M.Sc. in Nutrition and Dietetics

SYLLABUS (2024-25)

P.G. DEPARTMENT OF FOOD SCIENCE TECHNOLOGY AND NUTRITION

SAMBALPUR UNIVERSITY

JYOTI VIHAR

BURLA

OUT LINE OF COURSE STRUCTURE

MSc. Nutrition and Dietetics

SEMESTER- 1

Course Code	Course Name	Credits Hours	Marks*
ND-411	Basic Nutrition	4	100
ND-412	Food Biochemistry & Metabolic Disorder	4	100
ND-413	Human Anatomy & Physiology	4	100
ND-414	Durg Nutrient Interaction	4	100
ND-415	Practical-I	4	100
ND-416	EVS & Disaster Management	2	50
		22 CH	

SEMESTER-2

Course Code	Course Name	Credits Hours	Marks*
ND-421	Fundamental of Food Nutrition	4	100
ND-422	Clinical Nutrition & Diet Therapy	4	100
ND-423	Food Quality & Management	4	100
ND-424	Food Allergy & Intolerance	4	100
ND-425	Practical-II	4	100
ND-426	IDC(Inter Disciplinary Course)	3	75
		23 CH	

SEMESTER-3

Course Code	Course Name	Credits Hours	Marks*
ND-511	Critical Care & Nutrition	4	100
ND-512	Research Methodology & Biostatistics	4	100
ND-513	Nutrition Education & Diet Counselling	4	100
ND-514	Elective Paper (anyone)	4	100
	(a) Sports Nutrition		
	(b) Nutraceuticals & Nutrigenomic		
	(c) Food Processing & Packaging		
	(d) Public Health Nutrition		
ND-515	Nutritional Survey & Diet Planning	4	100
ND-516	Entrepreneurship Development Programme	2	50
		22 CH	

SEMESTER-4

Course Code	Course Name	Credits Hours	Marks*
ND-521	Advance Diet Planning	4	100
ND-522	Final Project/ Dissertation	12	300
ND-523	Internship Report and Seminar	4	100
MOOC (Online mode)	Any one paper(in 2nd or 3rdSemester)	3	
		23 CH	
	Total Course Credit	**90 CH**	**2400**

FIRST SEMESTER

Course Code: ND-411 (4CH)	Course Name: BASIC NUTRITION

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Food and Nutrition** Relating to the **M.Sc. in Nutrition and Dietetics**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPICS	NO. OF LECTURES
1	Definition- Food, Nutrition, Health and its determinants, nutrients, nutritional status, malnutrition-under nutrition, over nutrition and optimum nutrition, diet, diet therapy, therapeutic nutrition, kilocalorie, joule, diet diversity, body mass index, daily values, nutrient density National and international recommendation of nutrient requirements: A) Recommendations for Indian by the ICMR B) FAO/Who expert committee recommendations	10
2	Function of Food physiological psychological intake of food habits, RDA (General Principles, Use, Limitation) Balance diet, Food pyramid, My plat, Mindful eating (Definition, methods, advantages, disadvantages)	6
	Concept of energy: Definition, Units of energy, components of energy requirements, REE, BEE, TEE, EER, RMR, PAL, BMR (Harris Benedict), Energy requirement during work, SDA, Metabolic equivalents, NEAT, RQ, DLW, Techniques Heart Rate Monitoring method	6
3	Food Preparation: Selection of foods, preparation methods of food blanching, retrogradation, roux, principles of cooking, methods of cooking, advantages and disadvantages, Effect of cooking on nutritive value, methods of enhancing nutritive value, effect of cooking on nutritive value. Meal planning: Definition, Principles of planning diets, points to be considered in planning diet, steps involved in planning diet (using food composition tables and food exchange list), planning 10 low-cost balance diet.	5
	Defination, Principles, Functions of Tools management.	1
	Menu Planning, Factors effecting food choice, Meal planning, exchange list, steps in the development of exchange list factors for planning the balance diet.	4
4	Hospital food service: Hospitality in hospital care management of dietary department, purchasing, storage and quantity of food production, patient compliance, food production, serving to patient tray and trolley service, plate waste management, washing and garbage disposal.	3
	Food sanitation, personnel hygiene and safety, environmental hygiene and sanitation, hygiene in food handling, personal hygiene procedure. Food sanitation and control: GMP, good hygienic practices, hazard analysis and critical control points. (HACCP), food control agencies - AGMARK, BIS, ISO	3
	Agencies (Govt. and Private) in delivery health care services, health programmes in India.	2
	TOTAL LECTURES =	**40**

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Food and Nutrition**
CO-2	Analyze the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXT BOOK:

1. Mudambi S R and Rajagopal M V, (2008), Fundamentals of Foods, nutrition & Diet therapy by new age international publishers, New Delhi
2. Srilakshmi B, (2002), nutrition science. New Age International publishers. New Delhi.
3. Shubhangaini A Ioshi,(2010), Nutrition and Dietetics, with Indian case studies, Tata McGraw-Hill, New Delhi
4. Bamji, M.S, Reddy, V. (1998), Text Book of Human Nutrition, Oxford & IBH Publishing Co, New Delhi.
5. Gibney M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Backwell Science Publishing Co.
6. Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillian Pub. Co. New York.
7. Swaminathan, M. (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company Ltd.
8. Guthrie, H.A &Picciano, M.F (1995), Morby Publishing Co, New York. Srilakshmi, B. (2005). Dietetics, New Age International Publishers, New Delhi.
9. Sakharka B M, Principles of Hospital Administration and Planning, 2009, 2nd Edition, Jaypee Brothers Medical Publishers (p) Ltd.
10. Sherry Glied and Peter Smith, The Oxford Handbook of Health Economics,201 I ll . Jan Abel Olsen, Principles in Health Economics and Policy, 2009, Oxford University Press.
12. Mohinder Chand, Managing Hospitality Operations, 2009, 1st Edition, Anmol Publications Pvt. Ltd. New Delhi.
13. Goel S.L, Health Care System and Hospital Administration, 2009, Vol.7, Deep and Deep Publications Pvt. Ltd.
14. Kalkar S.A, Hospital Information Systems, 2010, Published by AsokeK.Ghosh, PHI Learning Pvt. Ltd.

REFERENCE BOOKS:	
1	Handbook of Seed Science and Technology, Basra A.,CRC Press, 2006
2	Handbook of Fruit and Vegetable Processing Sinha and Hui, John Wiley and Sons, 2010
3	Handbook of Meat, Poultry and Seafood Quality, Kerth Wiley Backwell, 2012
4	Technology of Milk Processing, Khan QA and Padmanabhan, ICAR, New Delhi
5	Food Science- N.Potter & J.H.Hotchkiss- CBS Publishers & Distributors, New Delhi.

