

**FOOD SCIENCE
NUTRITION
AND
DIETETICS**

SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF HOME SCIENCE
(Revised syllabus for regular students those who study in S.V.U. College (Campus), Tirupati)
(with effect from the batch of students who admitted during the academic year 2015-16)

M.Sc. FOOD SCIENCE NUTRITION AND DIETETICS

(CHOICE BASED CREDIT SYSTEM)

SCHEME OF INSTRUCTION AND EXAMINATION

Sem	Course Code	Title of the course	Core / Elective	No. of Credits	IA	SEE	Total Marks
I	FSND-101	Essentials of Food and Community Nutrition	Core	4	30	70	100
	FSND-102	Research Methodology	Core	4	30	70	100
	FSND-103	Food Science and Experimental Foods	Core	4	30	70	100
	FSND-104	Clinical Nutrition and Dietetics-I	Core	4	30	70	100
		Practical -I: Community Nutrition and Research Methodology	--	4	--	100	100
		Practical -II: Food Science and Dietetics.	--	4-	--	100	100
II	FSND-201	Food Chemistry and Analysis	Core	4	30	70	100
	FSND-202	Nutritional Bio Chemistry	Core	4	30	70	100
	FSND-203	Clinical Nutrition and Dietetics-II	Core	4	30	70	100
	FSND-204	Food Microbiology and Safety	Core	4	30	70	100
	FSND-205	Human Values and Professional Ethics-I			30	70	100
		Practical-I: Food and Biochemical Analysis	--	4	--	100	100
	Practical-II: Food safety and clinical Nutrition	--	4-	--	100	100	
III	FSND-301	Statistics and Computer Applications	Core	4	30	70	100
	FSND-302	Advanced Human Nutrition	Core	4	30	70	100
	FSND-303	Nutrition for Health and Fitness	Core	4	--	100	100
	FSND-304	A) Nutrition Research Techniques B) Nutrition in Emergencies and Disaster C) Food Packaging	IE/EE IE IE/EE	4	--	100	100
		Practical-I : Rural Work Experience*	--	4	--	100	100
		Practical-II : Internship	--	4-	--	100	100
IV	FSND-401	Food Quality Standards and Control		4	30	70	100
	FSND-402	Institutional Food Service Management /Dissertation		4	50	50	100
	FSND-403	Food Product Development and Marketing	Core	4	30	70	100
	FSND-404	Choose any ONE of the following A) Food Processing and Preservation Technology B) Geriatric Nutrition C) Improving Health and Nutrition-IEC Approaches	IE/EE IE/EE	4	30	70	100
	FSND-405	Human Values and Professional Ethics-II			30	70	100
		Practical -I Food quality and Food service Management/viva voce	--	4	--	100	100
		Practical -II Food processing and product development	--	4-	--	100	100

I SEMESTER

SEMESTER – I

FSND 101: ESSENTIALS OF FOOD AND COMMUNITY NUTRITION (Common to all Branches of M.Sc Home Science and MS Food Technology Course)

THEORY:

UNIT-I: Food Composition - Grouping and menu planning:

- Food groups – Classification – food composition, properties, characteristics culinary aspects and nutritive values of different foods, Functions of foods and nutrients – cereal grains, millets, pulses, nuts and oil seeds fruits and vegetables, milk and milk products, meat, egg, poultry and fish, spices and condiments.
- Nutrition through life span – Infancy, Pre-school children, childhood, Adolescence, Adulthood and Ageing – Nutritional requirements and Recommended Dietary Allowances (RDA)– Justification for special needs during periods of growth and development, pregnancy and lactation – significance of breast feeding – Principles of menu planning appropriate to age and stage of life span.

Unit – II: Assessment of Nutritional Status of the community:

Need - Methods of Assessment - (a) Direct Methods - (i) Diet Surveys (ii) Anthropometric Assessment - (iii) clinical and (iv) Biochemical Assessment (b) Indirect Methods - Vital Statistics - Merits and Demerits of methods - Nutrition surveys - longitudinal and cross sectional - Family, individual and institutional surveys - Techniques for assessment of age - use of reference standards for the assessment of nutritional status.

