

M.Sc. NUTRITION SCIENCE
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M.Sc. NUTRITION SCIENCE

PROGRAMME OBJECTIVE

1. To learn and know how to use and apply information sources related to nutrition, food, lifestyle and health.
2. To Identify and classify food and foodstuffs. knowing their composition, properties, nutritive value, bioavailability, organoleptic, sensory characteristics, and the changes they undergo as a consequence of technological and culinary processes.
3. To understand the basic processes involved in the preparation, transformation and conservation of foods of both animal and vegetable origin.
4. To learn and interpret using food composition tables.
5. To understand the microbiology, parasitology and toxicology of food.
6. To design and carry out health status assessment protocols, and identifying nutritional risk factors.
7. To understand the structure of food services, nutrition departments and hospital nutritionists, and identifying and developing the functions of a nutritionist-dietician in a multidisciplinary team.
8. To enable students to assess the structure and component of food system and analyze the relationships between nutritional health and food selection, use appropriate laboratory techniques and chemicals to enumerate, and identify the nutrients and microorganism in food.

PROGRAMME SPECIFIC OUTCOME

1. The Student will understand the role of food and nutrients in health and disease Processes.
2. The student will be able to provide nutrition counselling and education to individuals, groups, and communities using a variety of communication strategies.
3. The student will learn to evaluate nutrition information based on scientific reasoning for clinical community, and food service application.
4. The student will be able to apply technical skills, knowledge of health behaviour and decision-making skills when assessing and evaluating the nutritional status of individuals and communities and their response to nutrition intervention.
5. The student will learn to how to perform food management functions in business, health-care, community, and institutional arenas.

**M.Sc. NUTRITION SCIENCE
COURSE STRUCTURE AT A GLANCE**

Ist SEMESTER

PAPER CODE	COURSE TITLE	MARKS
MNS 1001	APPLIED PHYSIOLOGY	100
MNS 1002	NUTRITIONAL BIOCHEMISTRY	100
MNS 1003	ADVANCED NUTRITION	100
MNS 1004	ADVANCES IN FOOD MICROBIOLOGY	100
	PRACTICAL	100
	TOTAL MARKS	500

IInd SEMESTER

PAPER CODE	COURSE TITLE	MARKS
MNS 2001	RESEARCH METHODOLOGY, STATISTICS AND COMPUTER APPLICATION	100
MNS 2002	FOOD SCIENCE	100
MNS 2003	TECHNIQUES OF FOOD ANALYSIS	100
MNS 2004	NUTRITION DURING LIFE CYCLE	100
	PRACTICAL	100
	TOTAL MARKS	500

IIIrd SEMESTER

PAPER CODE	COURSE TITLE	MARKS
MNS 3001	THERAPEUTIC NUTRITION AND DIETETICS	100
MNS 3002	FOOD PROCESSING AND TECHNOLOGY	100
MNS 3003	FOOD SERVICE MANAGEMENT	100
MNS 3004	COMMUNITY NUTRITION	100
	PRACTICAL	100
	TOTAL MARKS	500

IVth SEMESTER

PAPER CODE	COURSE TITLE	MARKS
MNS 4001	FOOD PRODUCT DEVELOPMENT	100
MNS 4002	ADVANCED DIETETICS	100
MNS 4003	NUTRITION FOR HEALTH AND FITNESS	100
MNS 4004	DISSERTATION/PROJECT	200
MNS 4005	MOOC (COMPULSORY AND ANY ONE OUT OF AVAILABLE CHOICES)	GRADING SYSTEM: PASS/FAIL
	TOTAL MARKS	500
	GRAND TOTAL	2000

M.Sc. FIRST SEMESTER

APPLIED PHYSIOLOGY

PAPER CODE-MNS 1001

COURSE OBJECTIVE

To enable the student to understand the anatomy and function of human body

COURSE LEARNING OUTCOME

The student will be able to:

1. Understand the current level of knowledge regarding the human body's functioning organisation.
2. Gain a better understanding of how all of the body's organ systems work and how they interact.
3. Understand the pathophysiology of diseases that occur frequently.
4. Establish a link between physiology and a variety of illnesses and their pathophysiology.

COURSE CONTENT

Unit-1

Cell structure and functions of organelles, tissues, organs brief review Skeletal System- Review of structure & functions of bones and vertebral column

Unit-2

Nervous System -Review of structure and functions of neuron. Conduction of neuro impulse, synapses, Role of neuro transmitters.

Organisation of central nervous system. Structure and function of brain and spinal cord, afferent and efferent nerves, blood brain barrier. CSF, hypothalamus and its role in various body functions.

Unit-3

Digestive System - Review of structure and functions of Digestive system. Secretory, digestive and absorptive functions. role of liver. pancreas and gall bladder motility and hormones of GIT

Excretory System-Structure, function of nephron, urine formation, role of kidney in maintaining pH of blood, Diuretics

Unit -4

Respiratory System -Review of structure and functions, role of lung in exchange of gases. Transport of oxygen and CO₂.

Circulatory System -Structure and function of heart and blood vessels. Regulation of cardiac output and blood pressure, heart failure. Hypertension.

Unit-5

Endocrine System -Structure, function, role of hormones, regulation of hormones secretion. Disorders of endocrine glands.

Reproductive System - Male organs of reproduction. Female organs of reproduction. Menstrual cycle, fertilization, physiological changes in pregnancy.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course Learning outcomes	Teaching and learning activity	Assessment Tasks
1.	Will be able to become familiar with the structure and function of the Cell, structure and functions of different organelles and Skeletal system	Study of permanent slides	Assignments/Quiz/Test
2.	Comprehend the structural and functional organization of Nervous System	Study of permanent slides	10 min MCQ after lecture
3.	Understand the structural and functional organisation Of Digestive system and Excretory system	Study of permanent slides	Histological features of stomach. Small and large intestine, liver, Nephron and Kidney
4.	Understand the structural and functional organisation Of Respiratory system and Circulatory system	Measurement of Pulse, BP Estimation of blood group, haemoglobin, blood sugar, RBC,WBC and platelet count	Recording of BP by using a Sphygmomanometer, Use of Glucometer, Use of haemometer
5.	Become familiar with the structural and Functional organization of Endocrine System and Reproductive system	Study of permanent slides of testis, ovary Employ video lectures to demonstrate the functional organisation of different endocrine glands	Group based activity and seminar on diifferent endocrine glands and reproductive system

SUGGESTED READINGS

1. Ganong W.F. (2003)-Review of Medical Physiology.21st ed. McGraw Hill.
1. Guyton A.C. and Hall J.E. (2000) Textbook of Medical Physiology.10th ed. India: Harcourt Asia.
2. Tortora G.J and Grabowski S.R. (2000) Principles of Anatomy and Physiology.9th ed. John Wiley and Sons.Inc.

3. West J.B. (1996): Physiological Basis of Medical Practice.12th Edition. B. I. Waverly Pvt. Ltd.Marieb E.N(2001) Human Anatomy and Physiology (5th ed) Pearson Education, Inc, publishing as Benjamin Cummings.
4. Jain A. K (2014) Human Physiology for BDS (5th Edition), Publisher: Avichal Publishing Company; ISBN: 9788177394337.
5. Pal G.K and Pal Pravati (2016) Comprehensive Textbook of Medical Physiology (2Vols) Publisher: Jaypee Brothers Medical Pub (P) Ltd.) ISBN: 5551234080758;
6. Moran Campell E.J., Dickinson,C.J., Slater,S.D.Edwards.C.R.Wand Sikora,K.(1984) Clinical Physiology,5th Edition,ELBS, Blackwell Scientific Publications.
7. Wilson ,K .J.W. and Waugh,A.(1996): Ross and Wilson Anatomy and Physiology in Health and illness,8th Edition ,Churchilli Livingstone
8. McArdle,W.D., Katch, F.I. and Katch ,V.L. (1996): Exercise Physiology. Energy, Nutrition and Human Performance,4 th Edition, Williams and Wilkins, Baltimore.