Course Code: ND- 412 (4CH)	**Course Name: FOOD BIOCHEMISTRY AND METABOLIC DISORDER**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Food and Nutrition** Relating to the **M.Sc. in Nutrition and Dietetics**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPICS	NO. OF LECTURES
1	Metabolic pathways: Carbohydrates- Aerobic and anaerobic degradation, glycogenesis, glycogenolysis, gluconeogenesis HMP shunt pathway. Hormonal regulations of blood glucose, brief about metabolic disorders with reference to CHO. Glycogen storage disease, Essential Pentosuria, Glalctosemia, Fructosuria and their MNT.	**7**
2	Bioenergetics- Principles of bioenergetics, free energy – endergonic and exergonic process, role of high energy compounds in energy storage, formation of ATP-Biological oxidation and electron transport chain- Reduction potentials, anatomical site and components of oxidative phosphorylation, enzymes involved membrane location of electron transport, chemiosmotic theory, inhibitors of respiratory chain.	**5**
	Lipids- Metabolism of triacylglycerol, oxidation of fatty acids, cholesterol. Regulation of lipid metabolism and ketone bodies. Oxidative stress and antioxidants – Free radicals	**5**

	– definition, formation in biological systems, defense against free radicals. Role of free radicals and antioxidants in health and disease Determination of free radicals, lipid peroxides and antioxidants and brief about metabolic disorders of lipids metabolism. Gaucher's diseases, Niemann pick disease, Fabry's disease, Tac-sach's disease and their MNT.	
3	Protein: Protein degradation, fate of nitrogen (urea cycle), metabolism of aromatic, Sulphur containing, BCAA and other amino acid pool. Glutamine and alanine cycle, protein biosynthesis. Nucleic acids metabolism of nucleic acid components, biosynthesis of nucleotides, brief about metabolic disorders of protein metabolism. Phenyl ketonuria, Alkaptonuria, Albinism, Cystinuria, Hypertyrosinemia, Homocystinuria ana their MNT.	**5**
	Regulation of metabolism: Interrelationship of carbohydrate protein and lipid metabolic, Role of Vitamins and Minerals in metabolism, metabolic adaptation during starvation, exercise, stress, and diabetes mellitus. Significances of enzymes in food metabolism classification, chemical nature-Enzyme inhibition, enzyme pattern in disease pattern.	**5**
4	Hormones: Classification- synthesis – regulatory functions and mechanism of hormone action – Prostaglandin structure, biosynthesis, metabolism and biological action and their role in pathology. Brief about metabolic disorders of hormones and enzyme. Down's syndrome, Turner's syndrome, Klinefelter's syndrome and their MNT.	**4**
	Metabolic disorders: Etiology, Clinical manifestation, MNT- Down's Syndrome, Turner's Syndrome, Klinefelter Syndrome, Maple Syrup Syndrome, CHO Counting, Inborn errors of protein and purine, PKU, MSUD, Tyrosinosis, Homocystinuria, Fructosuria, Organic Aciduria.	**9**
	TOTAL LECTURES =	**40**

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of Biochemistry **of Foods**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXT BOOK:

1. Murray, R.K., Graner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25 th Ed. Harpers Biochemistry Macmillan Worth Publishers.
2. Nelson, D.L., and Cox, M.M. (2000): 3[1d] Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
3. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5 th Ed. Outlines of Biochemistry, Heinemann Medical Books Ltd.
4. Raghuramulu, N. , Madhavan Nair and K. Kalyanasundaram, S. (2003). A Manual of Laboratory Techniques, NIN, ICMR.
5. BergJM, Tymoczko JL and Stryer L. (2002) Biochemistry 5th ed. W.H. Freeman.
6. Devlin TM. (2002) Text Book of biochemistry with Clinical Correlations 5 th ed. John Wiley and Sons.
7. Horton RH, Moran LA, Ochs RS, Rawn JD and Scrimgeour.(2002) Principles of Biochemistry 3rd ed. Prentice Hall.
8. Murray RK, Granner DK, Kayes PA and Rodwell VW. (2003) Harper's Illustrated Biochemistry. 26th ed. McGraw-Hill. Asia.
9. Voet D and Voet JG. (2004) Biochemistry. 3rd ed. John Wiley and Sons.

REFERENCE BOOKS:	
1	Swaminathan M. 1974. Essentials of Foods and Nutrition. Vol. II. Ganesh& Co.
2	J.L. JAIN, Fundamentals of Biochemistry. S. Chand publication
3	Satyanarayan and Chakrapani, Biochemistry, 5th edition., Elsevier, 2013

Course Code: ND- 413 (4CH)	**Course Name: HUMAN ANATOMY & PHYSIOLOGY**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Human Anatomy & Physiology** Relating to the **M.Sc. in Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPIC	NO. OF LECTURES
1	Cells Structure and Its Basic- Labels of cellular organization and functions. Brief review of Cell membrane, and Intercellular communication.	3
	Muscular Skeletal System- Structure and function of bone, cartilage, connective tissue.	2
	Sense Organs- Eyes, Nose, Ears, Mouth, Skin (Structure and Functions)	3
2	Digestive System: anatomy of gastrointestinal tract and accessory organs. Digestion& absorption of foods, regulation of appetite Role of liver, pancreas, gall bladder	6
	Respiratory system: anatomy, physiology and mechanism of respiration. Cardiorespiratory response to exercise and physiological effects of training.	5
3	Circulatory system: blood, composition of blood cells, development & function of blood cells, blood clotting, blood grouping and haemoglobin, Heart: anatomy, cardiac cycle, blood pressure and factors affecting blood pressure.	6
	Excretory system: anatomy and function of kidney, formation, composition and excretion of urine. Role of kidney in water, electrolytes & acid base balance, pH of blood, diuretics, homeostasis, buffers. Electrolyte water balance- Osmolarity effect of hypertonic, hypotonic.	6
4	Endocrine glands: structure & function, mode of action of hormones.	2
	Reproductive system: Structure& function of male & female reproductive organs. Physiological changes in pregnancy. Lactation, Post parturition changes.	3
	Anatomy and Physiology of CNS and Brain, Hypothalamus and its role in various body function (Obesity, Sleep, Memory)	2
	Total Lecturer	40

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Human Anatomy & Physiology**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXT BOOK:

1. Ganong, W. F. (1985): Review of Medical Physiology, 12th Edition, Lange Medical Publication.
2. Moran Campell E.J., Dickinson, C.J., Slater, J.D., Edwards, C.R.W. and Sikora, K. (1984): Clinical Physiology, 5th Edition, ELBS, Blackwell Scientific Publications.
3. Guyton, A.C,(1985): Function of the Human body, 4th Edition, W.B. Sanders Company, Philadephia.
4. Guyton, A.C, and Hall, J. B. (1996): Text Book of Medical Physiology, 9th Edition, W.B. Sanders company, Prime Books (Pvt.) Ltd., Bangalore.
5. Wilson, K.J.W. and Waugh, A. (1996): Ross and Wilson Anatomy and Physiology in Health and Illness, 8th Edition, Churchill Livingstone.
6. McArdle, W.D., Katch, F.I. and Katch, V.L. (1996): Exercise Physiology. Energy, Nutrition and Human performance, 4th Edition, Williams and wilkins, Baltimore.
7. Jain, A.K., Textbook of physiology. Vol I and Il. Avichal publishing co.,

REFERENCE BOOKS:	
1	Modern Industrial Microbiology & Biotechnology by N. Okafor. 1st edition. CRC Press, USA. 2007.
2	Industrial Microbiology Samuel C Presscott

