by understanding the concept of human physiology and food science.*

Total no. of practical	Total contact hour	Contact hour/week
5	*30*	*8*

List of practical:

Practical 1: Calculation of BMR and Energy Expenditure.

Practical 2: Calculation of Chemical Score and NDP Cal percentage

Practical 3: Evaluation of protein quality

Practical 4: Planning and evaluation of dishes for supplementary feeding program.

Practical 5: Calcium and Nitrogen balance study

Continuous assessment: Quiz and assessment.

Course Outcome:

ADVANCED NUTRITIONAL SCIENCE	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to summarise the concept of macro and micro nutrients and their different functions, also develop an understanding of the emerging Concepts in Human Nutrition.
CO 2	The students will be able to outline the concepts of major physiological systems of the human body like the digestive system, endocrine system, immune system etc and evaluate their impact on health.
CO 3	The students will be able to understand and apply the concept of Recommended Dietary Allowance, learn about the Factors affecting RDA and the General principles of deriving RDA.
CO 4	The students will be able to illustrate the concept of Total Energy Requirement and Basal Metabolic Rate (BMR), their significance.
CO 5	The students will be able to learn and analyse nutrition in special conditions like nutrition in space, nutrition under stress, nutrition in high altitudes which will help them to solve such situations 'therapeutically'.
CO 6	The students will be able to assess the nutritional quality of food and determine methods to improve nutritional quality.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2	2	3	-	-	1	2
CO 2	2	2	2	3	1	-	1	2
CO 3	3	2	3	3	2	1	2	3
CO 4	2	2	2	2	1	1	2	2
CO 5	3	2	3	3	3	1	2	3
CO 6	3	3	3	3	3	2	3	3
Average	2.5	2.16	2.5	2.83	1.66	0.83	1.83	1.5

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

Text & Reference books:

1. Chatterjee C.C. (1987): Human Physiology, Vol. I & II, Medical Allied Agency, Calcutta.
2. Guyton, A.G. and Hall, J.B. (1996): Text Book of Medical Physiology, (9th Edition, W.B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore
3. Shubhangini A. Joshi, (1992)' "Nutrition and Dietetics" Tata Mc Grow- Hill publishing CompanyLtd, NewDelhi.
4. Srilakshmi. B – "Nutrition Science", V Edn, New Age International (P) Ltd, Publishers, Chennai
5. Swaminathan (1995): "Food & Nutrition", The Bangalore Printing & publishing co ltd., Vol I, Second Edition, Bangalore.
6. Srilakshmi (1997): "Food Science", New Age International (P) Ltd, Publishers, Pune.
7. Principles of Biochemistry A.Lehninger.
8. Biochemistry. U Satyanarayana. Elsevier India; 5th edition

Advanced Public Health Nutrition

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. in Nutrition and Dietetics

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Advanced Public Health Nutrition	**1290020103**	**Post Graduation**	**Sem**	**4**

Programme code: 29

Semester-I

Course title: Advanced Public Health Nutrition

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Theory	1290020103	4	4						40
Practical	1290020204	4			4				24

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

A. THEORY

Learning objectives*: This course develops students' understanding of public health nutrition and the role of various organisations, health policies, interventional programmes in surveillance and maintenance of the health status of a population.*

Prerequisite: Basic knowledge of community-based nutrition.

Total contact hour	Contact hour/week
40	*4*

Course content/Syllabus:

Module no.	No of lecture/Contact hour	Weightage (%)
Unit 1: Overview of Public health: Public health set up in the country: National level and State level - Union Ministry of Health and Family Welfare, Director General of Health Services, Indian System of	8	20

Medicine, Department of Health Research, Directorate of Health, Health and Family Welfare, Directorate of Medical Education: Ministry of Women and Child Welfare. Indian Public Health System Regional level and District level – Role of Regional Director of Health, Regional Districts Hospitals, District Level Hospitals, Sub-divisional/Taluka Level, Community Health Centres Sub-taluk/Mandal Level, in Public Health, PHC Level and sub-centres.		
Unit 2: Rural and Urban Health and Nutrition Scenario: Infant and young child feeding – Importance of infant and young child feeding, Supplementary feeding, Growth monitoring and promotion, Breastfeeding promotion. Common Nutritional problems-Undernutrition/overnutrition, Malnutrition (PEM, Vit A, Fe, I), Food fortification, Prophylactic micronutrient supplementation of at-risk groups, Immunization and parasite control.	8	20
Unit 3: National Nutrition Policy and Intervention Programmes: National Plan of Action on Nutrition, POSHAN Abhiyaan, Integrated Child Development Services, Mid-day meal for school children, Iodine Deficiency Disorder Control Program, National Anaemia Control Programme; National Iron Plus Initiative, Vit A Programme.	8	20
Unit 4: Nutrition, Monitoring and Surveillance: Definition of Nutrition monitoring and surveillance, Milestones in the development of Nutrition surveillance, "AAA" approach, monthly monitoring and surveillance report, Nutrition surveillance in the context of ICDS. Nutrition in Disaster Management – Natural and manmade disasters resulting in emergency situations, Nutritional problems in disasters particularly in vulnerable groups.	8	20
Unit 5: Food security: National food security mission, Food security at the National level,	8	20

Measures to improve the household food security, National Food Security Act.		

Course learning outcome*:*

1. The students will become familiar with the concept of public health nutrition.
2. The students will get exposure to the national healthcare delivery system.
3. The students will acquire knowledge about the assessment of the nutritional status of individuals and the community.
4. The students will understand the public health aspects of malnutrition in the community.
5. The students will understand the concept of food and nutrition security

Pedagogy for Course Delivery*: PowerPoint presentations, interactive lectures, group discussion, notes.*

List of Professional Skill Development Activities (PSDA)*: interactive seminars and field visits*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

B. PRACTICAL

Learning objectives*: The students will be able to assess the nutritional and health status of individuals and gain the expertise and skill to work at community level.*

Total no. of practical	Total contact hour	Contact hour/week
4	*24*	*8*

List of practical:

Practical 1: Assessment of nutritional status of different age group (Infants, pre-school, children, adolescents, adults & elderly, Pregnant & lactating females)

a. Learning anthropometric techniques – Recording & interpretation of height, weight, BMI, Fat percentage, waist hip ration, bone mineral density, skin fold thickness, chest, head & mid upper arm circumference, infant weight & length
b. Measurement of blood pressure, temperature, blood glucose, biochemical assessment to identify deficiency diseases namely PEM, anaemia etc.
c. Clinical assessment – Identifying clinical manifestations (signs & symptoms) of various nutrition related problems
d. Dietary survey – Use of different techniques to assess dietary intake of a given population

Continuous assessment: Quiz and assessment.