Unit – III: Major Nutrition Problems of the Community:

Malnutrition and under nutrition-PEM/CED, obesity- deficiencies vit-A, iron /iodine – Aetiology –Symptoms - government programmes to eradicate PEM, vitamin-A, Iron and Iodine deficiencies – principles of planning diets for different conditions of malnutrition

Unit – IV: Strategies to combat malnutrition:

Food security – Definition – Management of food insecurity - Food Production, Processing and Preservation-Food Fortification and enrichment- New Foods -Formulation of Food Mixtures.

Food Assistance and Food Supplementation - Policies and Programmes of the Government - Governmental Policies and Programmes - Food Assistance and Food Supplementation Programmes - Public Distribution System (PDS) - Food For Work (FFW), Special Nutrition Programme (SNP), School Lunch Programme (SLP), Mid Day Meal Programme (MMP), Balawadi Nutrition Programme (BNP), Integrated Child Development Services (ICDS) – MCH Services - Immunization- Universal Immunization Programme (UIP).

Nutrition Education - Importance - Approaches Media and Methods

PRACTICALS:

1. Planning and Preparation of Cereal and Pulse Products.
2. Planning and Preparation of Milk and Meat Products
3. Planning and Preparation of Fruits and Vegetable Products.
4. Assessment of Nutritional Status using Anthropometry, Dietary and Clinical methods.
5. Planning of Diets for Different Age Groups and Physiological Conditions.
6. Planning Diets for Different Nutritional Deficiency like PEM, Iron Vit-A, Obesity.
7. Planning and Preparation of Programmes for Significant Days like Breast Feeding Week Nutrition Week, World Food Day.
8. Study of the following through visits
 - Govt School Lunch Programme
 - ICDS Programme
 - Anganwadi Training Centers.
9. School Lunch Programme at Sri Venkateswara University Laboratory Nursery School.
10. Preparation of Visual Aids for Nutrition Education, and Method Demonstration on a Nutrition Recipe.

REFERENCES - TEXT BOOKS

1. Davidson and Passmore R., Brock, J.F., and Truswell A.S. “Human Nutrition and Dietetics”. 7th ed. New York. Churchill Living stone. 1979.

2. Gopalan, C (Editor) - Basic Issues in Combating Malnutrition - NFI Publication.
3. Gopalan, C (Editor) - Women Nutrition in India. NFI Publication.
4. Jelliffe, D.B."Assessment of Nutritional Status of the Community", WHO Monograph. Series No. 53. WHO Geneva 1966.
5. Mehtab S. Bamji, "Text book of Human Nutrition", Oxford & IBH Co.PVT.LTD, New Delhi, 1996.
6. Measuring change in nutritional status - WHO 1981 (NCHS Standards)
7. Monograph on Integrated Training on National Programmes for Mother and Child Development of Women and Child Department, Government of India, New Delhi.
8. Seymour L. Harpen M.D: Quick reference to clinical nutrition 1979.
9. Sutor C.W Hunter M.F. Nutrition principles and Application in Health Promotion. J.B. Lippincott Company Philadelphia 1980.
10. Swaminathan, M. Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
11. West B and L Wood; "Food Service in Institutions". John Wiley and Sons Inc.New York.
12. Seymour L. Haspern, "Quick reference to clinical nutrition". J.B. Lippin Cott Company.
13. Mahtabs. Bamji and N.Pralhad Rao "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi, 2004.
14. Heather Hedrick Fink, Alan E. mike sky "Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America. 2012
15. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA 2011.
16. N.MentaNitin.Jmenta.Nutrition and Diet for Children Simplified Meenakshi Jaypee Brothers Medical Publishers (P) LTD 2014.
17. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins Nutrition in Clinical Practice Second Edition.2007.
18. C.Gopalan, B.V.Ramasastriand S.C.Bala Subramanian. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.2012.
19. Madhu Sharma Pediatric Nutrition in Health and Disease, Jaypee Brother's Medical Publishers (P) Ltd New Delhi London Philadelphia Panama.2013.
20. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of Icmr.2010.
21. Dr. M Swami Nathan, Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.2010.
22. Shubhangini A. Joshi, Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.2010.

JOURNALS AND PROCEEDINGS

- World review of Nutrition and Dietetics. S. Karger New York and Sydney 1959 onwards.
- Proceedings of Nutrition society of India. ICMR. NIN Hyderabad, India 1969 onwards.
- Nutrition Quarterly Journal (ICMR) NIN, Hyderabad.
- The Indian Journal of pediatrics.
- The American Journal of clinical nutrition.
- Journal of Human Nutrition / Applied Nutrition.
- Future' quarterly journal / UNICEF.
- Monographs and other publications by ICMR, WHO, FAO, UNICEF and UNESCO, Nutrition Foundation of India.
- Indian Journal of Nutrition and dietetics, Coimbatore, India.