NUTRITIONAL BIOCHEMISTRY

PAPER CODE-MNS 1002

COURSE OBJECTIVE

To provide a keen knowledge of absorbed nutrient's assimilation and understand the mechanisms adopted by human body for regulation of metabolic pathway and cycles.

COURSE LEARNING OUTCOME

1. Gained knowledge of biological catalysts essential for metabolism, its compositional structure, characteristics, biological functions, classifications, working activities, Factors affecting enzyme activities, inhibitors, Iso enzymes, coenzymes essential in biological system or metabolism.
2. Understand of Biochemical composition of nutrient compounds on association of metabolism. Biological oxidation reactions and respiratory chain reactions with oxidative phosphorylation, regulation. Working in energy forming process of human body and its essentials.
3. Understand the biochemical events and processing of catabolism and anabolism held under the metabolism of macro nutrients: carbohydrates, proteins and fats including regulation of metabolism.
4. Gain knowledge of biochemistry of vitamins and minerals regarding its association with biological system.

COURSE CONTENT

Unit 1

Enzymes as biological catalysts, IUB system of classification, concept of active site, specific activities, turnover number. Units of enzymes activities. Effects of substrate concentrates, Effects of pH and temperature on enzyme catalyst reactions. Enzyme's inhibitors, Iso enzymes.

Unit 2

Biological oxidation, Enzymes of Biological oxidation, redox potential. Respiratory chain, oxidative phosphorylation. Mitchell's oxidative phosphorylation.

Unit 3

Intermediary Metabolism and its regulation, Carbohydrates: Glycolysis, HMP shunt pathway, gluconeogenesis.

Lipids: beta- oxidation and pathways of fatty acid's catabolism. Denovo synthesis of fatty acids. Metabolism of ketone bodies, cholesterol metabolism.

Unit 4

Protein Metabolism, An overview of protein metabolism, general reactions of protein catabolism, urea cycle, biosynthesis of protein.

Unit 5

Vitamin and minerals, Biological role, absorption and metabolism of vitamin A, D, E and K. B complex, Vitamin C. Macro and micro minerals.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
1.	Learn about enzyme activities and its functioning.	Discussion Assignment on various theories of enzyme activities	Sessional work Routine test
2.	Understand Biological oxidation reactions and respiratory chain reactions with oxidative phosphorylation, regulation, energy forming process of human body	Discussion on biological system for energy generation. Lectures on topics	Routine test
3.	Understand carbohydrates, proteins and fats including regulation of their metabolism	Discussion and lectures Assignment	Routine test
4.	Understand the biosynthesis of protein, Fatty acids, ketone bodies, cholesterol,	Lecture and discussion	Routine test
.	Gained knowledge of biochemistry of vitamins and minerals regarding its association with biological system.	Lecture and discussion	Routine test

SUGGESTED READINGS

1. Murray, R.K. Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. Harpers Biochemistry, Macmillan worth Publishers.
2. Nelson, D.L. and Cox, M.M. (2000): 3rd Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
3. Devlin, T.M. (1997): 4th Ed. Text book of Biochemistry with Clinical Correlations, Wiley Liss Inc.
4. Stryer, L. (1998): 4th Ed. Biochemistry, WH Freeman and Co.,
5. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
6. Voet, D. Voet, J.G. and Pratt, C.W. (1999). Fundamentals of Biochemistry.
7. Oser, B.L. (1965). 14th Ed. Hawk's Physiological Chemistry. Tata McGraw-Hill Publishing Co. Ltd.
8. Varley, H. Gowenlock, A.H. and Bell, M.(1980). 5th Ed. Practical Clinical Biochemistry, Heinemann Medical Books Ltd.,
9. Tietz, N.W.: (1976) Fundamentals of Clinical Chemistry. S.B. Saunders Co.,
10. Vogel, A.I. (1962): 3rd Ed. A. Textbook of Quantitative Inorganic Analysis. The English Language book Society and Longman
11. Raghuramulu, N : Madhavan nair and K. Kalyanasundaram, S. (1983). A Manual of Laboratory Techniques NIN, ICMR.
12. Plummer, D. T. (1987). 3rd Ed. An Introduction to Practical Biochemistry McGraw-Hill Book Co.
13. Winton, A.L. and Winton, K.B. (1999). Techniques of Food Analysis. Allied Scientific Publishers.

ADVANCED NUTRITION

PAPER CODE-MNS 1003

COURSE OBJECTIVE

To enable the student to understand the recent trends in nutrition, function, deficiency and toxicity of different nutrients

COURSE LEARNING OUTCOME

Students will be able to:

1. Understand the classification functions, sources, requirement, digestion and absorption and deficiency disorders of Carbohydrates, Proteins and fat. microbial flora associated with food; understand the beneficial effects of microorganisms and the relevance of food microbial safety.
2. Understand the concept of body composition, biochemical composition of body and body composition measuring technique.

COURSE CONTENT

Unit 1

Definition, classification functions, sources, requirement, digestion and absorption of Carbohydrates, Functions and role of dietary fiber, Energy concepts of food, physiological fuel value-review measuring of energy expenditure. BMR thermic effect of feeding and physical activity

Unit 2

Basic requirement, Function, Source, digestion and absorption of protein, method of assessing protein quality. Basic of requirement, Functions, Source, digestion, absorption and deficiency disorders of lipids, essential fatty acid MUFA and PUFA

Unit 3

Requirement, Functions, Source deficiencies and toxicities of fat and water soluble vitamins.

Unit 4

Requirement, Functions, Sources, deficiency, Toxicity and factors affecting absorption and utilization of macro and minerals

Unit 5

Body composition, biochemical composition of body. Body composition measuring technique: calculation of body density Isotope electrolyte method body cell mass, lean body weight and fat free body. Water and electrolyte balance.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
1.	Develop insight about basic concept of Definition, classification functions, sources, requirement, digestion and absorption of Carbohydrates	Discussion Assignment	Assignment/Test
2.	Understand basic requirement, Function, Source, digestion and absorption of protein	Discussion,	Assignment/Test
3.	Understand the requirement, Functions, Source deficiencies and toxicities of fat and water soluble vitamins	Discussion	Assignment/Test
4.	Understand the requirement, Functions, Sources, deficiency, Toxicity and factors affecting absorption and utilization of macro and minerals	Discussion	Assignment/Test
5.	Body composition, biochemical composition of body, Water and electrolyte balance.	Discussion	Assignment/Test

SUGGESTED READINGS

1. Annual Reviews of Nutrition. Annual Review Inc. California, USA.
2. Shils, M.E.: Olson, J: Shike, M. and Roos, C. (1998): Modern Nutrition in Health and Disease. 9th edition. Williams and Williams. A Beverly Co. London.
3. Bodwell, C.E. and Erdman, J.W. (1988) Nutrient Interactions. Marcel Dekker Inc., New York.
4. World – Reviews of Nutrition and Dietetics.
5. WHO Technical Report Series.
6. Indian Council of Medical Research. Recommended Dietary Intakes for Indians – Latest Recommendations.
7. Indian Council of Medical Research. Nutritive value of Indian Foods – Latest Publication.
8. Bordanier, C.D. and Haargrove, J.L. (Ed.) (1996): Nutrients and Gene Expression: Clinical Aspects. Boca Raton, FL CRP Press.
9. Baeurle, P.A. (Ed.)(1994) Inducible Gene Expression. Part-I : Environmental Stress and Nutrients. Beston : Birkhauser.
10. Chandra, R.K. (Ed.) (1992): Nutrition and Immunology, ARTS Biomedical. St. John's Newfoundland.
11. JOURNALS 1. Nutrition Reviews 2. Journal of Nutrition 3. American Journal of Clinical Nutrition 4. British Journal of Nutrition 5. European Journal of Clinical Nutrition 6. International Journal of Vitamin and Nutrition Research

ADVANCES IN FOOD MICROBIOLOGY

PAPER CODE-MNS 1004

COURSE OBJECTIVE

To enable the student to gain deeper knowledge of role of micro- organisms in human environment and to understand the importance of micro- organism in food spoilage and to learn techniques in food preservation.