Course Outcome:

ADVANCED PUBLIC HEALTH NUTRITION	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to develop comprehensive understanding regarding the concept and scope of public health nutrition.
CO 2	The students will be able to identify and assess the various nutritional problems prevailing in a community and employ methods for rectification.
CO 3	The students will be able to understand various protocols for facility and community-based management of severe nutritional disorders.
CO 4	The students will formulate plan to promote good health by applying evidence-based actions to solve nutrition and health problems.
CO 5	The students will learn the importance and role of several national/international agencies in combating malnutrition.
CO 6	The students will learn about the various methods and techniques for assessing nutritional status and identify at-risk individuals.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2	2	1	-	3	3	3
CO 2	3	2	2	2	1	3	3	3
CO 3	3	1	1	1	1	3	3	3
CO 4	3	2	2	1	3	3	3	3
CO 5	1	1	-	1	1	1	1	2
CO 6	2	2	2	3	2	2	3	3
Average	2.33	1.66	1.5	1.5	1.33	2.5	2.66	2.83

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

Text & Reference books:

1. Agarval, A.N.1981: Indian Economy problems of development and planning
2. Shukla, P.K.(1982): Nutritional Problems in India
3. Jelliffle, D.B(1968): Child Health in the tropics.
4. Ghosh, S(1989): You and your child.
5. Misra, S.K. and puri, V.K(1992): Indian Economy
6. Thankamma Jacob (1976): Food Adulteration.
7. Park, J.E. and Park, K(1994): Text book of Preventive and Social Medicine.

8. Prevention of Food Adulteration Act (1994): Govt of India.

SEMESTER II

Research Methodology and Biostatistics

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. in Nutrition and Dietetics **Programme code : 29**

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Research Methodology and Biostatistics	**1290021103**	**Post-Graduation**	**SEM**	**4**

Semester-I

Course title: Research Methodology and Biostatistics

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Theory	1290021103	4		4					40

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

A. THEORY

Learning objectives: Students will have a clear knowledge about the introduction to probability and sampling distributions; An overview of confidence intervals, hypothesis testing, correlation and regression analysis etc; Skills for the application of biostatistics in the practice and study of public health.
Prerequisite: Basic knowledge of mathematics.

Total contact hour	Contact hour/week
40	*4*

Course content/Syllabus:

Module no.	No of lecture/Contact hour	Weightage (%)
Unit I: Introduction to statistics and data representation Meaning & scope of statistics; Presentation of data - tabulation, graphic & diagrammatic presentation by graphs, bars, chart, etc.	2	5
Unit II: Measure of central tendency and dispersion Measures of' central tendency – mean, median, mode; Measures of dispersion - mean	4	10

deviation, standard deviation, variance, range, skewness, kurtosis.		
Unit III: Correlation and regression Correlation & regression interpretation.	8	20
Unit IV: Sampling and probability Sampling techniques; Data gathering instruments - questionnaires, interviews, measurements & scales, reliability & validity of measuring instruments; Methods of collecting information - census & sampling, various sampling schemes; Ideas of probability.	8	20
Unit V: Analysis of mean and variance Methods of estimating population means, & its standard error in simple random sampling & stratified random sampling; Student's t test - its application, significance, confidence interval in normal population for mean, when variance is known & unknown; Non parametric inference: sign, median, run test & X test, (as goodness of fit & independence of attributes in 2x2 & r x c contingency tables); Design of experiments - analysis of variance, completely randomized & random block designs.	8	20
Unit VI: Hypothesis and research methodologies Hypothesis - null hypothesis - level of significance: Types of research: descriptive/historical, experimental, survey, case study, definition & identification of research problem, selection of problem, basic assumption & limitation of problem; Planning, executing & analysis of large-scale surveys with special emphasis on surveys in Nutrition; Presentation & preparation of report for publication.	8	20
Unit VII: Research ethics-Research ethics.	2	5

Course learning outcome*:*

1. The students will be able to demonstrate the basic concepts of Statistics and its data representations

2. The students will be able to Make use of the knowledge about the different measures of Central Tendency and Dispersion

3. The students will be able to Interpret the different aspects of Bivariate data analysis

4. The students will be able to apply the knowledge of the various Sampling schemes and basic ideas of Probability

5. The students will be able to develop in depth knowledge about the different ways of analysis of mean and variance through testing of hypothesis

6. The students will be able to explain the basic ideas of different research methodologies and research ethics to be used in the field of Nutrition.

7. The students will be able to learn about ethical perspectives of research.

***Pedagogy for Course Delivery**: PowerPoint presentations, interactive lectures, group discussion, notes.*

***List of Professional Skill Development Activities (PSDA)**: interactive seminars*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

Course Outcome:

RESEARCH METHODOLOGY AND BIOSTATISTICS	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to demonstrate the basic concepts of Statistics and its data representations
CO 2	The students will be able to make use of the knowledge about the different measures of Central Tendency and Dispersion.
CO 3	The students will be able to interpret the different aspects of Bivariate data analysis.
CO 4	The students will be able to apply the knowledge of the various Sampling schemes and basic ideas of Probability.
CO 5	The students will be able to develop in depth knowledge about the different ways of analysis of mean and variance through testing of hypothesis.
CO 6	The students will be able to explain the basic ideas of different research methodologies and research ethics to be used in the field of Nutrition.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4
CO 1	2	3	-	1
CO 2	3	3	-	1
CO 3	3	3	-	1
CO 4	3	3	-	1
CO 5	3	3	-	1
CO 6	3	3	1	1
Average	3	3	0.16	1

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

Text & Reference books:

1. 1. Kothari, C. R. (2004). Research Methodology: Methods and Techniques. India: New Age Inter-national (P) Limited.
2. 2. Kafka, F., Simpson, G. (1960). Basic Statistics: A Textbook for the First Course. India: Oxford & IBH Publishing Co.

Additional reading:

1. Rohlf, F. J., Sokal, U. R. R. (1995). Biometry. United Kingdom: W. H. Freeman.

Advanced Medical Nutrition Therapy

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. Nutrition and Dietetics **Programme code:**

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Advanced Medical Nutrition Therapy	1290021105	**Post Graduation**	**Sem**	**4**

Semester-I

Course title: Advanced Medical Nutrition Therapy

Type	**Code**	**Credit**	**Credit division**						**Total no of lecture**
			L	T	P	SW	FW	No. of PSDA	
Theory	1290021105	4		4					50
Practical	1290021204	4			4				32

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

A. THEORY

Learning objectives: Students will be able to interpret and apply nutrition concepts to evaluate and improve the nutritional health of individuals with medical conditions such as gastrointestinal tract disorders, cardiovascular disease, kidney disease, etc.