Course Code: ND- 414 (4CH) **Course Name: Drug Nutrient Interaction**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of Drug **Nutrient Interaction** Relating to the **M.Sc. in Nutrition and Dietetics**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPICS	NO. OF LECTURES
1	Drugs and pharmaceutical compounds- natural and synthetic, use of excipients, characteristics of rugs action: Pharmaco-dynamics, pharmacokinetics, route, and form of excretion. Drug abuse and drug resistance, Drug and Nutrition- basic concept, Clinical significance and risk factor, rection of drugs in the body- Ingestion, Digestion Absorption, Metabolism.	**7**
	Effect of nutrition on drugs, Drug effects on nutritional status.	**3**
2	Food and drug interaction in different disease conditions: allergies, asthma, arthritis, CVD, GERD, ulcers, hypothyroidism, psychiatric disorders, food allergens, Guidelines to lower the risk of food and drug interaction, safe use of drugs. Nutrient effects on drug therapy- effects of dietary composition, interactions between medication and milk, iron, fruit juices, antacids. Drug response, adverse drug reactions, drug interactions and pharmacogenetics.	**10**
3	Drug Nutrient interaction in specific condition- Drug nutrition interaction in patients with cancer, transplantation, immune function, chronic infection, receiving enteral nutrition, antimicrobial nutrient interaction.	**10**
4	Guideline to lower the risk of food and drug interaction. Drug doses and efficacy, Safe use of drug.	**4**
	Drug Nutrient Interaction by life stage – Infancy and childhood, Pregnancy and lactation, elderly.	**6**
	TOTAL LECTURES =	**40**

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Drug Nutrient Interaction**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXT BOOK:

1. McCabe, B.J., Frankel, E.H., Wolfe, J.J., eds. Handbook of Food — Drug Interactions. CRC press. Boca Raton, FL2003.
2. Akamine, D, Filho M.K., &Peres, C.M. " Drug — nutrient interactions in elderly people." Current Opinion in Clinical Nutrition and Metabolic care, 10:304-310, 2007.
3. Genser, D. "Food and drug interaction: Consequences for the nutrition /health status." Annals ofNutrition & Metabolism. 52(suppl 1):29-32, 2008.
4. McCabe, B.J. Prevention of food — drug interactions with special emphasis on older adults. Current Opinion in Clinical Nutrition and Metabolic care, 7:2-26, 2004.

REFERENCE BOOKS:	
1	Swaminathan M. 1974. Essentials of Foods and Nutrition. Vol. II. Ganesh& Co.
2	Principles of Nutrition – Fisher and Fuqua, wiley eastern Private Limited, New Delhi.
3	Nutrient Requirements and Recommended Dietary Allowances for Indians – Indian Council of Medical Research, National Institute of Nutrition, Hyderabad.
4	ABC of Nutrition (4thedition), Stewart Truswell, BMJ Publishing Group, 2003

Course No. : ND-415 (4CH) **Course Name : Practical -I**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Practical –I** Relating to the **M.Sc. in Nutrition and Dietetics**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Practical -I**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

Course No: ND-. 416 (2CH) **EVS and Disaster Management**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **EVS and Disaster Management** Relating to the **M.Sc. in Nutrition and Dietetics**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **EVS and Disaster Management**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

SEMESTER-II

Course Code: ND- 421 (4CH)	**Course Name: FUNDAMENTAL OF FOOD NUTRITION**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of Fundamental **of Food Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study

UNIT	TOPICS	NO. OF LECTURES
1	Food Groups- Classification of Carbohydrates, Fats, Lipid, Protein, Minerals (Macro and Micro), Vitamins, Water.	5

2	Nutritional screening and assessment. Nutritional care plan, implementation of nutritional care. MUST, SGA, SOAP. Nutritional support systems and other life- saving measures for the critically ill. Role of immune enhances, conditionally essential nutrients, immune suppressants, and special diets in critical care.	**5**
	Eating Disorders – Brief evaluation of Anorexia Nervosa, Bulimia Nervosa, Bing Eating, Specified Feeding and Eating Disorders, Pica, Rumination disorder.	**5**
3	Nutritional need in different age grows (Infancy, preschool children, School going, adolescence, young adults, pregnancy and lactation, old age)	**16**
	Detail explanation of varieties of diet (Normal, semi solid, Fluid, Special Diet), EN and PN (Description, Limitation, Formulation, Complication)	**3**
	Pre and post operative diet	**3**
4	Body Composition – Methods of calculation, Determination of body composition physical and chemical, Body fat percentage- distribution of fat, attaining ideal body composition, fat loss, gaining lean body weight, low body fat percentage, body fat percentage and hormonal changes.	**3**
	Total Lecturer	**40**

Programme Outcome

CO-1	Remember and understand the basic concepts/Principles Nutrition through life cycle
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXT BOOK:

1. Srilakshmi, B. 2005. Food Science, New Age International (P) Ltd., Publishers, New Delh
2. Potter, N. and Hotch Kiss, J.H. (1996): Food Science, Fifth edition, CBS Publishers and Distributors, New Delhi
3. Julians, B.O. (1985). Rice Chemistry and Technology, 2nd edition, American Association Chemists, St. Paul Mimesota, USA.
4. Charley, H. (1982). Food Science, 2nd edition, John Wiley & Sons, New York.
5. Srilakshmi (2008). Nutrition Science. New Age International Pvt. Ltd, New Delhi.
6. Mahan L K and Escott — Stump S (2000). Krause's Food Nutrition and Diet Therapy 10th Ed WB Saunders Ltd
7. Shills, 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.
8. SreeDevi.V. (1997). Nutrition Education. Discovery Publishing House, New Delhi.
9. Bamji, M.S., Rao, P.N. and Reddy, V. (1996). Textbook of Human Nutrition, Oxford & IBH Publishing Co. Pvt. Ltd.
10. Gopalan, C. (1995). Recent Trends in Nutrition, Oxford University Press, London.

TEXT BOOKS:	
1	Dietetics – B.Srilakshmi; New age International (P) Limited, New Delhi.
2	Nutrition Science – B.Srilakshmi; New age International (P) Limited, New Delhi.
3	Human Nutrition and Dietetics – Davidson, Passmore, East wood, English Language Book Society (ELBS).
4	Text Book of Human Nutrition – Mahtab. S. Bamji; N.Pralhadrao&Vinodini Reddy, Oxford & IBH Publishing Co. Pvt.Ltd

Course Code: ND-422 (4CH)	Course Name: CLINICAL NUTRITION AND DIET THERAPY

PEO1	Understand the nature and basic concepts of Clinical **Nutrition and Diet Therapy**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPICS	NO. OF LECTURES
1	Disease Condition (Acute) – Nutritional management of fever, infection, TB and Typhoid	**4**
	Neurological Disorder Management- MNT of Stroke, Coma, Burn	**6**
	Nutritional Management of Gout, Rheumatoid Arthritis, Osteoporosis.	
2	Nutritional management in GI track – Pathophysiology and MNT of common GI disorder (Peptic Ulcer, IBD, IBS, GERD, Malabsorption syndromes, celiac diseases, dumping syndrome, constipation, ulcerative colitis.	**5**
	Hepatic and Pancreatic Diseases – Pathophysiology and MNT of Hepatic encephalopathy, Wilson diseases, Liver Cirrhosis, Cholelithiasis pancreatitis, Zollinger Ellison Syndrome.	**5**
3	Respiratory Disease: Pathophysiology and MNT of respiratory disorders – COPD, Asthma, Pulmonary Fibrosis.	**4**
	Cardiovascular disease – Dyslipidemias, CHD, IHD, Hypertension, Cardiac Failure, Atherosclerosis, Hyperlipidemia, RHD	**6**
4	Renal Disorder - Pathophysiology and MNT of Acute and Chronic Nephritis, CKD, Nephrotic Syndrome, Acute and Chronic Renal Failure, ESRD	**4**
	Nervous Disorder: Epilepsy, Hyperkinetic behavior syndrome.	**6**
	TOTAL LECTURES =	**40**

