

M.Sc. Nutrition Science
Course Structure-at a Glance

Ist Semester

Paper Code	Course Title	Marks
MNS 101	APPLIEDPHYSIOLOGY	100
MNS 102	NUTRITIONALBIOCHEMISTRY	100
MNS 103	ADVANCEDNUTRITION	100
MNS 104	ADVANCESINFOOD MICROBIOLOGY	100
	PRACTICAL	100
Total Marks		500

IInd Semester

MNS 201	RESEARCH METHODOLOGY STATISTICS & COMPUTER APPLICATION	100
MNS 202	FOODSCIENCE	100
MNS 203	TECHNIQUES OF FOOD ANALYSIS	100
MNS 204	NUTRITION DURING LIFE CYCLE	100
	PRACTICAL	100
Total Marks		500

IIIrd Semester

MNS 301	THERAPEUTIC NUTRITION AND DIETITICS	100
MNS 302	FOOD PROCESSING & TECHNOLOGY	100
MNS 303	FOOD SERVICE MANAGEMENT	100
MNS 304	COMMUNITY NUTRITION	100
	PRACTICAL	100
Total Marks		500

IVth Semester

MNS 401	FOOD PRODUCT DEVELOPMENT	100
MNS 402	ADVANCED DIETETICS	100
MNS 403	NUTRITION FOR HEALTH & FITNESS	100
MNS 404	DISSERTATION/ PROJECT	200
MNS 405	MOOC Compulsory (any one out of available choices)	Grading System: Pass or Fail
Total Marks		500
Grand Total Marks		2000

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SEMESTER I

MNS-101 APPLIED PHYSIOLOGY

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

Unit-1

Cell structure and functions –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 neurotransmitters.

Organisation of central nervous system. structure and function of brain and spinal cord. afferent and efferent nerves, blood brain barrier. CSF.

hypothalamous 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, fertili zation, physiological changes in pregnancy.

Suggested Reading-

1.Ganong,W.F. (1985):Review of Medical Physiology,12 th edition,Lange Medical Publication

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2. 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.

3. Guyton, A.C. (1985): Function of Human Body. 4th edition, W.B. Sanders Company, Philadelphia

4. Guyton A.C. and Hall, J.B. (1986): Text Book of Medical Physiology. 9th Edition, W.B. Sanders Company, Prism 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 II. Avichal

MNS 102 NUTRITIONAL BIOCHEMISTRY

Objective-To understand the mechanisms adopted by the human body for regulation of metabolic pathways

Unit-1

Enzymes- Enzymes as biological catalysts, IUB system of classification. concept of active site, specific activity, turnover number. units of enzyme activity. Effect of substrate concentration Effect of pH and temperature on enzyme catalyzed reaction. Enzyme inhibitors. Isoenzymes.

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 - carbohydrate : glycolysis. HMP pathway, gluconeogenesis.

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Lipid : Beta oxidation, pathway of fatty acid catabolism. Denovo synthesis of fatty acid. Metabolism of ketone bodies. cholesterol metabolism.

Unit – 4

Protein: An overview of protein metabolism, general reaction of protein catabolism, urea cycle, protein biosynthesis.

Unit-5

Vitamins and minerals- biological role, absorption.

Vitamin A, Vitamin B Complex, Vitamin C, Vitamin D, Vitamin E, Macro and Micro minerals.

References:

1. Murray, R.K. Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25* 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.

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MNS-103 ADVANCED NUTRITION

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

Unit -1

Defination,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, Funtions, 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.

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 :

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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.

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

MNS-104 ADVANCES IN FOOD MICROBIOLOGY

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

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, milk and 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.

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Unit-5 Role of microbes in fermented and genetically modified food

- References**
1. Pelezar, 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. Missouri, U.S.A.
 3. Topley and Wilson's (1983) Principles of Bacteriology, Vitology 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, McGraw Hill Inc. 4th Edition.
 6. Jay, James, M.(2000) : Modern 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.
 12. Roday, S. (1999): Food Hygiene and Sanitation, 1st Edition. Tata MacGraw Hill, New Delhi.
 13. 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.
 14. Journals of Food Science Published by the Institute of Food technologists, Chicago

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1u. U.S.A. 15. Journal of Food Science and Technology
Published by Association of Food Scientists
and Technologists (India) CFTRI-MYSORE. 16. Food
Technology Published by the Institute of Food
Technologists, Chicago 1u.

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 hemoglobin, 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 microorganisms.
17. Growth and growth curve of microorganisms.
18. Microbial count.