Prerequisite: knowledge on ICMR recommended RDA and Food composition table.

Total contact hour	**Contact hour/week**
50	*4*

Course content/Syllabus:

Module no.	No of lecture/Contact hour	Weightage (%)
Module-I: Factors in patient care, counselling and co-ordinated nutritional services for the patient, feeding the patient, psychological aspects & assessment of patient's needs – Different nutritional assessment tools for patients (MUST, SGA, MNA etc)	4	5
Module-II: Metabolic syndrome- Definition, assessment, significance	4	10

Module-III: Physiological changes & diet for different types of infections (Fevers)	4	5
Module IV: Physiological changes & diet for GI disorders	6	10
Module V: Physiological changes & diet for Cardiac disorders	4	5
Module VI: Physiological changes & diet for pulmonary disorders	4	5
Module VII: Physiological changes & diet for kidney disorders	4	10
Module VIII: Physiological changes & diet for liver disorders.	4	10
Module IX: Physiological changes, specialised feeding techniques, and diet for neurological disorders- (Alzheimer's, Parkinson's, neurological stroke).	2	5
Module X: Physiological changes & diet for different types of cancers: Nutritional impact of cancer treatments.	2	5
Module XI: Special feeding methods - Enteral & parenteral feeding	4	10
Module XII: Physiological changes & diet for endocrinal disorders (Diabetes, and Thyroid Disorders).	2	5
Module XIII: Physiological changes & diet in burn	2	5
Module XIV: Drug nutrient interaction: effect of nutrient on drugs and effects of drugs on nutrient.	2	5
Module XV: Standard guidelines for clinical nutrition (ASPEN/ ESPEN/ KDQOI/WHO/ADA/IDA-2020 etc.)	2	5

Course learning outcome*:*

1. *The students will be able to learn and understand the factors in patient care, counselling and co-ordinated nutritional services for the patient and study the different nutritional assessment tools for patients (MUST, SGA, MNA etc).*
2. *The students will be able to understand the concept of Metabolic syndrome.*
3. *The students will be able to understand the nutritional needs of individuals suffering from different types of infections (Fevers).*
4. *The students will be able to understand the nutritional needs of individuals suffering with diseases of the gastro intestinal tract and formulate dietary plan.*
5. *The students will be able to understand the nutritional needs and formulate diet plan for individuals suffering from cardiovascular diseases.*
6. *The students will be able to understand the nutritional needs and formulate diet plan for individuals suffering from pulmonary disorders.*

7. *The students will be able to understand the nutritional needs and formulate diet plan for patients suffering with kidney diseases.*
8. *The students will be able to understand the nutritional needs and formulate diet plan for individuals suffering with liver diseases.*
9. *The students will be able to understand the nutritional needs and formulate diet plan for neurological disorders- (Alzheimer's, Parkinson's, neurological stroke)*
10. *The students will be able to understand the nutritional needs and formulate diet for different types of cancers.*
11. *The students will be able to understand the concept of Special feeding methods - Enteral & parenteral feeding.*
12. *The students will be able to understand the nutritional needs and formulate diet plan for individuals suffering from diabetes and thyroid disorders.*
13. *The students will be able to understand the nutritional needs and formulate diet plan in burn.*
14. *The students will be able to understand the concept of Drug nutrient interaction.*
15. *The students will be able to learn Standard guidelines for clinical nutrition (ASPEN/ ESPEN/ KDQOI/WHO/ADA/IDA-2020 etc.)*

Pedagogy for Course Delivery*: PowerPoint presentations, interactive lectures, group discussion, notes.*

List of Professional Skill Development Activities (PSDA)*: interactive seminars*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

B. <u>PRACTICAL</u> (total contact hours, hr/week), if applicable

Learning objectives: the students will be able to apply the principles of nutrition and dietetics in formulating diet according to the nutritional demands of individuals suffering from medical condition.

Total no. of practical	Total contact hour	Contact hour/week
8	*32*	*8*

List of practical

Planning and preparation of

1: Diet in Diabetes
2: Diet in Hypertension.
3: Diet in Obesity
4: Diet in Dyslipidaemia
5: Diet in hypertension
6: Diet in NAFLD
7: Diet in Renal Disease (CKD and AKI)
8: Diet in GI Disorders.
Continuous assessment: Quiz and assessment.

Course Outcome:

ADVANCED MEDICAL NUTRITION THERAPY	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will develop an ability to apply principles of nutrition in the treatment of special disease conditions.
CO 2	The students will develop understanding about the underlying metabolic and physiological alterations that are responsible for the prognosis of diseases.
CO 3	The students will develop the ability to formulate diet plans by incorporating nutritional modifications with respect to specific health conditions.
CO 4	The students will be able to assess the nutritional status of a patient by co-relating to their medical history, biochemical and clinical profile.
CO 5	The students will develop the skills to counsel and motivate the patients to follow the dietary guidelines formulated by them.
CO 6	The students will learn to prepare and plan modified meals for individuals with a specific health condition.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	1	1	3	3	2	2	3
CO 2	3	2	2	3	2	2	3	3
CO 3	3	2	2	3	3	2	3	3
CO 4	2	2	2	3	3	2	2	3
CO 5	3	1	1	3	3	3	3	3
CO 6	3	-	2	3	3	2	2	3
Average	2.66	1.33	1.66	3	2.83	2.16	2.5	3

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

Text & Reference books:

1. Advanced text book on Food & Nutrition, Volume 2, Dr. M. Swaminathan

2. Mahan, L.K. and Escott-Stump, S. Krause's Food, Nutrition and Diet Therapy, 10th Ed. W.B. Saunders Company, London.

3. Srilakshmi. B, (2005): Dietetics, V Edition, New Age International (P) Ltd, Publishers, Chennai

Additional reading:

1. Williams S.R. (1993): Nutrition and Diet Therapy, 7th Ed. Times Mirror / Mosby College Publishing, St. Louis.
2. Antia F.P, Clinical Dietetics and Nutrition, Oxford UniversityPress.

Sports Nutrition and Weight Management

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: B.Sc. (Hons) in Applied Nutrition and Dietetics **Programme code: 29**

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Sports Nutrition and Weight Management	1290021104	**Graduation**	**Sem**	**4**

Semester-VI

Course title: Sports Nutrition and Weight Management

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Theory	1290021104	4		4					44
Practical	2290021202	4			4				28

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

A. THEORY

Learning objectives: the students will gain understanding and knowledge about the physiological adaptations in an athlete and techniques to improve their performance. They will also understand the application of the various principles of nutrition in formulating the diet for athletes of different sporting activities.