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Nutrition and Diet Therapy**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXT BOOK:

1. Modern Nutrition in Health and Disease 10th edition by Maurice E. Shils
2. Alfred H.Katz, Prevention and health, the Haworth, Press, New York 1999.
3. Nutritional biochemistry of vitamins David a bendor.
4. Achayya, K.T.:(1998) A Historical Dictionary of Indian Foods, Oxford Publishing co.
5. Mahindru, S.N. (2002). Food Additives Characteristics, Detection and Estimation, Tata McGraw-Hill Publishing Co. Ltd. New Delhi.
6. Research Methodology By C.R Kothari
7. International Life Sciences Institute Present Knowledge in Nutrition — latest edition.
8. Krause's food and nutrition care process, 14th edition
9. Mahan,LK&Escott-Stump,(2000),Krause's food nutrition and diet therapy, 12th edition
10. Sareen nutrition in human metabolism,4thedition, USA
11. IAPEN, BAPEN websites

REFERENCE BOOKS:	
1	Ross & Wilson Anatomy & Physiology in Health & illness-KJW.Wilson&JS.Ross 1987, Churhill Livingstone
2	Text book of Physiology-volI & II-AK.Jain, Avichal Publishing Co. New Delhi.
3	Review of Medical Physiology-WF. Ganong, Lange medical Publication

Course Code: ND- 423 (4CH)	Course Name: FOOD QUALITY AND MANAGEMENT

PEO1	Understand the nature and basic concepts of **Food Quality Control** Relating to the **M.Sc. in Food Science & Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Programme Education Objectives

UNIT	TOPICS	NO. OF LECTURES
1	Concept of quality: quality attributes: physical, chemical, nutritional and microbial evaluation.	2
	Objective evaluation: Tests used for objective evaluation, application and limit, Instruments used for quality assessment-color & gloss, size & shape, defects, texture, Viscosity & consistency	4
	Sensory evaluation: Sensory characteristics of food, sensory requirements, Types of sensory evaluation.	2
	Serviette Folding: Methods of serviette folding	1
2	Food adulteration and food toxins: common adulterant in food (milk and milk products, edible oils, cereals & pulses, prepared foods, spices, beverages); simple screening, control of food adulteration	2
	Food Toxins: Terms in toxicology; Safety evaluation using traditional and modern approach;	2
	Natural anti-nutritional factors, toxic phytochemicals, microbial toxins, toxins from fungi,	2
	Contaminations during handling and processing(PAHs), contaminants from industrial wastes, pesticide residues	2
	Toxicity of heavy metals and chemicals in food and their permissible limits,	2
	Food allergens.	1
3	Quality assurance, Quality Control, Total Quality Management;	1
	GMP, GHP;	2
	GLP, GAP;	1
	Sanitary and hygienic practices;	1
	physical, chemical and biological hazards in foods,	1
	HACCP- Principles of HACCP, application of HACCP system, implementation steps for HAACP system ;	2
	HACCP-systems for food safety,	1
	Quality manuals, documentation and audits.	1
4	Food laws and regulation: Mandatory and voluntary food laws,	1
	International quality systems and standards like ISO (9000 & 22000) series, Codex, BRC;	3
	Indian Food acts-Food Safety and Standards Act, 2006, FSNS Regulations: Regulations on Licensing and Registration, Regulations on Contaminants, toxins and residues, Food product standards, food additives, Laboratory and sampling analysis; Packaging and	3

Course Outcome

CO-1	Remember and understand the basic concepts/Principles of **Food Quality and Management**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXT BOOKS:	
1	Nutrition and Dietetics – Subhangini A.Joshi – Tata McGraw-Hill Publishing Company Limited, New Delhi
2	Dietetics – B.Srilakshmi – New age international (P) limited New Delhi.
3	Clinical Dietetics and Nutrition – F.A. Antia, Oxford University Press, London.
4	Text Book of Human Nutrition- Mahtab S. Bamji, N.Rao & V. Reddy, Oxford & IBH Publishing Co. Pvt Ltd.

REFERENCE BOOKS:	
1	Normal and Therapeutic nutrition- C.H. Robinson & M.R Lawler – Macmillen Publishing Co. New York.
2	Essentials of Food and nutrition – M.Swaminathan, Vol I & II, The Bangalore Printing & Publishing Co. Ltd (BAPPCO)
3	Food, Nutrition & Diet Therapy-L.K.Mahan & Escott.Stump- W.B. Saunders Ltd
4	Nutrition& Diet Therapy- S.R.Williams-Times mirror Mosby college Publishing. Co.
5	Human Nutrition & Dietetics- J.S.Garrow ,W.P.T.James, A. Ralph –Churhill Livingstone.

Course Code: ND- 424 (4CH)	**Course Name: FOOD ALLERGY AND INTOLORENCE**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Food Allergy and Intolerance** Relating to the **M.Sc. in Food Science & Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPIC	NO. OF LECTURES
1	Meaning of allergy, atopy, hypersensitivity, intolerance. Food allergy meaning, type of allergic reaction, characteristics of allergic reaction, Difference between food allergy and intolerance.	**8**
2	Effects of food allergy on the skin, mucous membrane, respiratory tract and digestive system. Food allergy in different age group (infancy, adolescence, young, geriatric)	**8**
	Common food allergens (fish, shellfish, milk, peanut, sesame seed, soy, MSG, gluten) Diagnosis process, medical management, nutritional management, diagnostic test	**8**
3	Food borne diseases: Bacterial food borne diseases (Staphylococcal intoxication, Botulism, Salmonello Shigellosis, Enteropathogenic Escherichia Coli Diarrhoea, Clostridium Perfringens gastroenteritis, Bacillus cereus Gastroenteritis). Food Borne Viral Pathogens (Norwalk virus, Norovirus, Reovirus, Rotavirus, Astrovirus, Adenovirus, Parvovirus, Hepatitis A Virus). Food Borne Animal Parasites Protozoa – Giardiasis, Amebiasis, Toxoplasmosis, Sarcocystosis, Cryptosporidiosis. Cysticercosis/Taeniasis. Roundworm – Trichinosis, Anisakiasis. Mycotoxins: types, health issues caused by mycotoxins like Aflatoxicosis, Deoxynivalenol Mycotoxicosis, Ergotism	**10**
4	Microbial Food hygiene and sanitation: Contamination during handling, processing and its control	**4**
	Fad Diet: Atkins diet, South beach diet, Vegan diet, Ketogenic diet, Plleo diet, The Zone diet, The Dukan Diet, The 5:2 diet.	**2**
	Total Lecturer	**40**

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Food Allergy and Intolerance**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXT BOOK:

1. Shills M E, Olson J A, Shike M and Ross A C (Ed) 1999: Modern Nutrition in Health and Diseases 9th Edition, Williams and Wilkins.
2. Mahan L K and Escott — Stump S (20); Krause's Food Nutrition and Diet Therapy 10th Ed W B Saunders Ltd.
3. Escott — Stump, S (1998): Nutrition and diagnosis related care 4th Edition, Williams and Wikins.
4. Garrow J S, James W P T and Ralph A (2000) Human Nutrition and Dietetics, 10th Edition, Churchill Livingstone.
5. Shils M E, Olson J A, Shike M and Ross A C (Ed) 1999: Modern Nutrition in Health and Diseases 9th Edition, Williams and Wilkins.
6. Mahan L K and Escott — Stump S (2000); Krause's Food Nutrition and Diet Therapy 10th Ed W B Saunders Ltd
7. Escott — Stump, S (1998): Nutrition and diagnosis related care 4th Edition, Williams and Wikins
8. Garrow J S, James W P T and Ralph A (2000) Human Nutrition and Dietetics, 10th Edition, Churchill Livingstone