COURSE LEARNING OUTCOME

Students will be able to:

1. Understand the microbial flora associated with food; understand the beneficial effects of microorganisms and the relevance of food microbial safety.
2. Understand the conventional and rapid methods for detecting foodborne pathogens and their toxins.
3. Understand the role of microbes in food spoilage.
4. Understand various biological and chemical methods of food preservation.

COURSE CONTENT

Unit 1

Food as a substrate for microorganisms, pH, moisture oxidation- reduction potential, nutrient content, inhibitory substance and biological structure.

Microorganism of importance in food, their classification, morphology, growth and reproduction, Industrial importance.

Unit 2

Methods of isolation and detection of microorganisms or their products in food. Conventional methods, Rapid methods (newer Techniques). Immunological methods, Chemical methods.

Unit 3

Spoilage of Food: sources of contamination, soil, water. Air, animal, plants, humans, sewage, equipment, ingredients product to product.

Spoilage of different groups of food: Cereal and cereal products vegetables and fruits, meat and meat products, egg and poultry, fish and other sea foods, mi11kand milk products, canned foods.

Unit 4

Food preservation: Physical methods, chemical methods and biological based preservation systems.

Food borne diseases: Bacterial and viral borne diseases. Food borne important animal parasites, mycotoxins.

Unit 5

Role of microbes in fermented and genetically modified foods.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course learning Outcomes	Teaching and learning activity	Assessment tools
1.	Understand the classification of micro-organisms and microbial Flora associated with food.	Lectures and Discussion	Assignment/Quiz
2.	Understand the conventional and rapid methods for detection of food borne pathogens	Lectures and Discussion	Presentations and Practical
3.	Understand the role of microbes in food spoilage	Lectures and Discussion	Presentations and Practical
4.	Acquire knowledge on Food preservation and food borne diseases	Lectures and Discussion	Presentations and Practical
5.	Understand the role of microbes in fermented and genetically modifies foods	Lectures and Discussion	Presentations and Practical

SUGGESTEC READINGS

1. Pelczar, M.I. and Reid, R.D. (1933): Microbiology McGraw Hill Book Company, New York, 5th Edition.
2. Atlas, M. Ronald (1995) Principles of Microbiology, 1st Edition Mosby- year Book, Inc. Misso uri, U.S.A.
3. Topley and Wilson's (1983) Principles of Bacteriology, Virology and Immunity, Edited by S.G. Wilson, A Miles and M.T. Parkar Vol. I: General Microbiology and Immunity II: Systematic Bacteriology. 7th Edition Edward Arnold Publishers.
4. Block, J.G. (1999): Microbiology Principles and Explorations, 4th Edition John Wiley and Sone Inc.
5. Frazier, W.C. (1988): Food Microbiology, Mc Graw Hill Inc. 4th Edition.
6. Jay, James, M. (2000): Modem Food Microbiology, 6th Edition, Aspen Publishers Inc. Maryland.
7. Banwant, G. (1989): Basic Food Microbiology, 2nd Edition. CBS Publishers.
8. Garbutt, J. (1997): Essentials of Food Microbiology. 1st Edition, Arnold International Students Editions.
9. Doyle, P. Benehat, L.R. and Mantville, T.J. (1997): Food Microbiology, Fundamentals and Frontiers, ASM, Washington DC.
10. Adams, M.R. and M.G. Moss (1995): Food Microbiology, 1st Edition, New Age International (P) Ltd.
11. Bensaon, H. J. (1990): Microbiological applications, C. Brown Publishers U.S.A. Roday, S. (1999): Food Hygiene and Sanitation, 1st Edition. Tata Mac Graw Hill, New Delhi.
12. Venderzant C. and D.F. Splitts Toesser (1992): Compendium of Methods for the Microbiological Examination of Foods 3rd Edition American Public Health Association, Washington DC.

PRACTICALS

1. Calcium: Estimation of calcium in foods and serum.
2. Phosphorus: Estimation of inorganic phosphorus in foods and serum.
3. Ascorbic acid: Estimation of ascorbic acid in foods.
4. Proteins: Estimation of protein in food stuffs.
5. Estimation of albumin, globulin and albumin / globulin ratio in serum and urine.
6. Estimation of haemoglobin, measurement of blood pressure
7. Identification of blood groups.
8. Identification and counting of blood cells
9. Estimation of random blood sugar
10. Bleeding and clotting time.
11. Glucose: Estimation of glucose in blood and urine.
12. Cholesterol: Estimation of cholesterol in blood
13. Urea and Creatinine: Estimation of urea and creatine in serum and urine.
14. Experiments related to the morphology of microbes.
15. Preparation of Media.
16. Staining techniques of micro-organisms.
17. Growth and growth curve of micro-organisms.
18. Microbial count

M.Sc. SECOND SEMESTER

RESEARCH METHODOLOGY, STATISTICS COMPUTER APPLICATION

PAPER CODE-MNS 2001

COURSE OBJECTIVE

To introduce the significance of statistics and research methodology in Nutrition Research and to understand the types, tools and method of research.

COURSE LEARNING OUTCOME

Student will be able to learn about conceptual understanding of statistical measures, Classification and tabulation of data, Measurement of central tendency, measure of variation, functional units of computer and application of computers.

COURSE CONTENT

Unit 1

Definition and identification of research problem. justification. hypothesis. assumptions. limitations and delimitations of a problem. Research design: principles, purpose application, exploratory and descriptive, survey and case study. Qualitative research methods: theory and design, types, methods and techniques of data collection. Types of variables and data gathering instruments.

Unit 2

Conceptual understanding of statistical measures. Classification and tabulation of data. Measurement of central tendency, measure of variation. Frequency distribution, histogram, frequency, polygons, ogive. Theory of probability. probability sampling: two stage and multi stage sampling, cluster sampling. Non- probability sampling.

Unit 3

Binomial and normal Distribution; Normal Probability Curve; Testing of hypothesis: significance level, confidence limit. Parametric and non-parametric tests; Chi square test. t-test, f-ratio, analysis of variance-one way and two-way classification. Correlation, coefficient of coefficient. rank correlation. Reliability of mean, standard deviation and predictions; experimental designs- completely randomized design. randomized block design, Latin square design. factorial design. trend analysis.

Unit 4

Introduction to computers and its classification: what is computer, functional units of computer, its characteristics, history, generation, classification according to data processing mode and according to size/function, hardware, software. input devices: key board, mouse, bar code readers. optical card readers, magnetic ink corrector reader. smart cards. Output devices: Monitor, printer.

Unit 5

Primary and secondary storage devices. data processing concepts. introduction to storage devices, characteristics. main memory. secondary storage. Data information and data processing.