SEMESTER II **MNS-201 RESEARCH METHODOLOGY, STATISTICS** **COMPUTER** **APPLICATION**

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

Unit-1

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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 Willy and Sons.
5. Brow F. (1988) : Statistics for Behavioural Science, Boston, Allyn and Barm Inc.
Centry 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, Appleton
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. Kenneth King. (1978) : Final report Literacy Research in developing countries -

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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 Behavioral

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

MNS 202 FOOD SCIENCE

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

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

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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

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.

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.MNS 203 TECHNIQUES OF FOOD ANALYSIS

Objective-To introduce the student to various modern instrumental techniques in food analysis.

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Unit -1

Physicochemical Food quality, proximate and ultimate principles of food. Preparation of various standard solutions. Sample and Sampling techniques.

Unit -2

Principles, Techniques and application of colorimetric, photo -fluorimetry, spectrophotometer and Advanced automatic food analyzer. Flame photometry and electrophoresis.

Unit -3

Principles, techniques and application of Bomb calorimeter, techniques analysis of Vitamin and minerals, Centrifugation Techniques

Unit -4

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

Unit -5

Sensory and Microbiological analysis of food. Subjective and objective sensory evaluation of Food. Enumeration of Bacteria, yeast and mould.

Suggested Readings

1. Boyer, R. (2000). 3rd Ed. Modern Experimental Biochemistry. Person Education, Asia.
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.
4. Oser, B.L. (1965): 14th Ed. Hawk's Physiological Chemistry. Tata McGraw-Hill Publishing Co. Ltd.,
5. Joshi H D., (2004)' Methods of Analysis, Department of Home Science Saurashtra

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University, Rajkot. 6. Raghuramulu N.; Madhavan Nair and K. Kalyanasundaram, S. (1983). A Manual of Laboratory Technique. NIN, ICMR. 7. Sharma, B.K. (1999). 8th Ed. Instrumental Methods of Chemical Analysis. Gel Publishing House. 8. Srivastava, A.K. and Jain P. C. (1986) (second edition) Chemical Analysis an instrumental approach. S. chand & co. limited. 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.

MNS-204 NUTRITION DURING LIFE CYCLE

Objective-To enable the student to know physiological changes and nutritional requirements during various stages of life cycle.

Unit-1

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

Unit-2

Nutritional requirements for infants 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 of ageing, nutritional problem related to old age especially old women.

Unit-5

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

Suggested Readings

1. Kumar, V. (1996): Aging- Indian Perspective and Global Scenario. Proceedings of International Symposium of Gerontology and Seventh Conference of the Association of Gerontology (India).
2. 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

Microscopic structure of different granules; evaluation of food by subjective and objective methods; changes in colour, texture and flavour of foods due to processing; effect of cooking on protein, fat and carbohydrates; product preparation using leavening agents.

Handling of equipment and instruments; 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; estimation of protein and starch digestibility; fractionation of protein; food adulteration

Planning of diet for infants, adolescent, adults, pregnant and expectant mothers, old age people

SEMESTER III **MNS 301- THERAPEUTIC NUTRITION AND DIETITICS**

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Objective-To familiarize student about estimation of RDA, deficiency of nutrients, estimation of different nutrients and metabolites in normal and disease conditions.

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 & counseling in Overweight, Obesity and Underweight

Nutritional Requirements, dietary management complications & counseling 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 & nutritional management of Genetic Disorders. Some common metabolic disorders like Phenylketonuria, Alkaptonuria, Galactosemia.

References

- Dave, Nilambari (2004). nutrition and Diet Therapy , 1st Edition, Dr. Nilambari Dave Head, Dept of home science Saurashtra University , Rajkot
- Mahan, L.K. and Escott- stamp S. (2000) Kreuse 's food nutrition and Diet therapy, 10th Edition W.B. Saunders.
- Shills , M.E. Olsan , J.A. Shilke , M. and Ross A.C. (1999) . modern in health and disease , 9th Edition W.B. Saunders Ltd.,
- Escott-Stump , S. (1998): Nutrition and Diagnosis Related care , 4th Edition Willams and wikins .
- Garrow, J.S. James , W.P.T. and Ralph , A. (2000): Human nutrition and Dietetics, 10th Edition , Churohill Livuvingstone .
- Willams , S.R. (1993); Nutrition And Diet therapy , 7th Edition . Times Mirror / Mosby Collage Publishing.
- Davis . J. and Sherer . J. K. (1994); Approval nutrient in pediatrics , Bostan, Little, Brown, & Co.,
- Walker, W.A. and Watkins , J.B. (Ed,) (1985); Nutrition and pediatrics, Bostan, littile, Brown, & Co.,

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- Guyton, A.C. and Hall, Textbook of medical Physiology, 9th Edition, W.B. Saunders Co.,
- Ritchie, A.C. (1990) : Boyd's textbook of pathology, 9th Edition, Lea and Febiger, Philadelphia.
- Fauci, S.A. et al (1998) : Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill.
- World Cancer Research Fund (1997) : Food, Nutrition and the prevention of Cancer. A Global Perspective, Washington, E.D. WCRF.
- Dave N R, (2004) "Nutrition & Diet therapy" Department of Home science, Saurashtra University, Rajkot.