REFERENCE BOOKS:	
1	Modern Industrial Microbiology & Biotechnology by N. Okafor. 1st edition. CRC Press, USA. 2007.
2	Industrial Microbiology Samuel C Presscott

Course NO. ND- 425 (4CH) Course Name: Practical -II

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Practical –II** Relating to the **M.Sc. in Food Science & Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Course Outcome

CO-1	Remember and understand the basic concepts/Principles of **Practical -II**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

Course No: ND- 426 (4CH) Course Name : INTER DISCIPLINARY COURSE

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Inter Disciplinary Course** Relating to the **M.Sc. in Food Science & Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Inter Disciplinary Course**
CO-2	Analyse the Various Concepts to understand them through case studies

CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

SEMESTER-III

COURSE CODE:ND 411(4CH) COURSENAME:CRITICAL CARE AND NUTRITION

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Critical Care and Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPIC	NO. OF LECTURES
1	Assessment of patient needs based on interpretation of patient data- Clinical, biochemical, biophysical, and personal. Definition and history of dietetic, Dietetics in modern health care management. Role of dietitian – functions and classification of a dietitian Team approach inpatient care.	9
	Critical Care in malnutrition	3
2	Nutritional management in coronary heart disease Pathogenesis, role of nutrients in prevention and management –Nutritional and metabolic implicates of dyslipidaemias.CHD Prevalence, Etiology and risk factors, Diagnostictest, Nutrition management, common disorders of CHD and Nutrition management Dyslipidaemias, Atherosclerosis, cardiac failure, Hypertension, IHD,CCF, Rheumaticheart disease.	6
	Nutrition Management of Renal Disease: Etiology and pathogenesis: change in function with progression of diseases, metabolic and nutritional implications. Clinical and metabolic manifestations, diagnostic tests, Types Acute and chronic nephritis, Nephrotic syndrome, Renal Failure: Acute and chronic, ESRD. Nutritional management in	6
	cancer, Cancer: pathogenesis and progression of cancer Role of Nutrients and food additives in cancer therapies and their nutritional implications.Types of symptoms,Diagnosis, Cancer therapies: Nutritional implication Dietary management.	
3	Nutritional supplement in critical care patient, organ transplantation, brain injury, Trauma, Sepsis and pancreatitis.	5
4	Nutritional support in specific condition like, liver, major surgery, cancer, abdominal injury, renal surgery.	5
	Ethical consideration of critical care.	1
	TOTAL LECTURES	**40**

Course Outcomes

CO-1	Remember and understand the critical/emergency and role of diet during emergency
CO-2	Analyse the Various Concepts to understand them through cases tudies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXTBOOK:

1. Mahan.L.K.and Escott-Stump,S. (2000): Krause's Food Nutrition and Diet-Therapy, I(Y^{h}Edition,W-13 Saunders Ltd,
2. Shills.M.E..Olson,JA.Shike, Mand Ross,A-c.(2002):Modern Nutrition in Health and Disease,9thEdition, A.vaiiiams and Willdns..
3. Sareen, S, James, J(2005). Advanced Nutrition in Human Metabolism, 4th Edition, Thomson Wordsworth Publication, USA.
4. Chandra,R.R.(eds)(2002):Nutrition and Immunology, ARTS Biomedical.St-JOhn's New found l and.

REFERENCE:

1	Swaminathan S.:Advanced Textbook On Food & Nutrition Vol.1&N(2ndEd.Revised_ Enlarged) Bapp Co. 1985.
2	MahanL.K.,Sylvia Escott-Stump(2000):Krause‟s Food Nutrition and Diet Therapy 10th Edition, W.B.Saunders Company London.
3	B.Srilakshmi,(2007):Dietetics, published by K.K.Gupta For New age International Pvt.Ltd. New Delhi.

Course Code:ND-512 (4CH)	**Course Name: RESEARCH METHODOLOGY AND BIOSTATISTICS**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Research Methodology and Biostatistics** Relating to the **M.Sc.in Food Science & Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPICS	NO. OF LECTURES
1	Research Methodology: Meaning, aim & objective of research, significance of research, Research types, Research methods vs methodology, Different types of research design. Different Steps in Writing Report, Technique of Interpretation, Precaution in interpretation, Significance of Report Writing, Layout of the Research Report.	**3**
	Fundamentals of statistics: Research process, Population, Variables, Primary and secondary data, Collection of data, Classification and tabulation of data, Need and usefulness of Diagrams & Graphs, Different types of diagrams and graphs(Barcharts, Histograms, Frequency polygons, one way scatter plots, Box plots, two way scatter plots, line graphs)	**2**
	Frequency distribution*:* Discrete and continuous frequency distribution, population & sample, Sample Size and its Determination	**2**
	Sampling Designs: Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, Sampling errors.	**2**
2	Measure of dispersion: Range, Mean deviation & Standard deviation;	**4**
	Descriptive statistics: Measure of central tendency: (Arithmetic mean, harmonic mean, geometric mean, median, mode), relation between mean, median and mode;	**2**
	Skewness and Kurtosis,	**2**
	Probability.	**2**
	Testing of Hypotheses: Definition, Basic Concepts, Procedure for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Normal distribution, data transformation, Null and Alternative Hypothesis, level of significance.	**3**
	Chi-square Test: Chi-square as a Non-parametric Test, Conditions for the Application Chi-square test, Steps Involved in Applying Chi-square Test	**2**

3	Student„t"distribution and its application,, f"test and its application,	2
	Analysis of Variance and Covariance: Analysis of Variance(ANOVA):Concept and Technique of One-way ANOVA, Concept of Two way ANOVA & Analysis of Co- variance (ANOCOVA)	4
4	Measures of Relationship: Need and meaning, Correlation and Simple Regression Analysis,Types of correlation; simple, partial and multiple correlation, Method Of study & testing the significance of correlation coefficient.	4
	Regression analysis: regression equations and regression lines, Properties of Regression lines, regression coefficient, testing the significance of regression coefficient.	4
	Concept of cluster Analysis and Principal component Analysis.	2
	Computer Application: Use of Computer in data analysis and research, Use of Software and Statistical package .Introduction to SPSS. Importing data from excel, access, entering data, labeling variable, coding and recoding a categorical and continuous variable. Converting data from string to numeric variables, sorting & filtering, merging, appending data sets.	10
	TOTAL LECTURES=	**40**

Course Outcomes

CO-1	Remember and understand the basic concepts /Principles of **Research Methodology and Biostatistics**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Projector field assignment as per the knowledge gained in the course

TEXTBOOKS:	
1	Zar, Jerrold H.(1998). Biostatistical Analysis, Pretice Hal, NJ
2	Statistics for Management, Levin and Rubin, Owls Books, Toledo, USA
3	Business Mathematics and Statistics, N.K. Nag & S.K.Nag, Kalyani publishers.
4	Hand book on Data Envelopment Analysis, Cooper, Seiford, Lawrence & Zhu, Springer

REFERENCE BOOKS:	
1	Statistical Methods–S.P.Gupta, Sultan Chand & Sons Publisher-New Delhi
2	Research Methodology, Methods and Techniques–C.R.Kothari Wiley Eastern Limited–New Delhi