Representation of information, number system (binary, octal, decimal, hexadecimal) and their conversions. Bits, bytes kilobyte, megabyte, gigabyte. Application of computers.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course learning Outcomes	Teaching and learning activity	Assessment tools
1.	Understand the definition and identification of research problem. hypothesis. Research design, Qualitative research methods, methods of data collection.	Lectures and Discussion	Assignment/Quiz/Test
2.	Conceptual understanding of statistical measures. Measurement of central tendency and variation. Probability and Non-Probability sampling	Lectures and Discussion	Assignment/Quiz/Test
3.	Understand and learn about Binomial and normal Distribution Parametric and non-parametric tests Experimental designs	Lectures and Discussion	Assignment/Quiz/Test
4.	Learn about functional units of computer, hardware, software. input and output devices	Lectures and Discussion	Assignment/Quiz/Test
5.	Understand about Primary and secondary storage devices. Data information and data processing, gigabyte. Application of computers	Lectures and Discussion	Assignment/Quiz/Test

SUGGESTED READINGS

1. Agrawal C., Joshi S.P. and Sinha A Communication Research and development, The ISRO Experience, new Delhi, Nawray Rai concept Pub. Co.
2. Beaglehole R, Bonita R and Kjellstrom T (1993). Basic Epidemiology. World Health Organization, Geneva.
3. Best J. (1959): Research in education. Englewood, Cliffs. New Jersey Prentice Hall Inc.
Bhattacharya DK (2004). Research Methodology. Published by Anurag Jain for excel books, New Delhi, India
4. Biderman A. and Drury T. (1976): Measuring work and Quality for social reporting New York, John Wiley and Sons.
5. Brow F. (1988): Statistics for Behavioural Science, Boston, Allyn and Barm Inc. Century Gofes Company, Inc. New York. Delhi, Sultan Chand and Sons. Design, Prentice Hale Inc. N.J.
6. Fowler FJ (2001). Survey Research Methods (3rd ed.). Sage Publications, Newbury Park
7. God V. Caite (1972): Essentials of Educational Research Methodology.
8. Good C.N. (1963): Introduction to Educational research, New York, Applatan
9. Gupta S.C. and Kapodi V.R. (1990) : Fundamentals of Applied Statistics, New Hinton P (2004). Statistics Explained: A Guide for Social Science Students. Routledge Publishing, London
10. Kaul L. (1980): Methodology of Educational Research, Vani educational books, Vikas Pub., New Delhi.

11. Keennetb King. (1978): Final report Literacy Research in developing countries. Kerlinger F.n. (1965): Foundations of Behavioural Research, N., Holl Rinehart and Winston Inc.
12. Kothari C R (2008). Research Methodology: Methods and Techniques (2nd ed.). New Age International Publishers, New Delhi, India. Ltd., Ramnagar, Delhi
13. Methodology of Research in Education – Publishing Sidhu Sterling Publishers Pvt.Ltd. New Delhi.
14. Monly C.J. (1964): Tre Science of Educational Research, Einasia Pub. House New Delhi.
15. Patton Q.M. (1990): Qualitative evaluation and Research methods, sage Pub., Ratnapala N. (1993): New Horizons in Research methodology, Sri Lanka,
16. Rolvert horndike (1977): Measurement & Evaluation in Psychology & Education.4th ed. John Willy & Sons Sarvodaya Research Institute. Sciences, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
17. Singh A.K. (1986): Tests, Measurement and Research Methods in Behavioural
18. Sproull N (2003). Handbook of Social Research Methods: A Guide for Practitioners and Students in the Social Sciences. The Scarecrow Press, Inc., New Jersey
19. Wandt Edwin (1968): A cross section of educational Research, David McKay workshop on education research with special research on literacy. Geneva

FOOD SCIENCE

PAPER CODE- MNS 2002

COURSE OBJECTIVE

To make the student aware about common food processing techniques and understand the physio-chemical properties of food.

COURSE LEARNING OUTCOME

After studying this paper, the student will be able to understand food processing techniques as well as the physical and chemical properties of various foods.

COURSE CONTENT

Unit 1

Colloidal chemistry as related to food, evaluation of food by subjective and objective method, carbohydrates in food sources and characteristics of sugar, starch, cellulose, pectin and gums characteristics in foods, effect of cooking and processing

Unit 2

Protein in food, plant and animal food chemical and physical properties related to food effect of cooking and processing technique, on fats, properties, uses, processing techniques, changes during heating and storage of fats and oils.

Unit 3

Classification, Importance, Composition function of fruits and vegetables and effect of cooking and processing on their nutritive value.

Unit 4

Classification and Importance of beverages, fruit pigments, browning reaction Definition, classification, uses and legal aspect of food additives classification, nature, and uses of leavening agents, flavours.

Unit 5

Definition, Importance of organic food and Nutraceuticals, Definition, type, different type of common adulterants law related to prevention of food adulteration

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course learning Outcomes	Teaching and learning activity	Assessment tools
1.	Understand and learn about Colloidal chemistry as related to food, characteristics of sugar, starch, cellulose, pectin and gums, effect of cooking and processing	Lectures and Discussion	Assignment/Quiz
2.	Learn about Protein in food, chemical and physical properties related to food, processing techniques.	Lectures and Discussion	Presentations and Practical
3.	Enable the student to learn about the Classification, Importance, Composition function of fruits and vegetables	Lectures and Discussion	Presentations and Practical
4.	Enable the student to learn about the Classification and Importance of beverages, food additives	Lectures and Discussion	Presentations and Practical
5.	Learn and understand the Definition, Importance of organic food and Nutraceuticals, adulterants and law related to prevention of food adulteration	Lectures and Discussion	Presentations and Practical

SUGGESTED READINGS

1. Charley, H. (1982): Food Science (2nd edition), John Willey & Sons, New York.
2. Potter, N. and Hotchkiss, J.H. (1996): Food Science, Fifth edition, CBS publishers and Distributors, New Delhi.
3. Belitz, H.D. and Gropsch, W. (1999): Food Chemistry (2nd edition), Springer, New York.
4. Abers, R.J. (Ed.) (1976): Foam, Academic Press, New York.
5. Cherry, J.P. (Ed.) (1981): Protein Functionality in Foods, American Chemical Society, Washington, D.C.
6. Pomeranz, Y. (Ed.) (1991): Functional Properties of Food Components, (2nd edition), Academic Press, New York.
7. Duckworth, R.B. (Ed.) (1978): Water Relation to Foods, Academic Press, London.
8. Parihar, P., Agarwal, R. Jain D.K. and Mandhyan, B.L. (1977): Status Report on Dehydration of Eggs. PHT / CAE / Publishers.
9. Marshall, K.R. and Harper, W.J. (1988): Whey Protein Concentrates, IDF Bulletin No.233.
10. Tindall, H.D. (1983): Vegetables in the Tropics, MacMillan, Press, London.
11. Julians, B.O. (Ed.) (1985): Rice Chemistry and Technology, (2nd Edition), American Association of Cereal Chemistry, St. Paul Minesota, USA.

TECHNIQUES OF FOOD ANALYSIS

PAPER CODE-MNS 2003

COURSE OBJECTIVE

1. To introduce the students about basic concept of biochemical assessment and estimation quantitatively from food samples.
2. To introduce the principles and working techniques of advanced analytical instruments and equipment.