Prerequisite: Basic knowledge of physiology and nutrition

Total contact hour	Contact hour/week
44	*4*

Course content/Syllabus:

Module no.	No of lecture/Contact hour	Weightage (%)
Module-I: Introduction to work physiology: Definitions in work and exercise Physiology, Fundamental concepts of work; work characteristics, work cycle and work pauses (Work-rest cycle).	4	5
Module-II: Physiological basis of work: Physical work load; Static and dynamic work. Physiological responses to static and dynamic work. Relationship between oxygen consumption and heart rate. Physiological	4	5

assessment of work load, cardiovascular and respiratory indices for evaluating work load.		
Module-III: Exercise and Physical fitness Basic concept of Exercise, physical activity and physical fitness. Physical Working Capacity, concept of maximal physical working capacity VO_2 max, and its estimation by different methods. Factors affecting VO_2 max. Effect of exercise and training on cardiovascular system. Effect of exercise and training on respiratory system. Effect of exercise and training on muscular system. Physiological concept of physical fitness, warming up, conditioning and fatigue. Types of assessment of health and fitness of athletes.	8	20
Module IV: Bioenergetics: Work power and energy, sources of energy. Aerobic and anaerobic capacity, EPOC, lactate threshold and lactate tolerance and their limitations. Determination of energy cost by direct and indirect methods. Athletic performance based on aerobic capacity and O_2 debt. Energy sources during exercise (Phosphagen, Anaerobic system and aerobic system)	8	20
Module V: Training Principles: Training principles, different training methods. Training principles for different sporting activities. Over-training and de-training and their physiological effects.	4	10
Module VI: Nutrition and Optimal Performance: Dietary and nutritional recommendations for sports (Energy nutrients, Vitamins, minerals, fluid and electrolytes). Micro and macronutrient nutrient supplements, small introduction on ergogenic aids Nutritional allowances as given by NIN to different groups of players.	8	20
Module VII: Pre-competition, during competition and post- competition meal.	2	5
Module VIII: Body composition; Nutrient requirements and Dietary periodisation; Distribution of macronutrients in the diet; Guidelines for fuel during different phases of training and competition; Nutrient timing; Travel nutrition.	4	10
Module IX: Supplement or other ergogenic aids commonly used: Benefits and associated risk factors.	2	5

Course learning outcome*:*

1. *The students will be able to learn about the physiology of work and exercise.*
2. *The students will be able to understand the physiological basis of work.*
3. *The students will be able to learn about the concept of exercise, physical activity and physical fitness.*
4. *The students will be able to learn about the bioenergetics of sports: work power, energy, and sources of energy.*
5. *The students will be able to learn about the training principles, different training methods and application of the principles.*
6. *The students will be able to interpret the principles of dietetics in formulating diets for athletes.*
7. *The students will be able to learn and plan Pre-competition, during competition and post- competition meal for different sports category.*
8. *The students will be able to assess the body composition of athletes.*
9. *The students will be able to learn about the different ergogenic aids and suggest their application accordingly to improve performance in sports.*

Pedagogy for Course Delivery*: PowerPoint presentations, interactive lectures, group discussion, notes.*

List of Professional Skill Development Activities (PSDA)*: interactive seminars*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

B. <u>PRACTICAL</u> (total contact hours, hr/week), if applicable

Learning objectives: The students will learn to utilise the principles of nutrition and dietetics in improving the health, nutritional status, and performance of athletes.

Total no. of practical	Total contact hour	Contact hour/week
4	*28*	*8*

List of practical:

Practical-1: Measurement of resting and working heart rate using thirty beats and ten beats methods respectively. Measurement of blood pressure before and after exercise.
Practical-2: Determination of BMI, BSA, PI, waist hip ratio, body fat percentage and body type.
Practical-3: Recording of heart rate and blood pressure during static and dynamic work, determination of workload from heart rate and cardiac indices and classification of work load.
Practical-4: Preparation of meal for different sports category.

Continuous assessment: Quiz and assessment.

Course Outcome:

SPORTS NUTRITION AND WEIGHT MANAGEMENT	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to learn about the physiology of work and exercise.
CO 2	The students will be developing understanding about the physiological basis of work.
CO 3	The students will be able to learn about the concept of exercise, physical activity and physical fitness.
CO 4	The students will develop deep understanding about the bioenergetics of sports: work power, energy, and sources of energy and be able to compare the different energy systems.
CO 5	The students will be able to learn about the training principles, different training methods, their application, use of ergogenic aids, that would help to boost performance of an athlete.
CO 6	The students will be able to interpret the principles of dietetics in formulating diets for athletes.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2	2	2	-	-	1	2
CO 2	2	2	2	2	-	-	-	2
CO 3	2	2	2	3	-	1	1	2
CO 4	2	2	2	2	-	-	2	3
CO 5	3	2	2	2	3	2	2	3
CO 6	3	2	2	3	3	1	3	3
Average	2.33	2	2	2.33	1	0.66	1.5	2.5

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

Text & Reference books:

1. Essentials of exercise physiology. McArdle, W. D., Katch, F. I., & Katch, V. L. (2006). Lippincott Williams & Wilkins.
2. Nancy Clark's sports nutrition guidebook. Clark, N. (2019). Human Kinetics.

Additional reading:

1. Exercise Physiology Fitness and Sports Nutrition Srilakshmi, B., Suganthi, V., & Ashok, C. K. (2017). New Age International (P) Limited.
2. The complete guide to sports nutrition. Bean, A. (2022). Bloomsbury Publishing.