FSND 102: RESEARCH METHODOLOGY

(Common to all Branches of M.Sc Home Science and MS Food Technology Course)

THEORY:

UNIT – I : Research Purpose And Process

- i. Research – Significance, meaning, objectives, Approaches, Research process, Criteria of good research, Problems encountered by Researchers in India
- ii. Variable-types – Concepts, Theory-Inductive and Deductive
- iii. Types of Research : Historical, descriptive, experimental, case study, survey research, participatory research, Fundamental, applied and action, exploratory ex-post facto
 - Longitudinal and cross sectional, co-relational.

Basic Principles of Research Design: Meaning, Need and features of a good design - Purposes of research design.

- iv. Steps in Research Design

UNIT –II: Research Problem and Methods of Sampling:

- i. Definition and Identification of a Research Problem
 - Selection of research problem
 - Justification
 - Theory, hypothesis, basic assumptions, limitations and delimitations of the Problem.
- ii. Probability and Non-probability Techniques
 - Population and sample
 - Probability sampling : simple random, systematic random sampling, two stages and multi stage sampling, cluster sampling.
 - Non-probability sampling : purposive, quota and volunteer sampling/ snowball Sampling.

UNIT –III: Qualitative Research Methods and methods of data collection

- i. Qualitative Research.
 - Definition and types of qualitative research.
- ii. Methods and techniques of data collection.
 - Group discussions
 - Interviews : key informants, in-depth interviews
 - Observations
 - Social mapping
 - Participatory rapid assessment
 - Participatory learning assessment
- iii. Data Gathering Instruments:
 - Observation, questionnaire, interview, case study, home visits.

UNIT – IV: Measurement, Data Processing and Interpretation

- i. Measurement Scales – Nominal, Ordinal, Interval and Ratio
- ii. Tests of Sound Measurement-Validity and Reliability and Practicality.
- iii. Important scaling Techniques
- iv. Analysis of data and research report.
- v. Project Proposal – Preparation.

PRACTICALS:

1. Identification of different variables in specialization of study.
2. Framing of hypothesis-Null and alternate Hypothesis
3. Selection of Random sample, using tippets random number tables.
4. Preparation of schedule/questionnaire.
5. Development of a Rating scale.
6. Tabulation of data
7. Preparation of research proposal

REFERENCES

1. Bandarkar, P.L. and Wilkinson T.S. (2000) : “*Methodology and Techniques of Social Research*”, Himalaya Publishing House, Mumbai.

2. Batnagar, G.L. (1990) : “*Research Methods and Measurements in Behavioural and Social Sciences*”, Agri. Cole publishing Academy, New Delhi.
3. Kothari, C.R. (2004) : “*Research Methodology (Methods and Techniques)*”. New Age International (p) Ltd., New Delhi.
4. Black, T.R. (1999) : “*Doing Quantitative Research in the Social Sciences*”, Sage Publications, New Delhi.
5. Goode J.W. and Hatt P.K. “*Methods in Social Science Research*” Mc. Graw hill-Co. New York.
6. BajPai S.M. (1987) “*Methods of Social Survey and Research*” Kitab Ghat, Kanpur-3.
7. Kerlinger F.N.(1983) “*Foundations of Behaviouring Research*”, Subject Publications, Delhi,
8. Dev Doss R.P. and Kulandavel K (1985) – “*Hand book of methodology of research*” Oxford Press,
9. Garett. (1986) “*Statistics in Psychology and Education*” 10th Indian Re-print Valeits Fefer and Simons Co., Bombay.
10. Sharma S.R. (1994) “*Statistical methods in Educational Research*”, Anmol Publications Pvt. Ltd., New Delhi.

FT 103:FOOD SCIENCE AND EXPERIMENTAL FOODS
(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

THEORY:

UNIT I: Foods of plant origin

- Cereals and cereal products: Starch: Structure, Characteristics of some food starches. Gelatinization, Factors effecting gelatinization. Modified food starches-Applications.
- Pectin and Gums-Functional roles in food products.
- Baking process - Cereal flours, flour mixes, dough and batter, Leavening agents-Applications
- Pulses and Legumes: Composition, Toxic constituents, processing, effect of cooking.
- Vegetables and Fruits: Classification, composition, Pigments and Flavors constituents - cooking effect, Browning reaction.