COURSE LEARNING OUTCOME

1. Gain the knowledge about physical chemical quality or characteristics of food which can be estimate qualitatively and quantitatively in biochemical and physics laboratories.
2. Understand the needs of analytical experiments in laboratories: equipment, glassware, small tools and devices required in lab. Infrastructure, electricity and water supply. As the first step of food analysis is Sampling of food to be estimated.
3. Gain knowledge about the proximate principles. Estimating quantity of particular nutrients from instruments based techniques.
4. Understand the principles, instrumentation and working techniques of advanced modern and automatic quick food analysers like electrophoresis, photo-fluorimeter, spectrometry, chromatography etc.
5. Knowledge gain about physical quality analysers and assessment of sensory quality of food.
6. Understand the analysis of bacteriological quality of food by enumeration of bacteria and yeast moulds counting.

COURSE CONTENT

Unit 1

Physiochemical quality of food, proximate and ultimate analysis of food. Preparation of various standard solutions. Sample and sampling techniques.

Unit 2

Principles, techniques and application of colorimetric, photo- fluorimeter, spectrophotometry, Advanced automatic food analysers. Flame photometry and electrophoresis.

Unit 3

Principles, techniques and application of Bomb calorimetric, techniques of vitamins and minerals analysis.

Unit 4

Principles, techniques and application of Chromatography (Paper chromatography, TLC, GLC, HPLC etc.

Unit 5

Sensory quality analysis: subjective and objective analysis. Microbiological quality analysis: enumeration of bacteria, yeast and moulds.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
1.	Gain the knowledge about physical chemical quality or characteristics of food which can be estimate qualitatively and quantitatively in biochemical and physics laboratories.	Discussion Assignment and lectures	Sessional work Routine test
2.	Understand the needs of analytical experiments in laboratories and preparation of solution and sampling.	Discussion, lab visits. Lectures on topics	Routine test and Visit report
3.	Gain knowledge about proximate principles. Estimating quantity of particular nutrients from instruments based techniques, Principles, instrumentation and working techniques of advanced Morden and automatic quick food analysers	Discussion and lectures Assignment on collecting information from laboratory visit.	Routine test and Visit report
4.	Knowledge gain about physical quality analysers and assessment of sensory quality of food.	Lecture discussion	Routine test
5.	Understand the analysis of bacteriological quality of food by enumeration of bacteria and yeast moulds counting.	Lecture and discussion and lab work	Routine test

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2. Dawes, E.A. (1980)6th Ed. Quantitative Problems in Biochemistry. Longman Group Ltd.,
3. Khosla, B. D., Garg V. C. and Khosla, A. (1987) _ . 5th Ed. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi.
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9. Varley, H; Gowenlock, A.H. and Bell, M. (1980). 5th Ed. Practical Clinical Biochemistry. Heinemann Books Ltd.,
10. Vogel, A.I. (1962) 3rd Ed. A Textbook of Quantitative Inorganic Analysis by The English Language Book Society and Longman

NUTRITION DURING LIFE CYCLE

PAPER CODE-MNS 2004

COURSE OBJECTIVE

To enable the student to know physiological changes and nutritional requirements during various stages of life cycle and also to understand how Dietary Reference Intakes are derived for the population.

COURSE LEARNING OUTCOME

The student will be able to:

1. Analyse and calculate the needs for specific macronutrients.
2. Recognize important periods in growth and development, as well as the effects of malnutrition.
3. Determine nutritional needs at various age groups.
4. Recognize the consequences of bad and poor dietary and lifestyle choices.

COURSE CONTENT

Unit 1

RDA, Balanced diet, Four food groups suggested by ICMR, Food Exchange List, Principles of Diet Planning

Unit 2

Nutritional requirements for infant, development during infancy low birth weight pre-term baby, weaning.

Nutritional requirement for preschool children (1-6 year) Nutrition related problem for pre-schoolers PEM, vitamin A deficiency feeding programmes, ICDS.

Unit 3

Nutritional requirements for school children (6-12 years) feeding problems, packed lunches school lines programs

Nutritional requirements for adolescents, nutritional problems.

Unit 4

Nutritional requirements for adults, Nutritional requirement during old age, Process problem related to old age especially old women.

Unit 5

Nutritional requirements of expectant mother, psychological changes during pregnancy General dietary problems, complications. Nutritional requirements of lactating women.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course learning outcomes	Teaching and learning activity	Assessment tools
1.	Understand nutritional Requirements, RDA, balanced diet and Food Exchange list	Lecture cum Discussion	Calculation of nutrient content of foods and menu planning
2.	Gain knowledge about about nutritional requirements in infancy and pre-school age	Lecture cum Discussion	Diet plan for infants and pre-school children
3.	Gain knowledge about about nutritional requirements of school going children and adolescents	Lecture cum Discussion	Diet plan for school-going children and adolescents
4.	Gain knowledge about about nutritional requirements adults and old-age people	Lecture cum Discussion	Diet plan for adults and old-age people
5.	Gain knowledge about about nutritional requirements of expectant and lactating mothers	Lecture cum Discussion	Diet plan for expectant and lactating mothers

SUGGESTED READINGS

1. Bamji, M.S., Krishnaswamy K. Brahman G.N.V. (Eds). (2017). Textbook of Human Nutrition. 4th Edition. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.
2. Cameron N. (2002). Human Growth and Development. USA: Academic Press, Elsevier Science.
3. FAO/WHO/UNU (2004). Human Energy Requirements. Report of a Joint Expert Consultation. Rome.
4. Gibson R S. (2005). Principles of Nutritional Assessment. 2nd ed. Oxford University Press.
5. ICMR (2010). Nutrient Requirements and SUGGESTED Dietary Allowances for Indians and its revised documents. New Delhi. ICMR.
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14. Bagchi, K. & Puri, S. (Ed.) (1999): Diet and Aging-Exploring Some Facets. Soc. For Gerontological Research, New Delhi and Help Age India, New Delhi

PRACTICALS

1. Microscopic structure of different granules; evaluation of food by subjective and objective methods; changes in colour, texture and flavour of foods due to processing
2. Effect of cooking on protein, fat and carbohydrates; product preparation using leavening agents.
3. Handling of equipment and instruments
4. Preparation of samples and buffers quantitative estimation of proximate principles, minerals and vitamins by the use of colorimetry, flame photometry, UV spectrophotometer; chromatography, analysis of anti-nutritional factors
5. Estimation of protein and starch digestibility; fraction of protein, food adulteration
6. Planning of diet for infants, adolescent, adults, pregnant and expectant mothers, old age people

M.Sc. THIRD SEMESTER

THERAPEUTIC NUTRITION AND DIETETICS

PAPER CODE-MNS 3001

COURSE OBJECTIVE

To familiarize student about estimation of RDA, deficiency of nutrients, estimation of different nutrients and metabolites in normal and disease conditions. To understand the the causative factors and metabolic changes in various diseases/disorders and acquire knowledge on the principles of diet therapy and comprehend principles of dietary counselling.

COURSE LEARNING OUTCOME

Student will be able to:

1. Recognize the significance of nutritional assessment in patient care.
2. Learn about the reasons that cause diseases and disorders, as well as the metabolic changes that occur, and the food therapy principles that go along with them.
3. Understand the fundamentals of dietary counselling.
4. Understand the rationale behind disease/disorder prevention.

COURSE CONTENT

Unit 1

Introduction to Diet Therapy-Planning Therapeutic diet, Routine Hospital Diet: Regular diet, Soft Diet, Liquid Diet

Unit 2

Nutritional support systems and special feeding methods.

Unit 3

Nutritional Requirements, dietary management complications and counselling in Overweight, Obesity and Underweight

Nutritional Requirements, dietary management complications & counselling of Pre-operative and Post-Operative and stages. Gastro- intestinal diseases, Liver & Gall bladder. Allergy

Unit 4

Etiopathophysiology, metabolic aberrations, complications, prevention and dietary management of Cardiovascular, Renal diseases, Diabetes and Gout.