Course Code: ND 513 (4CH)	**CourseName: NUTRITION EDUCATION AND DIET COUNCELLING**

PEO1	Underst and the nature and basic concepts of Nutrition **Education and Diet Counselling**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPIC	NO. OF LECTURES
1	Introduction to diet therapy a) Nutrition support service b) Malnutrition in hospitalized patients c)pre- and post-operative diets d) Immune nutrition	8
2	Diet for PCOS, a)Prevalence b)clinical effects c)Risk factor d)Dietary management	8
	Diet in Diabetes Mellitus a) Prevalence, types, Etiology and symptoms b) Diagnosis, treatment, and complications c) Dietary management	6

3	Diet in Cancer a) Risk factors and Symptoms b) Nutritional problems of cancer therapy c) Nutritional requirements and Dietary management d) Role of food in the prevention of cancer e) Physical activity and cancer	**6**
4	Diet for HIV/ AIDS a) Definition b) Sign & Symptoms c) Pathophysiology d) Mode of transmission e) Relation between malnutrition & HIV.	**6**
	Diet for Obesity a) Definition b) Sign & Symptoms c) Pathophysiology d) Mode e) Relation between malnutrition	**6**
	TOTAL LECTURES	**40**

Programme Outcome

Course Outcomes

CO-1	Remember and understand the critical/ emergency and role of diet therapy during emergency
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

TEXT BOOK:

1. Counselling Skills for Dietitians Second Edition Judy Gable M SC (Nutrition), BACP Accredited Counsellor
2. British Dietetic Association (2003) ne Work of Registered Dietitians. British Dietetic Association, Birmingham. Krause, Food, Nutrition & Diet therapy.
3. Martin E. A: Nutrition education in Action, A guide for teacher, Holt, Rinhart and Winston Inc. 1963.
4. Bhatia. KK, Principles of guidance and counselling, Kalyani publishers, Ludhiana.2002.
5. Nelson- Jones, Richard, Practical counselling and helping skills, Better Yourself Books, Bombay, 1994.
6. Escott — Stump, S. (1998): Nutrition and Diagnosis Related care, 4th Edition, Williams and Wilkins.
7. Prashantham B.J., Indian case studies in therapeutic counselling, Christian Counselling centre, Vellore. 1978.
8. Narayan Rao.S., Counselling, Tata MC Graw Hill Publishing company Ltd, New York 1981.

Course Code: CND- 514 (a) (4CH)	Course Name: SPORTS NUTRION

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Sports Nutrition** Relating to the **M.Sc. in Nutrition and Dietetics**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPICS	NO. OF LECTURES
1	Introduction to fitness-body composition, changes through the lifecycle, definition, component of physical fitness- health and skin related, type of exercises, athlete fitness. Holistic approach to management to health and fitness- diet, exercise, yoga and meditation. Effect of specific nutrients on work performance and physical fitness. Nutrition, exercise, physical fitness, and health- their inter Fluid and electrolyte balance- Water compartment in human body, fluid regulation & water intake in different conditions, effect of dehydration	**10**
2	Approaches to the management of fitness and health. Physiological changes during physical activity in cardiovascular system, respiratory system, muscular system and haemopoietic system. Fuel and other nutrients support physical activity (metabolic pathways). Mobilization of fuel stores during exercise. Importance of carbohydrate loads, shifts in carbohydrate and fat metabolism. Fatigue during exercise and its management.	**10**
3	Sport Nutrition: Introduction, Evaluation, and growth of sports nutrition as a discipline Anthropometric and physiological measurement. Various techniques for measuring body composition. Work capacity Nutrition in sports – Sports specific requirements diet manipulation pregame and post-game means, Use of different mutagenic aids and commercial supplements. Sports drinks, Diets for persons with high energy requirements stress, fracture and injury, pre- and post-natal fitness, diabetes, hypertension, CVD, Osteoporosis, osteoarthritis, sports anaemia, female athlete triad.	**10**
4	Anti-doping regulations and harmful effects of use of steroids & other banned substances Dietary Supplements: Regulations and Classification − Definition and regulations OF Dietary Supplements (country-specific) and Nutritional Supplements Composition, Benefits and 33 Applications of Nutritional Supplements, ergogenic aids, Macronutrient Supplements: − Pure proteins (e.g. Whey, Casein, Egg albumin, Soy protein, Pea protein & other vegan proteins/protein blends), Protein bars, Weight gainers; Amino acid supplements- , Glutamine, Arginine −Carbohydrate supplements & EFAs, Glycerol − Meal replacement powders, Ready To Drink protein shakes (RTDs) − Sports drinks.	**5**
5	Applications of food psychology for health maintenance and fitness − Strategies to change dietary behaviour − Optimism and intention − Strategic atomization − Using stages of change model to change dietary behaviour − Behaviour modification strategies to influence food and nutrition choices − Theory of planned behaviour and healthy eating.	**5**
	TOTAL LECTURES =	**40**

TEXT BOOK:

1. Mahan, L.K. &Ecott-Stump, S. (2000): Krause's Food, Nutrition and Diet Therapy, 10th Edition, W B. Saunders Ltd.
2. Sizer, F & Whitney, E. (2000): Nutrition — Concepts and Controversies, 8th Edition, Wadsworth Thomson Learning.
3. Whitney, E.N. &RoIfes, S.R. (2003): Understanding Nutrition, 8th Edition, WestWadsworth, An International Thomson Publishing Co.
4. Ira Wolinsky (Ed) (2003): Nutrition in Exercise and Sports, 3rd Edition, CRC Press
5. Parizkova, J. Nutrition, physical activity and health in early life, Ed. Wolinsky, I. CRC Press.

Course Code: ND- 514 (B) (4CH)	Course Name: NUTRACEUTICALS AND NUTRIGENOMICS

PEO1	Understand the nature and basic concepts of Nutraceuticals and Nutrigenomics Relating to the M.Sc. in Nutrition and Dietetics
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Programme Education Objectives

UNIT	TOPICS	NO. OF LECTURES
1	Nutrigenomics- definition, concepts and theories, Introduction to nutrigenomics, objectives of nutrigenomics. Examples of diseases related to diet and importance of nutrigenomics studies. The nutrients as signal molecules.	3
	Mechanisms of nutrient perception. Lipid metabolism, Analysis examples nutrigenomics on the effect of lipids in human diet. Polyphenols, transcriptomic analysis on the effect of the polyphenols in the human diet. Caloric restriction and molecules that mimic the effects of caloric restriction.	3
	Genetic materials, gene expression and inheritance, Molecular mechanisms of genetic variations linked to diet- role of diet, macro, and micronutrients. Role of animal foods, Evolution of human disease.	4
2	Introduction to gene-diet interactions, Nutrigenomics: Scope and Importance to Human Health and health care 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 unravelling physiological effects of complex foods. The intestinal microbiota - role in nutrigenomics.	5
3	Modifying disease risk through nutrigenomics: Modulating the risk of cardiovascular disease through nutrigenomics; Modulating the risk of diabetes through nutrigenomics; Modulating the risk of inflammatory bowel diseases through nutrigenomics; Modulating the risk of obesity through nutrigenomics; Modulating the risk of cancer through nutrigenomics; Modulating the malnutrition through nutrigenomics	5
4	Introduction to Nutraceutical, classification of nutraceuticals, dietary supplements, fortified foods, functional foods and Phyto nutraceuticals. Phytochemicals: Non-nutritive food components and their potential health benefits: polyphenols, tannins, phytate, phytoestrogens, cyanogenic compounds, lectins and saponins. Scope involved in the health care industry, Indian and global scenario. Concepts of nutraceuticals through traditional food and medicine.	10
5	Nutraceuticals of plant and animal origin Plant secondary metabolites, applications with specific examples with reference to skin, hair, eye, bone, muscle, heart, brain, liver, kidney, general health, and stimulants. Concept of cosmeceuticals and aquaceuticals. Concept of antioxidants - use of antioxidants as dietary supplements in prevention and treatment of cancer, obesity, and stress. Role of nutraceuticals and functional foods in paediatrics, geriatrics, sports, pregnancy, and lactation.	10
	TOTAL LECTURES =	40