SEMESTER III

Molecular Nutrition

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. in Nutrition and Dietetics
Programme code: 29

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Molecular Nutrition	**1290022110**	**Post Graduation**	**Sem**	**4**

Semester-III

Course title: Molecular Nutrition

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Theory	1290022110	4	4						32

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

A. THEORY

Learning objectives*: Students taking this course are expected to learn about etiology, pathophysiology, and treatment of micronutrient related human genetic disorders, interactions of micronutrients with human disease states, influence of genetic variation on nutritional requirement, role of genetics in human nutrient metabolism, regulation of genetics on cellular and molecular metabolism.*
Prerequisite: *Basic knowledge of college-level introductory biology, physiology, or equivalent coursework.*

Total contact hour	Contact hour/week
32	*4*

Course content/Syllabus:

Module no.	No of lecture/Contact hour	Weightage (%)
Unit 1: Introduction to nutraceuticals and functional food: Nutraceuticals: Historical perspective,	8	25

classification, scope & future prospects. Applied aspects of the Nutraceutical Science. Sources of Nutraceuticals. Functional food: Overview; definition, classification; functional food, functional food science, food technology and its impact on functional food development; markers for development of functional foods; key issues in Indian functional food industry and nutraceutical. Relation of functional foods and nutraceutical (FFN) to foods and drugs.		
Unit 2: Nutraceuticals against different diseases Concept of free radicals and antioxidants; antioxidants role as nutraceuticals and functional foods. Nutraceuticals in treatment for cognitive decline, Nutraceutical remedies for common disorders like Arthritis, Bronchitis, circulatory problems, hypoglycemia, Nephrological disorders, Liver disorders, Osteoporosis, Psoriasis and Ulcers. Brief idea about some Nutraceutical rich supplements e.g. Bee pollen, Caffeine, Green tea, Lecithin, Mushroom extract, Chlorophyll, Kelp and Spirulina.	8	25
Unit 3: Nutraceuticals and the Future of Medical Science: Increasing role of Nutraceuticals in management of health and diseases, development of designer foods for specific chronic diseases like diabetes, cardiovascular diseases, AIDS and degenerative diseases like Parkinson, functional foods for specific sports, oligosaccharides, dietary fibers of microbial and plant origin as Nutraceuticals of future, Role of changing food preferences and globalization on selection of Nutraceutical products.	8	25
Unit 4: Nutrigenomics and gene-diet interaction: Basic Knowledge about Genetic Engineering. Nutrigenomics: Scope and Importance to Human Health and Industry. Transporter gene polymorphisms -interaction with effects of micronutrients in humans. Nutrigenomics approaches to unravelling physiological effects of complex foods. The intestinal microbiota - role in nutrigenomics Modulating the risk of cardiovascular disease, diabetes obesity	8	25

***Course learning outcome**:*

1. The students will be able to define and develop the concept of functional foods and nutraceuticals, understand their historical perspective.

2. The students will be able to understand the chemistry and patho-physiological effects of functional foods and nutraceuticals in the prevention of diseases and treatment.

3. The students will be able to define the increasing role of nutraceuticals and functional foods in future in the management of diseases.

4. The students will be able to interpret the gene-diet interaction, basic knowledge about nutrigenomics, and its impact on health outcome.

***Pedagogy for Course Delivery**: PowerPoint presentations, interactive lectures, group discussion, notes.*

***List of Professional Skill Development Activities (PSDA)**: interactive seminars and field visits*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

Course Outcome:

MOLECULAR NUTRITION	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to define, classify, and develop the concept of functional foods and nutraceuticals, understand their historical perspective.
CO 2	The students will be able to understand the chemistry and patho-physiological effects of functional foods and nutraceuticals in the prevention of diseases and treatment.
CO 3	The students will gain knowledge about the various techniques for the development of nutraceuticals.
CO 4	The students will be able to illustrate the impact of functional foods and nutraceuticals in the global and Indian market, their application, popularity and health implications.
CO 5	The students will be able to define the increasing role of nutraceuticals and functional foods in future in the management of diseases.
CO 6	The students will be able to interpret the gene-diet interaction, basic knowledge about nutrigenomics, and its impact on health outcome.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2	2	2	-	2	2	3
CO 2	3	2	2	3	1	-	1	2
CO 3	3	2	3	2	2	2	3	2
CO 4	3	2	2	3	1	2	2	2
CO 5	2	2	2	2	2	1	1	2
CO 6	3	3	3	3	2	1	2	3
Average	2.66	2.16	2.33	2.5	1.33	1.33	1.83	2.33

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

Text & Reference books:

1. Krause's Food & the Nutrition Care Process, 13th Edition, Elsevier.

2. Handbook of Nutraceuticals and Functional Foods Edited by Robert E.C. Wildman, Routledge Publishers.

Additional reading:

1. Journal Nutrients 2013, 5, 32-57; Nutrigenetics and Metabolic Disease: Current Status and Implications for Personalized Nutrition

Nutrition Communication and Health Promotion

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. in Nutrition and Dietetics
Programme code: 29

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Nutrition Communication and Health Promotion	**1290022111**	**Post Graduation**	**Sem**	**4**

Semester-III

Course title: Nutrition Communication and Health Promotion

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Theory	1290022111	4	4						40
Practical	1290022212	4			4				30

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

A. THEORY

Learning objectives: *The students will learn the various mode of communication, its importance, and application in promoting nutrition education.*

Prerequisite: *Basic knowledge of community nutrition.*

Total contact hour	Contact hour/week
40	*4*

Course content/Syllabus:

Module no.	No of lecture/Contact hour	Weightage (%)
Unit 1: Introduction to Communication: 1.1 Basics of Communication: Definition, Need for Communication; Process of Communication; Communication; Public Communication; Mass Communication. 1.2 Basic Models and Barriers to Communication: Models of	10	25

Communication (Transmission, Interaction, and Transaction Models); Barriers to Effective Communication (Written and Oral); Barriers Caused by Varying Perceptions of Reality; Psychological/Attitudinal Barriers; Cultural Barriers; Semantic Barriers; Wrong Choice of the Medium of Communication. 1.3 Health and Nutrition Communication: Basics of health and public health, Understanding health in cultural context, Evolution of Health and Nutrition Communication, Health communication administration, Media and Health Communication, Elements of action plan, Stakeholders of health communication; Evolution of Media and Nutrition Communication, Health and Nutrition Communication in Policy, Five- year Plans, Tamil Nadu Integrated Nutrition Programme (TINP), Niti Aayog. Public Health issues, Burden of Diseases, Health Literacy.		
Unit 2: Methods and Tools for Health and Nutrition Communication: 2.1 Methods in Health and Nutrition Communication: Interpersonal Communication for Nutrition Education and Counselling: Dyadic Communication; Group Communication, Public Communication; Organizational Communication, Family Communication; Advantages and Disadvantages of Different Methods. 2.2 Tools Used in Health and Nutrition Communication: Nutrition Communication using Diverse Media Platforms: TV, Radio, Print Media, Folk Media, New Media and ICT's; Advantages and Disadvantages. 2.3 Use of Social-Media in Health and Nutrition Communication: Social Media Engagement and its Uses in Health and Nutrition Communication; Social Media Platforms (Facebook, Twitter, Instagram, Video Clips, Blogs, YouTube, Wikis, LinkedIn) Advantages and Disadvantages of Social-Media; Formulation and Implementation of Social Media Campaign; Viral Approaches.	10	25
Unit 3: Concepts and theories of Health Behaviour Change: 3.1 Behaviour Change	10	25