Unit 5

Metabolism and nutritional management of Genetic Disorders. Some common metabolic disorders like Phenylketonuria, Alkaptonuria, Galactosemia

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course learning outcomes	Teaching and learning activity	Assessment tools
1.	Develop a detailed understanding of diet therapy	Discussion	Assignment/Quiz/Test
2.	Develop understanding and expertise on nutritional support systems and special feeding methods	Discussion	Assignment/Quiz/Test
3.	Develop a detailed understanding and knowledge aetiology, physiological and metabolic anomalies of various acute and chronic disorders	Discussion	Assignment on various disorders on nutritional status, nutritional and dietary requirements
4.	Apply the nutrition care process to the medical nutritional therapy of various metabolic disorders	Discussion	Diet plans for prevention and treatment of various disorders
5.	Develop understanding of nutritional care plan and management of various inborn errors of metabolism	Discussion	Assignment on various Disorders and their nutritional and dietary requirements

SUGGESTED READINGS

1. Gibney MJ, Elia M, Ljungqvist & Dowsett J. (2005) Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
2. Gibson SR. (2005). Principles of Nutritional Assessment. 2nd Edition. Oxford University press
3. Joshi YK. Basics of Clinical Nutrition. 2nd Edition. Jaypee Brothers Medical Publishers.
4. Lee RD & Neiman DC. (2009). Nutritional Assessment. 5th Edition. Brown & Benchmark.
5. Mahan, L. K. and Escott Stump. S. (2016) Krause's Food & Nutrition Therapy 14th ed. Saunders-Elsevier
6. Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.
7. Williams, S.R. (2001) Basic Nutrition and Diet Therapy. 11th ed. Times Mirror Mosby College Publishing
8. World Cancer Research Fund & American Institute for Cancer Research (2007) Food, Nutrition, Physical Activity and the Prevention of Cancer- A Global Perspective. Washington E.D. WCRF.
9. Dave, Nilambari (2004).nutrition and Diet Therapy, lest Edition, Dr. Nilambari Dave Head, Dept of home science Saurashtra University , Rajkot
10. Mahan, L.K. and Escott- stamp S. (2000) Kreuse 's food nutrition and Diet therapy, 10th Edition W.B. Sanders.
11. Shills, M.E. Olsan, J.A. Shilke , M. and Ross A.C. (1999) . modem in health and disease , 9th Edition W.B. Saunders Ltd.,

12. Escott-Stump, S. (1998): Nutrition and Diagnosis Related care, 4th Edition Willams and wikins.
13. Garrow, J.S. James, W.P.T. and Ralph, A. (2000): Human nutrition and Dietetics, 10th Edition, Churohill Livuingstone.
14. Williams , S.R. (1993) ; Nutrition And Diet therapy, 7th Edition . Times Mirror / Mosby Collage Publishing.
15. Davis. J. and Sherer. J. K. (1994); Approval nutrient in Paediatrics, Bostan, Little, Brown, & Co.,

FOOD PROCESSING AND TECHNOLOGY

PAPER CODE-MNS 3002

COURSE OBJECTIVE

To know processing technology of various food stuffs, physical and chemical principles in food processing and ways of quality control.

COURSE LEARNING OUTCOME

The student will be able to understand the processing of various food stuffs, physical and chemical principles in food processing.

COURSE CONTENT

Unit 1

Physical principles in Food Processing Operations: Food deterioration, methods of preservation and processing. Thermal processing, refrigeration, freezing, dehydration, ionizing radiations, fermentation, concentration.

Unit 2

Chemical Principles of Food Processing: Preservation, processing by sugar, salt, smoke, acid and chemicals. Chemical and biochemical reactions affecting food quality and safety.

Unit 3

Processing technology of foods and nutritional implications for Cereals and pulses- wheat grain characteristics and products, rice processing, pulses processing and their elimination of toxic factors. Fermentation and germination.

Nuts and oilseeds- nuts oilseeds processing, solvent extraction purification, hydrogenation and tempering products- butter, margarine.

Unit 4

Fruits and Vegetables: Physiological and biochemical changes during ripening, handling and storage and fruit processing. Processing of vegetables, canning, freezing, dehydration, pickles and chutneys.

Fleshy foods: Processing and their products (meat and fish)

Unit 5

Milk and milk products- classification, standardization pasteurization, homogenization and packing of milk. Milk Products- fortified milk, skim milk concentrated milks, cream, butter, cheese, ice cream and indigenous milk products, khoa, Paneer, curd, yoghurt, ghee.

Recent concepts in food technology- biotechnology in food, algae as food, low cost nutrient supplement.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course and learning outcomes	Teaching and learning activity	Assessment tools
1.	Understand physical principles in Food Processing Operations	Lecture-cum Discussion	Assignment/ Test/ Quiz
2.	Understand Chemical Principles of Food Processing	Lecture-cum Discussion	Assignment/ Test/ Quiz
3.	Understand the Processing technology of foods and nutritional implications	Lecture-cum Discussion	Assignment/ Test/ Quiz
4.	Understand the Physiological and biochemical changes during ripening. handling and storage and fruit and vegetable processing	Lecture-cum Discussion	Assignment/ Test/ Quiz
5.	Understand and learn classification, standardization pasteurization. homogenization and packing of milk. Learn about recent concepts in food technology	Lecture-cum Discussion	Assignment/ Test/ Quiz

SUGGESTED READINGS

1. Saiauel, A. Matz., The Chemistry and Technology of cereals of Foods and Feed”, BS Publishers and Distributors, 1996.
2. G.C. Banerjee, Poultiy, Oxford and IBH Publishing CODUB Ltd., New Delhi.
3. Giridhari Lal, G.S. Sidhappa and G.L. Tandon- Preservation of fruits and vegetables, ICAR, New Delhi, 1994.
4. Raghurent Chinatamini, Advances in Agro Industry and Food Processing, Dominant Publishers and Distributors, 1999.
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6. R & D at the CFTRI, Three decades M.R. Raghavendra Rao, K.R. Bhatt Achaiya and J.V. Shankar CFTRI, Mysore.
7. Research and Development at CFTRI, 1950 — 2000, CFTRI, Mysore.
8. Potter, N.W. Food Science, AVI Publishing Co., Connecticut, 1960.
9. Processed food Industry- Journal of Indian food industry
10. D.K. Salunkhe, S.S. Kadam- Handbook of vegetable science and technology, Marcel Dekker Inc, New York, 2005.

INSTITUTIONAL FOOD SERVICE MANAGEMENT

PAPER CODE-MNS 3003

COURSE OBJECTIVE

1. To enable the students to compete globally as food service professional by developing a knowledge base about the personal, finance and food service management of different food service establishments.
2. To learn the facilities in terms of equipment, machineries, materials, skills etc. needed in different types of food service units with an individual in understanding and managing resources in a food service institution.

COURSE LEARNING OUTCOME

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will be able to:

1. Eligible and expertise to deal as a food service manager in all segment of establishment.
2. Gain knowledge about modern structure and techniques used in computerized services in various food service systems.
3. Understand about human and non-human resources and able to manage these resources in accordance to type of food service institution.
4. Practically understand and experience in managing institutional kitchens, food material, storage, preparations and so on for food service establishments.
5. Gain knowledge about quality control process and food assurance.

COURSE CONTENT

Unit 1

Introduction and food service system and their development. Waiter, Cafeteria food services and room service.

Unit 2

Management: Definition, principles and functions catering of management. Tools and styles of management. Types of organization chart. Budgeting: Definition and types.

Unit 3

Space, Equipment and material management, planning, layout and selection of equipment, purchase and maintenance of equipment. Types of menu, factors affecting menu planning.