Journal and Other References Series:

- Nutrition update Series
- World Review of nutrition and dietetics
- Journal of the American Dietetic Association
- American journal of clinical nutrition
- European journal of clinical nutrition
- Nutrition reviews.

MNS-302 FOOD PROCESSING AND TECHNOLOGY

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

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.

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Nuts and oilseeds- nuts oilseeds processing. solvent extract ion 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.

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, 1998
4. Raghurent Chinatamini, Advances in Agro Industry and Food Processing, Dominant Publishers and Distributors, 1999.
5. Shakuntala Manay, N., Shadak Cheraswamy, M., Food Facts and Principles, Wiley Eastern Ltd., 1987.
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
10. Journal of Indian food industry

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11. D.K.Salunkhe,S.S.kadam-Handbook of vegetable science and technology,Marcel Dekker Inc,New York,2005.

MNS 303 FOOD SERVICE MANAGEMENT

Objective-To enable the student to understand the process of planning,organizing and controlling the management of food and other sources in catering Institutions

Unit-1

Introduction of food service systems and their development.Cafeteria,Waiter and Room service.

Unit-2

Management- Definition, principles & functions of catering management. tools,styles,organization charts and its types.Budgeting-Defination and types

Unit-3

Space, equipment & material management. Planning Layouts. selection of equipment, purchase,maintenance of equipment. Types of Menu,Factors affecting Menu planning,

Unit-4

Personnel management- Manpower planning, placement, recruitment, induction. training, motivation & performance appraisal.

Unit-5

Quality assurance, food quality, food laws & standards.PFA,Standards Weights and Measurement Act.

Suggested Readings- Management

1. West, B. Bssie & Wood, Levelle (1998). Food Service in Instituions 6th Edition. Revised by Harger FV, Shuggart SG & Palgne-Palacio June MacMillan Publication Company, new York.
2. Sethi Mohini (1993) Catering management An Integrated Approach 2nd Edition Wiley Publication.
3. Kotas Richard & Jayawardardene, C. (1994): Profitable Food and Beverage management, hodder & Stoughton Publication.
4. Brodner, J. Maschal, H.T., Carlon, H.M. (1982): Profitable Food and Beverage Operation 4th Edition, hayden Book Company, New Jersey.

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5. Green, E.E. Drake, G.G. Sweeny, J.F. (1978). Profitable Food and Beverage Management.

Planing operations

1- Hayden Book Company, new Jersey. 6. Knootz, H, O. Donnel C. (1968): Principles aof Management McGraw Hill Book Company. Personal management 7. Desseler, Garry (1987): Personnel management Modern Concepts and Techniques, Prentice Hall, new Jersey. 8. Kumar, H.L. (1986): Personal management in Hotel Catering Industries, metropolitan Book Company, New Delhi. 9. Hich Cock M. J. (1980): Food Service System Administration, McMillan Publishing Company. Cost Control 10. Keiser, J. & Caillo, E. (1974): Controlling and Analysis of Cost in Food Service Operations Wiley and Sons New York. 11. Khari, W. L. (I) (1977): Introduction to Modern Food and Beverage Service (1979). Advanced Modern Food and Beverage Service Prentice Hall Series. 12. Coltman, M.M. (1977): Food and Beverage Cost Control. Prentice Hall Series. 13. Levison (1976): Food and Beverage Operation Cost Control and System management. Prentice Hall Series. Layout and Design 14. Kazarian, E.A. (1989) Food Service Facilities Planning 3rd Edition Von. Nostrand Reinhold. 15. Avery A.C. (1980): Modern Guide to Food Service Equipment, Boston CBI Publishing Company. 16. Brichfield, J. (1988): Design ad layout of Food Service Facilities, new York, Van Norland Reinhold. 17. Tolve, A.P. (1984): Standardising Food Service for Quality ad Efficiency, AVI Publishing Company INC.

MNS-304 COMMUNITY NUTRITION

Objective-To enable the student to study the current strategies and programmes to combat malnutrition and to study the methods of assesment of nutritonal status of community

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, etiology, biochemical and metabolic changes in

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vitamin A deficiency, PEM, iron deficiency anemia, 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.

Suggested Reading

Gopaldas T & Seshadri S. 1987. Nutrition Monitoring and Assessment. Oxford University Press.