Communication: Information Education Communication; Behaviour, Change Communication; Social and Behavioural Change Communication; Stages of Behaviour Change; Social Marketing 3.2 Theories of Behaviour Change-Part- A: Usefulness of theories in behaviour change; Health Belief Model; Theory of Reasoned Action/Theory of Planned Behaviour Self-Efficacy: The Trans theoretical Model		
Unit 4: Translation of Health and Nutrition Communication Research into Practice and Communication for Policy and Advocacy: 4.1 Strategic Health and Nutrition Communication: Communication Campaign Development and Evaluation: Designing Health Communication, Goal setting. Identification of target group(s), Audience Segmentation, Targeting Messages, Pretesting, Implementing a Program and Evaluation Health Communication calendar. Preparing report and presentation of report and strategy. 4.2 Delivering Health and Nutrition Communication: Basic Principles, Creation of Environment for Nutrition Education and Leaming: Communicating Scientific Information to Lay Audiences; Communication to Diverse Age, Cultural and Literacy Population Groups. 4.3 Strategic Health and Nutrition Policy Communication and Advocacy: Preparing and Implementing a Policy Presentation; Barriers and Challenges in Communicating with Policymakers; Advocacy: Use of Media in Advocacy (New & Traditional); Ethics in Nutrition and Health Communication.	10	25

Course learning outcome*:*

1. *The students will be able to develop comprehensive understanding regarding the need, basis, various modes of communication that must be followed for propagating information pertaining to nutrition and health.*
2. *The students will be able to distinguish the applicability of different tools in nutrition education as well as communication*
3. *The students will be able to learn about the various concepts and theories of changes in behaviour.*

4. *The students will be able to translate the principles of Health and Nutrition Communication and incorporate them into research and practice.*

***Pedagogy for Course Delivery**: PowerPoint presentations, interactive lectures, group discussion, notes.*

***List of Professional Skill Development Activities (PSDA)**: interactive seminars and field visits*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

B. PRACTICAL (total contact hours, hr/week), if applicable

***Learning objectives**: The students will learn to select and apply the appropriate mode of communication in promoting nutrition education.*

Total no. of practical	Total contact hour	Contact hour/week
7	*30*	*8*

List of practical:

Practical 1: Conducting an interview with an adolescent girl to address anaemia.
Practical 2: Conducting a one-on-one nutrition counselling - Role play.
Practical 3: Conducting a telephonic nutrition counselling - Role play.
Practical 4: Conducting group discussions for communicating needs assessment.
Practical 5: Designing a campaign to address a nutritional problem-Group activity.
Practical 6: Converting scientific information into a simpler format for a target audience - print media.
Practical 7: Converting scientific information into a simpler format for a target audience - key messages for social media.
Continuous assessment: Quiz and assessment.

Course Outcome:

NUTRITION COMMUNICATION AND HEALTH PROMOTION	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to develop comprehensive understanding regarding the need, basis, various modes of communication that must be followed for propagating information pertaining to nutrition and health.
CO 2	The students will be able to distinguish the applicability of different tools in nutrition education as well as communication.
CO 3	The students will be able to learn about the various concepts and theories of changes in behaviour.
CO 4	The students will be able to translate the principles of Health and Nutrition Communication and incorporate them into research and practice.
CO 5	The students will be able to practice different modes of communication in communicating nutritional information to different category of individuals.
CO 6	The students will adapt the skills to interpret complex scientific information into comprehensible form.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2	2	1	3	3	2	2
CO 2	2	2	2	2	2	3	2	2
CO 3	2	2	1	3	2	3	2	2
CO 4	2	2	2	2	3	3	3	2
CO 5	2	1	1	2	3	3	1	2
CO 6	3	2	1	3	3	3	2	3
Average	2.16	1.83	1.5	2.16	2.66	3	2	2.16

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

Text & Reference books:

1. Pedersen, P. M., Laucella, P., Kian, E., & Geurin, A. (2016) Strategic Sport Communication, 2E. Human Kinetics.
2. Littlejohn, S. W., & Foss, K. A. (2010) Theories of human communication. Waveland press.
3. Abraham, C., & Kools, M. (2011) Writing health communication: An evidence-based guide. Sage.

Additional Reading:

1. Contento, I.R. (2016). Nutrition Education Linking Research, Theory and Practice. Jones & Bartlett Learning, USA
2. Parvanta, C.F. & Bass, S.B. (2020) Health Communication Strategies and Skills for a New Era Jones & Bartlett Learning, USA 6. Parvanta, C.F., Nelsen, D.E., Parvanta, S.A., Harner, R.N. (2011) Essentials of Public Health Communication. Jones & Bartlett Learning, USA

Food Microbiology and Food Safety

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. in Nutrition and Dietetics
Programme code: 29

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Food Microbiology and Food Safety	**1290022113**	**Post Graduation**	**Sem**	**4**

Semester-III

Course title: Food Microbiology and Food Safety

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Theory	1290022113	4	4						40
Practical	1290022214	4			4				30

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

A. THEORY

Learning objectives: *the students will be gain access to the world of microbes, their growth pattern, classification, use and adverse effects on human health and the food industry.*

Prerequisite: *Basic knowledge of Biology*

Total contact hour	Contact hour/week
40	*4*

Course content/Syllabus:

Module no.	No of lecture/Contact hour	Weightage (%)
Unit 1: Introduction to Toxicology: History, perspective and scope of toxicology, Toxicity testing and risk assessment, Dose response relationship and toxicity assessment parameters, Principles of biochemical toxicology, Absorption, distribution,	8	20