Unit 4

Personal management: man power planning, placement, Recruitment, induction training, motivation and performance appraisal.

Unit 5

Quality assurance, food quality, food laws and standards, PFA and FSSAI standards, Weights and measure acts.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
1.	Develop insight about basic concept of catering management	Discussion Assignment on various theories of management	Sessional work
2.	Understand manage food service in healthcare	Discussion, visits to healthcare system	Report of the visits
3.	Understand resource management in a food service unit	Discussion Assignment on collecting information on various resources in management	Routine test
4.	Practically understand and experience in managing institutional kitchens, food material , storage, preparations and so on for food service establishments	Lecture discussion	Routine test
5.	Develop insight of new laws and regulation in food safety for food service and quality control.	Lecture and discussion	Routine test

SUGGESTED READINGS

1. West B Bessie & Wood Levelle (1988) Food Service in Institutions 6th Edition Revised by Hargar FV, Shuggart SG, & Palgne Palacio June, Macmillian Publishing Company New York.
2. Sethi Mohini (2005) Institution Food Management. New Age International Publishers
3. Kazarian E A (1977) Food Service Facilities Planning 3rd Edition Von Nostrand Reinhold New York.
4. Kotas Richard & Jayawardardene. C (1994) Profitable Food and Beverage Management Hodder & Stoughton Publications
5. Kotler Philip. (2001) Marketing management Millennium Edition Prentice Hall of India
6. Taneja S and Gupta SL (2001) Entrepreneurship development, Galgotia Publishing

7. Dessler Gary (2007) Human Resource Management 11th edition Prentice Hall New Jersey
8. Luthans Fred (2004) Organisational Behaviour 10th Edition Mc Graw Hill International.

COMMUNITY NUTRITION

PAPER CODE-MNS 3004

COURSE OBJECTIVE

To enable the student to study the current strategies and programmes to combat malnutrition and to study the methods of assessment of nutritional status of community.

COURSE LEARNING OUTCOME

Student will be able to:

1. Understand the concept of public health nutrition and the current issues.
2. Gain a thorough understanding of the National Health Care Delivery System.
3. Recognize the causes and implications of community nutritional issues.
4. Understand the causes, effects, and prevention measures for community nutritional issues.
5. Understand the strategies for enhancing community nutrition and health.

COURSE CONTENTS

Unit 1

Assessment of the nutritional status at individual, household and institutional level: direct and indirect methods.

Unit 2

Ecological, socio-cultural, economic and demographic correlations of malnutrition: prevalence, aetiology, biochemical and metabolic changes in Vitamin A deficiency, PEM, Iron deficiency anaemia, Iodine deficiency disorders.

Unit 3

Major nutritional problems of the state, nation and world. Nutrition Intervention-Definition, importance, methods of nutrition intervention and their impact evaluation.

Unit 4

National nutritional programmes and policies; Anaemia Prophylaxis Program, Vitamin D deficiency control Program, IDD

Unit 5

Nutritional surveillance, National programmes and policies regarding food production and distribution.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course and learning outcomes	Teaching and learning activity	Assessment tools
1.	Understand the method of assessment of nutritional status by direct and indirect methods	Lecture-cum Discussion	Assignment/ Test/ Quiz
2.	Understand the prevalence, aetiology, biochemical and metabolic changes in various nutritional deficiencies	Lecture-cum Discussion	Assignment/ Test/ Quiz
3.	Understand the causes, consequences and prevention strategies of diet-related problems in the community and its intervention	Lecture-cum Discussion	Assignment/ Test/ Quiz
4.	Understand strategies to improve community diet and health and various National nutritional programs	Lecture-cum Discussion	Assignment/ Test/ Quiz
5.	Develop an understanding of the concept of nutrition monitoring and nutrition surveillance	Lecture-cum Discussion	Assignment/ Test/ Quiz

SUGGESTED READINGS

1. Gopaldas T & Seshadri S. 1987. Nutrition Monitoring and Assessment. Oxford University Press.
2. Jeannette B Endres. 1990 Community Nutrition challenges and Opportunities.
3. Merrill. Joliffe DB. 1966. The Assessment of the Nutritional status of the Community. WHO.
4. Joliffe N. 1962. Clinical Nutrition. Hoeber Medical Division.
5. McLaren DS. 1977. Nutrition in the Community. John Wiley & son. Nutrition Foundation of India Bulletin. New Delhi. Nutrition News. NIN, Hyderabad.
6. Park JE & park K 2000. Text book of preventive and social Medicine. Banarsidas Bhanot Publ.
7. Rao BSN, Deothale yg & Pant KC. 1998 (Revised and updated). Nutritive value of Indian Food by Gopalan C, Ramashastri BV & Balasubramanium SC. NIN, Hyderabad.
8. Shukal PK. 1982. Nutritional Problemss of India. Prentice Hall of India
9. Gibney M J, Margetts B M, Kearney J M Arab (1st Ed) (2004) Public Health Nutrition, NS Blackwell Publishing
10. Gopalan C (Ed) (1987) Combating Under nutrition- Basic Issues and Practical Approaches, Nutrition Foundation of India
11. Kaufman M (2007) Nutrition in promoting the public health strategies, principles and practices. Jones and Barletta Publishers

12. Park K (24th ed) (2017) Park's Textbook of Preventive and Social Medicine, Jabalpur M/s. Banarsidas Bhanot
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15. Ross A C (Eds) (2012) Nutrition in health and disease, Lippincott Williams & Wilkins
16. Shils M E (Eds) (1998) Nutrition in health and disease, Lippincott Williams & Wilkins
17. NNM: <http://www.icds-wcd.nic.in/nnm/home.html>
18. Vir S (2011) Public health nutrition in developing countries, Wood head Publishing India limited.

PRACTICALS

1. Formulation of Food Exchanges, Therapeutic modifications of diet in terms of nutrients, consistency and composition for various disorders and diseases.
2. Visit to different types of food service Institutions and study the following Organization, physical plan and layout, food service equipment, sanitation and hygiene.
3. Practical experience in organization and management of college cafeteria/canteens
4. Standardization of recipes: planning and preparation, modification of basic recipe, Use of left over foods
5. Market survey for food availability and their cost: development of low cost nutritious recipes suitable for various vulnerable groups
6. Visit to the ongoing public health nutrition programmer and report writing: Techniques of assessment of nutritional status.
7. Project Work: Studying existing diet and nutrition practices, planning and conducting survey, analysing data and writing report; development, implementation and evaluation of community nutrition and health programmes.

M.Sc. FOURTH SEMESTER

FOOD PRODUCT DEVELOPMENT

PAPER CODE-MNS 4001

COURSE OBJECTIVE

1. To enable the student to understand the concept of product development, their sensory evaluation and quality control.
2. To enable the students to learn about the concept and steps of formulation and development of new food products and launch for marketing as accordance to needs of its packaging and labelling under the norms and standards.

COURSE LEARNING OUTCOME

1. Comprehension about the innovation through value addition in formulation of new therapeutic and other high quality food products.
2. Gained the knowledge of process of evaluation of food for standardization.
3. Eligible in packaging and labelling skill of developed products
4. Learning of food safety aspects and assurance of food quality.
5. Practiced in therapeutic new food products formulation and development.

COURSE CONTENT

Unit-1

Basic principles of food product development. Sensory properties of food and their role in product development. Formulation and evaluation of recipes at laboratory level. Bulk food preparation for food institutions and enterprises: servings, nutritive value and costing.

Unit-2

Evaluation of food- Objective and subjective methods, selection and training of judges, development of score cards and analysis of data.