Jeannette B Endres. 1990 Community Nutrition challenges and Opportunities. Merrill.

Jolliffe DB. 1966. The Assessment of the Nutritional status of the Community. WHO.

Jolliffe N. 1962. Clinical Nutrition. Hoeber Medical Division.

McLaren DS. 1977. Nutrition in the Community. John Wiley & son. Nutrition Foundation of India Bulletin. New Delhi.

Nutrition News. NIN, Hyderabad.

Park JE & Park K 2000. Text book of preventive and social Medicine. Banarsidas Bhanot Publ.

Rao BSN, Deothale YG & Pant KC. 1998 (Revised and updated). Nutritive value of Indian Food by Gopalan C, Ramashastri BV & Balasubramaniam SC. NIN, Hyderabad.

Shukal PK. 1982. Nutritional Problems of India. Prentice Hall of India

PRACTICALS

Formulation of Food Exchanges, Therapeutic modifications of diet in terms of nutrients, consistency and composition for various disorders and diseases

Visit to different types of food service Institutions and study the following-Organization, physical plan and layout, food service

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equipment, sanitation and hygiene. Practical experience in organization and management of college cafeteria/canteens
Standardization of recipes: planning and preparation, modification of basic recipe, Use of left over foods

Market survey for food availability and their cost: development of low cost nutritious recipes suitable for various vulnerable groups: visit to the ongoing public health nutrition programme and report writing: Techniques of assessment of nutritional status.

Project Work: Studying existing diet and nutrition practices, planning and conducting survey, analyzing data and writing report; development, implementation and evaluation of community nutrition and health programmes.

SEMESTER IV

MNS 401-FOOD PRODUCT DEVELOPMENT

Objective-To enable the student to understand the concept of product development, their sensory evaluation and quality control

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 labeling.

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.

Suggested Readings

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

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MNS 402 ADVANCED DIETITICS

Objective-To familiarize the student with newer concept in dietary management of various disorders and diseases.

UNIT-1 Pathophysiology, 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

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

References

- Dave, Nilambari (2004).nutrition and Diet Therapy , 1st Edition, Dr. Nilambari Dave Head, Dept of home science Saurashtra University , Rajkot
- Mahan, L.K. and Escott- stamp S. (2000) Kreuse 's food nutrition and Diet therapy, 10th Edition W.B. Saunders.
- Shills , M.E. Olsan , J.A. Shilke , M. and Ross A.C. (1999) . modern in health and disease , 9th Edition W.B. Saunders Ltd.,
- Escott-Stump , S. (1998): Nutrition and Diagnosis Related care , 4th Edition Willams and wikins .
- Garrow, J.S. James , W.P.T. and Ralph , A. (2000): Human nutrition and Dietitics, 10th Edition , Churohill Livuvingstone .
- Willams , S.R. (1993); Nutrition And Diet therapy , 7th Edition . Times Mirror / Mosby Collage Publishing.
- Davis . J. and Sherer . J. K. (1994); Approval nutrient in pediatrics , Bostan, Little, Brown, & Co.,
- Walker, W.A. and Watkins , J.B. (Ed,) (1985); Nutrition and pediatrics, Bostan, littile, Brown, & Co.,
- Guyton, A.C. and Hall , Textbook of medical Physiology, 9th Edition, W.B. Saunders Co.,

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- Ritchie ,A.C. (1990) : Boyd' s textbook of pathology, 9th Edition ,Lea and Febiger, Philadelphia.
- Fauci,S.A. et al (1998) : Harrison 's Principal of internal Medicine , 14th Edition Mecgraw Hill.
- World Cancer Research Fund (1997) : Food , Nutrition and the prevention of Cancer . A Global Prespective Washington , E.D. WCRF.
- Dave N R ,(2004) "Nutrition & Diet therapy " Department of Home science Saurashtra university , Rajkot.

Journal and Other References Series:

- Nutrition update Series
- World Review of nutrition and dietetics
- Journal of the American Dietetic Association
- American journal of clinical nutrition
- European journal of clinical nutrition
- Nutrition reviews.

MNS 403 NUTRITION FOR HEALTH FITN ESS

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

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.

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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. Katch, F. and Katch, V. (1996). Exercise Physiology. Energy, Nutrition and Human performance 4th edition, Williams and Wilkins, Philadelphia.
- Journals 1. Medicine and Science in Sports and Exercise. 2. International Journal of Sports Nutrition

PRACTICALS

Sensory evaluation, Selection and modification of food product to be developed. Formulation and standardization of products. Objective and subjective evaluation of products. evaluation of consumer acceptability, Packaging and sale of products

Formulation and planning of diets for various diseases and disorders

MNS 404-DISSERTATION/PROJECT

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