metabolism and excretion, Toxicological Pathology, Direct toxic action, pharmacological, physiological and biochemical effects, teratogenesis, immunotoxicity, mutagenesis and carcinogenesis Food Toxins, Plant and sea toxins, food residues, food additives, vitamins, dioxins, heavy metals, process induced toxins (including food irradiation) and bacterial toxins. Analysis of toxicants in Food Products, Methods for analysis of toxicants including ELISA and Ames test. Legislation/ethical investigation, Legislation for the protection of animals used for scientific purposes. Ethical standards, professional codes of investigation.		
Unit 2: Microbial Growth Characteristics: Reproduction and growth (fission, generation time, optimum growth, growth curve). Microbial growth in foods: Intrinsic (pH, Moisture Content, Oxidation–Reduction Potential, Nutrient Content, Antimicrobial Constituents) and Extrinsic Parameters (Temperature of Storage, Relative Humidity of Environment, Presence and Concentration of Gases in the Environment). Thermal Destruction of Microorganisms, Thermal Death Time, D Value, Z Value, F Value, Thermal Death Time Curve, 12 D Concept. Microbiology of atmosphere, water, influence of water activity, milk and milk products, cereals and cereal products; meat and meat products, fish or fish products: poultry and eggs; sugars; spices and salt, canned foods.	8	20
Unit 3: Food Borne Diseases: Food borne diseases: food pathogens (*Aeromonashydrophila*, *Bacillus cereus* and other Bacillus Species, Brucella, Campylobacter, *Clostridium botulinum*, *Clostridium perfringens*, *Escherichia coli*, *Listeria monocytogenes*, Salmonella, Shigella, *Staphylococcus aureus*, Vibrio, *Yersinia enterocolitica*, Fungi, virus and rotavirus.	8	20
Unit 4: Food contaminants Food contaminants: Their occurrence, composition, physiological, significance in foods, Metals and toxic Metals e.g., Cd, Hg etc. Pesticide residues e.g. Dioxin, Aldrin, Malathion etc., Mycotoxins, Argemone, Khesari dal, Ergot, Karnal bunt, Dhatura, etc. Allergens,	8	20

Antibiotic & hormone residues, Veterinary drug residue, other new contaminants and toxins, Naturally Occurring Toxic Substances (NOTS) and Deoxynivalenol (DON).		
Unit 5: Food Labelling: Food labelling – regulating agency, nutritional facts, Identify food colours, preservatives, Study of permitted range of various compounds – emulsifiers, acidity regulators, stabilizers.	8	20

Course learning outcome*:*

1. *The students will be able to develop comprehensive understanding regarding the different types of toxins, their associated hazards, dose response, and risk assessment.*
2. *The students will be able to develop knowledge and understanding about the types, growth characteristics, structural characteristics of microbes, their growth requirement and describe sources of microorganisms in foods.*
3. *The students will be able to classify and describe food borne diseases and use this information while reporting and investigating an outbreak in the region.*
4. *The students will be able to illustrate the basic principles of sanitation and importance of good personal hygiene and ensuring food safety.*
5. *The students will be able to learn the importance of various food labels in determining shelf-life, nutritional components and analyse their utility and applicability.*

Pedagogy for Course Delivery*: PowerPoint presentations, interactive lectures, group discussion, notes.*

List of Professional Skill Development Activities (PSDA)*: interactive seminars and field visits*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

B. <u>PRACTICAL</u> (total contact hours, hr/week), if applicable

Learning objectives*: the students will be able to learn and demonstrate the techniques of microbiological analysis, and safety measures.*

Total no. of practical	Total contact hour	Contact hour/week
3	*30*	*8*

List of practical:

Practical 1: **Isolation of microbes:** 1. Detection of microbes from spoiled meat, egg and fish 2. Isolation and identification of *Salmonella, E. coli, Listeria, Proteus, Shigella and Vibrio* 3. To determine the LD50 value of common microbial toxin i.e. aflatoxin, enterotoxin 4. To study the antibiotic sensitivity pattern and MIC for different food

pathogen 5. Microbial analysis from the chemically preserve food material 6. Detection of microbial toxin from infected food/spoiled food.

Practical 2: Identify food colours, preservatives, Study of permitted range of various compounds – emulsifiers, acidity regulators, stabilizers.

Practical 3: Product development: Experimental preparation of foods, recipe formulation, product development & evaluation, Practical learning of sensory evaluation of foods using different methods.

Continuous assessment: Quiz and assessment.

Course Outcome:

FOOD MICROBIOLOGY AND FOOD SAFETY	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to develop comprehensive understanding regarding the different types of toxins, their associated hazards, dose response, and risk assessment.
CO 2	The students will be able to develop knowledge and understanding about the types, growth characteristics, structural characteristics of microbes, their growth requirement and describe sources of microorganisms in foods.
CO 3	The students will be able to classify and describe food borne diseases and use this information while reporting and investigating an outbreak in the region.
CO 4	The students will be able to illustrate the basic principles of sanitation and importance of good personal hygiene and ensuring food safety.
CO 5	The students will be able to learn the importance of various food labels in determining shelf-life, nutritional components and analyse their utility and applicability.
CO 6	The students will gain practical knowledge on the basic principles and techniques of microbiological analysis

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	2	2	3	-	-	2	2
CO 2	3	2	2	2	-	-	1	2
CO 3	3	2	2	3	-	2	2	3
CO 4	3	2	2	2	2	3	3	3
CO 5	2	1	2	2	1	3	3	2
CO 6	3	3	3	3	3	1	2	3
Average	2.83	2	2.16	2.5	1	1.5	1.83	2.5

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

Field Program

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. in Nutrition and Dietetics
Programme code: 29

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Field Program	**1290022515**	**Post Graduation**	**Sem**	**4**

Semester-III

Course title: Field Program

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Practical	1290022515	4			4				30

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

PRACTICAL (total contact hours, hr/week), if applicable

Learning objectives*: The students will be able to gain first-hand experience on the role of nutritionists in different professional fields.*

Total no. of practical	Total contact hour	Contact hour/week
1	*30*	*8*

List of practical:

Practical 1:

1. Field visits to hospital/ food industries/ health care centres.
2. Monitoring the system.
3. Nutritional assessment of the subjects.
4. Evaluation and reporting
5. Presentation and feedback

Course learning outcome*:*

1. *The students will be able to learn the role of a nutritionist in the practical field, real-time setup.*
2. *The students will develop comprehensive understanding regarding the different job responsibilities of a nutritionist/dietitian.*

3. *The students will get a first-hand experience and can enhance their skills in problem solving.*
4. *The students will be able to build a written, well -documented report based on their experience and activities.*

Pedagogy for Course Delivery*: PowerPoint presentations, interactive lectures, group discussion.*

List of Professional Skill Development Activities (PSDA)*: interactive seminars*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

Course Outcome:

FIELD VISIT	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to learn the role of a nutritionist in the practical field, real-time setup.
CO 2	The students will develop comprehensive understanding regarding the different job responsibilities of a nutritionist/dietitian.
CO 3	The students will learn to interact with patients and assess their health and nutritional status
CO 4	The students will get a first-hand experience and can enhance their skills in problem solving.
CO 5	The students will be able to build a written, well -documented report based on their experience and activities.
CO 6	The students will gain practical knowledge on the various techniques and working of a food industry.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	1	2	3	3	1	1	2
CO 2	2	1	2	2	3	3	2	2
CO 3	2	2	2	3	3	3	2	2
CO 4	3	2	2	3	3	2	2	3
CO 5	2	1	3	3	3	2	1	2
CO 6	2	3	3	3	3	-	2	2
Average	2.16	1.66	2.33	2.83	3	1.83	1.66	2.16