Unit-3

Consumer evaluation-development of schedule and data analysis Packaging material, types for different products. Food labelling.

Unit-4

Food safety issues in product development, food quality regulations and standards, quality control and HACCP. Product formulation and development for general and therapeutic use.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
1.	Comprehension about the innovation through value addition in formulation of new therapeutic and other high quality food products.	Discussion Assignment on various theories of product development	Sessional work and Routine test
2.	Gained the knowledge of process of evaluation of food for standardization.	Discussion Lectures on topics	Routine test
3.	Eligible in packaging and labelling skill of developed products	Discussion and lectures Assignment on collecting information on various resources.	Routine test
4.	Learn food safety aspects and assurance of food quality.	Lecture discussion	Routine test
5.	Practiced in therapeutic new food products formulation and development.	Lecture and discussion and lab work.	Routine test

SUGGESTED READINGS

1. Altschul Aaron M. 1993. Low Calorie Foods. Mrcal Dekker
1. Goldberg I. 1994. Functional Food; Designer Food, pharma foods, Nutraceuticals. Springer.
2. Matz. 2004. Formulating & processing Dietic Foods. CHIPS Publ.

ADVANCED DIETETICS

PAPER CODE-MNS 4002

COURSE OBJECTIVE

To familiarize the student with newer concept in dietary management of various disorders and disease and also better understanding of the etiologic, physiological, and metabolic abnormalities, and to provide appropriate nutrition care for the prevention and treatment of many ailments and diseases.

COURSE LEARNING OUTCOME

1. Develop a thorough understanding of the etiologic, physiological, and metabolic abnormalities associated with a variety of acute and chronic illnesses and diseases.
2. Learn to assess nutrition and conduct a food history survey.
3. Gain knowledge and skills about the impact of various illnesses on nutritional status, nutritional requirements, and dietary needs.
4. Develop a nutritional care plan for the prevention and treatment of various ailments and diseases using critical thinking and clinical reasoning.
5. Using the best evidence, use the nutrition care approach to medical nutritional therapy of nutritionally fragile persons.

COURSE CONTENT

UNIT 1

Patho-physiology, clinical & metabolism aspect of PEM, Anaemia, Diet in Infection and Fever-Causes, types and dietary considerations

Unit 2

Patho-physiological, clinical and metabolic aspects. Understanding of special nutritional requirements, nutritional goals in critical illness like-Stress, trauma cancer.

Unit 3

Clinical and metabolic aspects & nutrition goals of; AIDS, Hepatic failure and transplants, GIT surgery and complications

Unit 4

Complications of nutritional support systems including Re-feeding syndrome, Allergy

Unit 5

Definition of Dietician, functions and role of Dietician in a health care team in hospital and community.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course learning outcomes	Teaching and learning activity	Assessment tools
1.	Develop nutritional care plan for prevention and treatment of various diseases/disorders	Discussion	Diet plans for various nutritional disorders
2.	Understanding nutritional requirements in critical illnesses	Discussion	Assignment/Test
3.	Learn to develop a nutritional care plan for AIDS, Hepatic failure and transplants, GIT surgery	Lecture and Discussion	Diet plans for various nutritional disorders
4.	Learn about complications of nutritional support systems	Lecture and Discussion	Assignment/Test
5.	Understand about the functions and role of Dietician	Discussion	Assignment/Test

SUGGESTED READINGS

1. Mahan, L. K. and Escott Stump. S. (2016) Krause's Food & Nutrition Therapy 14th ed. Saunders-Elsevier
2. Joshi Y K.(2008) Basics of Clinical Nutrition 2nd ed. Jaypee Brothers Medical Publishers
3. Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.
4. Gibney MJ, Elia M, Ljungqvist & Dowsett J. (2005) Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
5. Garrow, J.S., James, W.P.T. and Ralph, A. (2000) Human Nutrition and Dietetics. 10th ed. Churchill Livingstone.
6. Marian M, Russel M, Shikora SA. (2008) Clinical Nutrition for Surgical Patients. Jones and Bartlett Publishers.
7. Dave, Nilambari (2004).nutrition and Diet Therapy , lest Edition, Dr. Nilambari Dave Head, Dept of home science Saurashtra University , Rajkot
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12. Williams, S.R. (1993); Nutrition and Diet therapy, 7th Edition. Times Mirror I Mosby Collage Publishing.

13. Davis. J. and Sheerer. J. K. (1994); Approval nutrient in Paediatrics, Boston, Little, Brown, & Co.,
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15. Guyton, A.C. and Hall, Textbook of medical Physiology, 9th edition W.B. Saunders Co.,

NUTRITION FOR HEALTH FITNESS

PAPER CODE-MNS 4003

COURSE OBJECTIVE

To enable the student to know the recent technique and metabolism, health and specific fitness inter-relationship

COURSE LEARNING OUTCOME

Student will be able to understand the definition, components of specific fitness and health status and significance of physical fitness and nutrition.

COURSE CONTENT

Unit -- 1

Definition, components of specific fitness and health status. Energy input & output, diet and exercise, types of exercise physical fitness & health inter- relationship.

Unit - 2

Review of different energy systems for endurance and power activity: shifts in carbohydrate and fat metabolism. Mobilization of fat stores during exercise.

Unit - 3

Nutrition in sports: Sports specific requirements, diet manipulation, pre-game and post-game meal. Diets for persons with high energy requirements, stress and injury.

Unit - 4

Significance of physical fitness and nutrition in prevention and management of weight control, obesity, CV disorder.

Unit - 5

Alternative systems for health and fitness. like Ayurveda, Yoga, Meditation.

FACILITATING THE ACHIEVEMENT OF LEARNING OUTCOME

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
1.	Comprehension about the definition, components of specific fitness, energy input and output.	Discussion and Lectures	Sessional work/ Assignment/Seminar/Test
2.	Gained the knowledge about different energy systems for endurance and power activity	Discussion and Lectures	Sessional work/ Assignment/Seminar/Test
3.	Learn about nutrition in sports and specific requirements	Discussion and Lectures	Sessional work/ Assignment/Seminar/Test
4.	Enable to understand the significance of physical fitness and nutrition in prevention and management of weight control, obesity, CV disorder.	Discussion and Lectures	Sessional work/ Assignment/Seminar/Test
5.	Learn about Ayurveda, Yoga and Meditation.	Discussion and Lectures	Sessional work/ Assignment/Seminar/Test

SUGGESTED READINGS

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 & Controversies, 8th Edition, Wadsworth. Thomson Learning.
3. Whitney, E. N. & Rolfes, S.R. (1999): Understanding Nutrition, 8th Edition, West / Wadsworth, An International Thomson Publishing Co.,
4. Ira Wolinsky (Ed.)(1998): Nutrition in Exercise and Sports, 3rd Edition, CRC Press.
5. Parikova, J. nutrition, Physical activity and health in early life, Ed. Wolinsky, I., CRC Press.
6. Shils, M.E., olson, J.A., Shike, N. and Rossa, A.C. (Ed.) (1999): Modern Nutrition in Health & Disease, 9th Edition, Williams & Wilkins.
7. McArdle, W. Katche, F. and Katch, V. (1996). Exercise Physiology. Energy, Nutrition and Human performance 4th edition, Williams and Wilkins, Philadelphia.
8. Journals-Medicine and Science in Sports and Exercise and International Journal of Sports Nutrition

PRACTICALS

1. Sensory evaluation, Selection and modification of food product to be developed.
2. Formulation and standardization of products. Objective and subjective evaluation of products.
3. Evaluation of consumer acceptability
4. Packaging and sale of products
5. Formulation and planning of diets for various diseases and disorders

DISSERTATION/PROJECT

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