TEXT BOOK:

1. Journal Nutrients 2012, 4, 1898-1944; Molecular Nutrition Research—The Modern Way of Performing Nutritional Science.
2. Journal Nutrients 2013, 5, 32-57; Nutrigenetics and Metabolic Disease: Current Status and Implication for Personalized Nutrition
3. J Nutrigenetics Nutrigenomics 2011; 4:69—89; Nutrigenetics and Nutrigenomics: Viewpoints on the Current Status and Applications in Nutrition Research and Practice.
4. J Am Diet Assoc. 2006; 106:569-576; Nutrigenomics: From Molecular Nutrition to Prevention of Disease.
5. The Journal of Nutrition; Nutritional "Omics" Technologies for Elucidating the Role(s) of Bioactive Food Components in Colon Cancer Prevention.

6. Nutrition 25 (2009) 1085—1093; Proteomics at the center of nutrigenomics: Comprehensive molecular understanding of dietary health effects.

Course Code: ND-514 (c)	**Course Name: FOOD PROCESSING AND PACKAGING**

Objective: To develop the skills for postharvest processing of food and use them as preservation techniques in food processing industries

UNIT	TOPICS	NO. OF LECTURES
1	Basic concept of food processing and preservation: Reason of food Spoilage and Scope of food processing preservation; principles of food processing and preservation	**2**
	Principle and preservation by low temperature: (refrigeration, freezing, and dehydro freezing; cold storage, frozen food), changes during freezing-physical and chemical changes	**2**
	Processing and preservation by drying: factors affecting drying rate, types of dryer – (kiln, tray, drum, spray, tunnel, fluidized bed drying),	**2**
	Types of drying technique (freeze drying, vacuum drying)	**2**
	Microwave cooking-(principle, changes during microwave cooking, advantages),difference between microwave and conventional heating	**2**
2	Processing and preservation by heat: (blanching, pasteurization, sterilization, UHT processing, heating, smoking, pickling, canning)	**3**
	Concentration and evaporation-(flash evaporator, falling film evaporator and multiple effect evaporators), changes during Concentration	**2**
	Ohmic heating	**1**
	Food processing equipments: material handling, cleaning and grading, conveyors, size reduction	**2**
	Separation Technique: filtration (MF, UF, NF, RO), agitation and mixing, frying, baking	**2**
3	Irradiation	**1**
	High pressure processing	**2**
	pulsed electric field	**1**
	Ultrasonic processing: Properties of ultrasonic, application of ultrasonic as processing techniques	**2**
	IR heating	**1**
	Hurdle technology: concept of hurdle technology and its application	**2**
	Extrusion Technology-(principle, types of extruders).	**1**
4.	Food packaging: Packaging material, Mass transfer in packing material	**3**
	packaging system and methods- vacuum packaging, gas flush packaging, aseptic packaging	**2**
	Modified atmosphere packaging (MAP), controlled atmosphere packaging (CAP), active packaging	**2**
	Bio-degradable packages, aseptic and edible package.	**2**
	Package testing, CA & M, quality changes during storage of foods	**1**
	TOTAL LECTURES =	**40**

COURSE OUTCOMES:	
Upon successful completion of the course, students should be able to:	
CO1	Create a basis knowledge of food processing and preservation methods
CO2	Demonstrate some basis knowledge of thermal processing methods for food preservation
CO3	Develop the fundamental ideas of non-thermal food preservation techniques
CO4	Implement the advancement of packaging material in food processing industries

TEXT BOOKS:	
1	Fellows PJ. 2005. *Food Processing Technology: Principle and Practice*. 4thEd. CRC.
2	Potter NN & Hotchkiss 1997. *Food Science*. 5th Ed. CBS
3	Sahay KM & Singh KK. 1994. *Unit Operation of Agricultural Processing*. Vikas Publ. House.
4	Robertson, G.L. Food Packaging: Principles and Practice (2nd ed.), Taylor & Francis 2006

REFERENCE BOOKS:	
1	Ramaswamy H &Marcotte M. 2006. *Food Processing: Principles and Applications*. Taylor & Francis
2	Wills, R.B.H., McGlasson, W.B., graham, D., Lee, T.H. and Hall, E.G. 1989.
3	Food Packaging Technology Handbook. NIIR Board, National Institute of Industrial Research, 2003
4	Robertson, G.L. Food Packaging: Principles and Practice (2nd ed.), Taylor & Francis 2006

Course Code: ND- 514 (d) (4CH)	Course Name: PUBLIC HEALTH NUTRITION

PEO1	Understand the nature and basic concepts of **Public Health Nutrition** Relating to the **M.Sc. in Nutrition and Dietetics**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Programme Education Objectives

UNIT	TOPICS	NO. OF LECTURES
1	Introduction to PHN, behavioral aspect of PHN, public health nad food policy. Rural health- importance of interprofessional approach. Urban health and urbanization, global health.	**4**
	Role of nutrition support in- dietetic interns, dietitian Dietary guidelines, food choice	**3**
	Assessment of nutritional status of individual and community	**3**
2	Community nutrtion- definition, characteristics of community, community health-factors affecting community health, community organization. Factors influencing community nutrition	**4**
	Family- characteristics, types, function food habits, food faddism	**3**
3	Food nutrition and security vin community	**3**
	Public health aspects of overnutrition, public health aspects of under- nutrition	**3**
	Role of new food, food fortification & enrichment, food labeling in the community	**3**
	Community centers- organization and function of community health center	**4**
4	Malnutrition and nutritional disorders- PEN, folic acid, iodine, zinc, iron and vitamins deficiency.	**4**
	Public health nutrition programme planning, training of workers in nutrition education programmes.	**2**
	Challenges in public health nutrition	**2**
	Professional development, needs and strategies in public health nutrition	**2**
	TOTAL LECTURES =	**40**

TEXT BOOK:

1. Owen, A. Y. and Frackle, R.T., (2002): Nutrition in the Community. The Art of Delivering Services, 2nd Edition Times Mirror/Mosby.
2. Part, K. (2000): Part's Textbook of Preventive and Social Medicine, 18ü1 Edition, M/S. BanarasidasBhanot, Jablpur.
3. Beaton, G.H. and Bengoa, J.M. (Eds) (2000): Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Bamji, M.S., Rao, P.N., Reddy, V (Eds) (2003): Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

Course Code: ND-515 (4CH)	Course Name: NUTRITIONAL SURVEY AND DIET PLANNING

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **NUTRITIONAL SURVEY AND DIET PLANNING** Relating to the **M.Sc. in Nutrition and Dietetics**
PEO2	Analyse the relationships among different concepts

PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **NUTRITIONAL SURVEY AND DIET PALNNING**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

Course Code: ND-516 (2CH)	**Course Name: ENTERPRENEURSHIP DEVELOPMENT PROGRAMME**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **ENTERPRENEURSHIP DEVELOPMENT PROGRAMME** Relating to the **M.Sc. in Food Science Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **ENTERPRENEURSHIP DEVELOPMENT PROGRAMME**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

Course Code: MOOC (3 CH)	**Course Name: (As per choice of student)**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **MOOC** Relating to the **M.Sc. in Food Science & Nutrition**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Student should opt in 2nd or 3rd semester as per available from online platforms like-SWAYAM, IGNOU, CONSORTIUM FOR EDUCATIONAL COMMUNICATION, NPTEL etc. Evaluation shall be done by examination. Students should be assigned marks for the same.