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

SEMESTER IV

Internship

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. in Nutrition and Dietetics
Programme code: 29

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Internship		**Post Graduation**	**Sem**	**8**

Semester-IV

Course title: Internship

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Practical		8			8				128

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

PRACTICAL (total contact hours, hr/week), if applicable

Learning objectives*: The students will be able to learn the role of a nutritionist in the practical field, in real-time setup and get exposure to actual hospital situation; to study the types of cases admitted, their biochemical, clinical and dietary history*

Total no. of practical	Total contact hour	Contact hour/week
1	*128*	*16*

List of practical:

Practical 1:

1. Internship in hospitals to get hands-on-training.
2. Study the consumption and acceptability of the hospital diet and record patients' suggestions and comments.
3. Take detailed Clinical and Dietary history of the selected patients
4. Observe the dietary counselling given by the dietitian and to evaluate patient compliance.
5. Preparation of report based on it.
6. Presentation and feedback.

***Course learning outcome**:*

1. *The students will be able to learn the role of a nutritionist in the practical field, in real-time setup.*
2. *The students will be exposed to actual hospital situation; to study the types of cases admitted, their biochemical, clinical and dietary history*
3. *The students will become aware of the type of diets, that is prescribed by the dietitian and study the patient's response to them*
4. *The students will develop an appreciation of the role of dietitian in the hospital setting, fitness centres, geriatric homes, schools etc*

***Pedagogy for Course Delivery**: PowerPoint presentations, interactive lectures, group discussion.*

***List of Professional Skill Development Activities (PSDA)**: interactive seminars*
Continuous assessment: Quiz/assessment/presentation/problem solving etc.

Course Outcome:

INTERNSHIP	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to learn the role of a nutritionist in the practical field, in real-time setup.
CO 2	The students will be exposed to actual hospital situation; to study the types of cases admitted, their biochemical, clinical and dietary history
CO 3	The students will become aware of the type of diets, that is prescribed by the dietitian and study the patient's response to them
CO 4	The students will develop an appreciation of the role of dietitian in the hospital setting, fitness centres, geriatric homes, schools etc
CO 5	The students will be able to build a written, well -documented report based on their experience and activities.
CO 6	The students will know the importance of diet often recommended for clients who have a range of conditions from food allergies, to heart disease and cancer etc.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	2	3	3	1	1	2
CO 2	2	2	2	3	3	2	2	2
CO 3	2	2	2	3	3	3	2	2
CO 4	3	2	2	3	3	2	2	3
CO 5	2	2	2	3	3	3	2	2
CO 6	2	3	3	3	3	-	2	2
Average	2.33	2	2.16	3	3	1.83	1.83	2.16

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.

Dissertation

Syllabus Details

Name of the department: Applied Nutrition and Dietetics

Academic year:

Programme: M.Sc. in Nutrition and Dietetics
Programme code: 29

Name	Code	level	Duration (yr/Sem)	Cumulative credit
Dissertation		**Post Graduation**	**Sem**	**4**

Semester-IV

Course title: Dissertation

Type	Code	Credit	Credit division						Total no of lecture
			L	T	P	SW	FW	No. of PSDA	
Theory		4	4						80
Practical		4			4				160

SW = Self work, FW = Field work, Professional Skill Development Activities (PSDA)

Component:

A. THEORY

Learning objectives: *The students will be guided to carry out independent research on a topic agreed between the student and their supervisor. It typically involves a literature review and an appropriate form of critical analysis of sources of primary and /or secondary data; it may involve field and/or laboratory work.*

Prerequisite: *Basic knowledge of nutrition, research ethics, and statistics.*

Total contact hour	Contact hour/week
80	*4*

Course content/Syllabus:

Module no.	No of lecture/Contact hour	Weightage (%)
Unit 1: Introduction to Research: The students will be guided to plan, and engage in, an independent and sustained critical investigation and evaluation of a chosen research topic relevant to environment and society	20	25
Unit 2: Build the plan of work: Select the	20	25

proper techniques/ method to carry out analysis, interpretation of results.		
Unit 3: Writing and documentation: The students will be guided to write their dissertation report, bibliography and review pertinent literature.	40	50

Course learning outcome*:*

1. *The students will be able to plan, and engage in, an independent and sustained critical investigation and evaluation of a chosen research topic relevant to environment and society.*
2. *The students will be able to distinguish the applicability of different techniques in conducting the research.*
3. *The students will develop the skill to write scientific reports independently.*

Pedagogy for Course Delivery*: PowerPoint presentations, interactive lectures, group discussion, notes.*

List of Professional Skill Development Activities (PSDA)*: interactive seminars*
Continuous assessment: Quiz/assessment/presentation/ etc.

B. <u>PRACTICAL</u> (total contact hours, hr/week), if applicable

Learning objectives*: The students will develop understanding, ability for critical analysis and/or appropriate use of advanced research techniques.*

Total no. of practical	Total contact hour	Contact hour/week
1	*160*	*8*

List of practical:

Practical 1:

a. Select the appropriate method to conduct research
b. Carry out the procedures
c. Record the observation
d. Interpret the results using statistical tools.
e. Preparation of report based on it.
f. Presentation and feedback.

Continuous assessment: Presentation, Quiz and assessment.

Course Outcome:

DISSERTATION	
CO	**COURSE OUTCOME DESCRIPTION**
CO 1	The students will be able to plan, and engage in, an independent and sustained critical investigation and evaluation of a chosen research topic
CO 2	The students will develop the skills to solve research problems.
CO 3	The students will be able to distinguish the applicability of different techniques in conducting the research.
CO 4	The students will engage in systematic discovery and critical review of appropriate and relevant information sources
CO 5	The students will be able to apply ethical standards of conduct in the collection and evaluation of data and other resources
CO 6	The students will develop the skill to communicate research concepts and contexts clearly and effectively both in writing and orally.

CO-PO Mapping:

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	3	2	3	-	2	2
CO 2	3	3	3	2	3	-	2	2
CO 3	3	3	3	1	3	-	2	2
CO 4	3	3	3	2	3	-	2	2
CO 5	3	3	3	2	3	1	2	3
CO 6	3	3	3	3	3	3	2	3
Average	3	3	3	2	3	0.66	2	2.33

The notation of 3, 2 and 1 denotes substantially (high), moderately (medium) and slightly (low). The meaning of '-' is no correlation between CO and PO.