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **MOOC**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

Course: MOOC	Course Name: MOOC Alternative Course (DAIRY TECHNOLOGY)

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Dairy Technology** RelatingtotheM.Sc.in **Food Science and Technology**
PEO2	Analyze the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

UNIT	TOPICS	NO.OF LECTURES
1	Present status of milk & milk products in India and Abroad; market milk-Composition Of milk of various species, Physiochemical properties, difference evaluation, defects in dried milk powder.	3
	Quality evaluation and testing of milk, procurement, transportation and processing of Market milk, cleaning & sanitization of dairy equipment	3
	Special milks such as flavored, sterilized, recombined & reconstituted toned & double Toned.	4
2	Cream- Definition, classification, composition, cream separation, sampling, neutralization, sterilization, pasteurization & cooling of cream, evaluation, defects in cream	4
	Butter-Definition, composition, classification, methods of manufacture, theories of churning, evaluation, defects in butter	4
	Ice-cream-Definition, composition and standards, nutritive value, classification, methods Of manufacture, evaluation, defects in ice-cream, and technology aspects of softy manufacture.	2
3	Condensed milk-Definition, methods of manufacture, evaluation of condensed & Evaporated milk	3
	Dried milk Powder-Definition, methods of manufacture of skim & whole milk powder, instantiation	3
	Cheese: Definition, composition, classification, methods of manufacture, cheddar, Gouda, cottage and processed cheese, evaluation, defects in cheese.	3
	Pre-biotic and pro biotic milk products.	1
	TOTALLECTURES=	**30**

FOURTHSEMESTER

Course Code: ND-521 (4CH)	Course Name: ADVANCE DIET PLANNING
Pre-requisite: None	**Co-requisite: None**

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Entrepreneurship Development Proposal** Relating to the**M.Sc.in Nutrition and Dietetics**
PEO2	Analyze the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Entrepreneurship Development Proposal**
CO-2	Analyze the Various Concepts and understand them through case studies
CO-3	Apply the knowledge to understand practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

Course Code: ND-522 (12CH)	Course Name: FINAL PROJECT/DISSERTATION
Pre-requisite: None	Co-requisite: None

Programme Education Objectives

PEO1	Understand the nature and basic concepts of **Final Project /Dissertation** RelatingtotheM.Sc.in **Nutrition and Dietetics**
PEO2	Analyze the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Final Project /Dissertation**
CO-2	Analyze the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

1. Basic concepts of project planning
a) Defining objectives- Need, problem, project, feasibility, planning, formulation. - . Identifying resources
b) Methods/approaches,

2. Guideline for project writing –
Title of the project - Name of the person - Duration of the project, type of project. – Aims and objectives - summary of the proposed project - Project information, location, people and personnel involved. - Working/methodology – Evaluation - Writing and reporting

3. Internship Tenure– 6months-
After successful completion of the course the candidate is eligible to undergo 6months internship in the following departments.

Modules for Project Work:

1. Drying and Dehydrations of fruits and vegetables
2. Fruits and Vegetable Products
3. Beverages and other Innovative Products
4. Spice Products
5. Postharvest management and marketing of Fresh Fruits and Vegetables
6. Egg, Poultry and Meat Processing
7. Bakery Products
8. Grain-based Products (Cereal, Legumes/pulses, and oilseeds)
9. Chocolate, Confectionary, and Snack Products10. Milk and Milk products
11. Processing of Fish and Fish Products
12. Functional Foods and Nutraceuticals
13. Innovative Food Packaging

A Good Project should have:

i) Originality, Innovation and creativity and should commensurate with understanding the problem andfinding solution.
ii) Relevance of the project to the community and impact of the project on society.
iii) Proper understanding of the subject, quality and quantity of the work and efforts to validate the datacollected.

Project Report Writing:

The structure of the project report shall be in the format is as follows:

i) The Cover Page-
It should have
- Title of the project
- Name and address of department
- Name and address of Supervisor/Guide/ teacher

ii) Abstract -500 words

iii) Contents:
-List of tables/figures
- Abbreviations

iv) Introduction-Description on background of the study

v) Aims and Objectives

vi) Relevance of the project work

vii) Methodology

viii) Observations: This shall include the observations during the experiment. Observation can be bothqualitative as well as quantitative.

ix) Data analysis and interpretation: The data generated/ obtained from the experiments/observations should be processed for better understanding in a more structured manner. Tools and methods (e.g.statistical methods) may be used for analyzing data to understand the patterns that emerges from itto form results and conclusions.

x) Results: Results are the output of compilation of the data into meaningful outcomes/ interpretationsand sometimes, there is a need to redo the experiments to get consistent results. In case it is not possible to "repeat the experiments", there should be adequate replicates so that adequate data is available for interpretation, and arriving at results.

xi) Conclusions: This is the logical end of the project to arrive at specific conclusions from the observed phenomena. In a way, the whole objective of the project is to arrive at some conclusion,either positive or negative which would lead to a better understanding of the problem.

xii) Acknowledgement

xiii) References

Evaluation shall be done by external members. Students should be assigned marks for project report basedon following Criteria:

Sl.No.	Topics	%Marks
1	Originality of Idea and Concept	5
2	Relevance of the project to the theme/problem	5
3	Data collection and analysis	10
4	Research Plan and Methodology	10
5	Experimentation/ execution of research work	10
6	Research Report Writing	30
7	Oral Presentation	20
8	Clarification of queries raised	20
	Total=	100

The word „Project" essentially means that learning and development are achieved through personally determined experience and involvement, rather than on received teaching or training, typically in group, by observation, study of theory or hypothesis, bring in innovation or transfer of skills or knowledge. Experiential learning during project work is a business curriculum-related endeavour which is interactive.

Course Outcomes

CO-1	Remember and understand the basic concepts/Principles of **Project Work/Internship and Viva Voce**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

Course Code: ND-523(4CH)	**Course Name: INTERNSHIP REPORT AND SEMINAR**
Pre-requisite: NONE	**Co-requisite: None**

Programme Education Objectives

PEO1	Understand the nature and basic concepts RelatingtotheM.Sc.in **Nutrition and Dietetics**
PEO2	Analyse the relationships among different concepts
PEO3	Perform procedures as laid down in the areas of study
PEO4	Apply the Basic Concepts learned to execute them

The student utilizes the knowledge in detail to build self-confidence.

Course Outcomes

CO-1	Rememberandunderstandthebasicconcepts/Principles of **Seminar**
CO-2	Analyse the Various Concepts to understand them through case studies
CO-3	Apply the knowledge in understanding practical problems
CO-4	Execute/create the Project or field assignment as per the knowledge gained in the course

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