UNIT II:Foods of animal origin

- Milk: Composition, kinds of milk, milk products and Functional properties of Milk- Cooking applications.
- Egg: Structure, grading, quality and Functional properties of eggs, use in cookery-its effect.
- Meat and Poultry: Structure, Muscle composition, postmortem changes, Heat-induced changes in meat, tenderness – tenderizers. : Poultry classification.
- Fish and Marine foods: Classification and Composition, Selection and cooking.

UNIT III: Sugars and Fats

- Sugars, sugar crystals and Confections – Types of sugars and sugar syrups, Sugar cookery, Crystallization of sugars, Confectionery-Types and confections raw materials and their role, chocolate processing, Indian confectionery, sugar substitutes.
- Fats and oils -Sources, composition, Absorption, Functional properties of fat and uses in food Preparations, Rancidity, Fat substitutes or replacements.

UNIT IV: Food Evaluation –Attributes of food quality-Subjective and objective evaluation.

- Sensory evaluation-Requirements-panel-sensory testing procedures and tests.
- Objective evaluation-Food Rheology-objective methods of food evaluation.

PRACTICALS:

1. Standardization of weights and measures of various foods
2. Starch cookery- Structure, gelatinization and factors affecting gelatinization

3. Baking –Determination of gluten content, Preparation of plain cake, Bread and evaluation by subjective and objective methods.
4. Pulse cookery – effect of different processing methods-Soaking, germination, malting-effect of factors.
5. Vegetable cookery – Effect of time, temperature, media and cooking methods on pigments.
6. Fruit - Enzymatic Browning- Effect
7. Sugars and confections: Factors affecting crystallization in candies like fondant, experiments on applying scientific methods to Indian confectionary, preparation of confections – role of ingredients and processing of confectionary.
8. Fats and oils – Smoke points, oil absorption and stability of emulsion – mayonnaise.
9. Milk cookery: preparation of milk products-Effect of cooking.
10. Egg cookery: Egg white foams: preparation of the eggs acting as binding, emulsifying and thickening agent.
11. Meat cookery : Effect of different cooking methods and tenderizers
12. Fish cookery, and other marine foods.
13. Sensory evaluation of food
14. Objective evaluation of food

TEXT BOOKS & REFERENCE BOOKS:

1. Food. Theory and Application. edi.Paul. P.C. and Palmer A.H. John Wiley & Sons, Inc. New York, 2002.
2. Belle Lowe: Experimental Cookery, John Wiley & Sons, INC, New York, 1998.
3. Norman N Potter, Food Science, Fifth edition, An Aspen Publication, Maryland-2007.
4. Griswold. R.M.: The Experimental Study of Foods. Houghton and Mifflin company, Boston, New York, 1962.
5. Sethi Mohini, Food Science: Experiments and Application, second edition, Jain book Agency, New Delhi-2011.
6. Vijayakshar, Text book of food science and Technology, ICAR, New Delhi-2001.
7. G. Subbulakshmi & Shobha A. Udipi. Food processing and preservation. New Age International (P) Ltd., Publishers Bangalore, Chennai. Hyderabad. 2001.
8. B. Srilakshmi. Food Science, 2nd edition New Age International (P) Ltd., Publishers, Bangalore, Chennai & Hyderabad. 2001.
9. Swaminathan, M. Food science and Experimental foods. Ganesh & Co., Madras, 1979.
10. N. Shakuntala Manay & M. Shadaksharswamy, Foods- Facts and Principles, second edition, New Age International Publishers, New Delhi-2001.
11. Marjorie P. Penfield & Adamarie Campbell, Experimental Food Science, Third Edition, Academic Press, New York-1990.

JOURNALS:

1. Journal of Food Technology.
2. Journal of Food Science and Technology (CFTRI Publication)
3. Journal of American Dietetic Association.
4. Indian Journal of Nutrition and Dietetics.

FSND 104: CLINICAL NUTRITION AND DIETETICS-I

THEORY:

UNIT I: Dietetics and Roles of Dietician:

Dietetics – Definition- Dietician as part of the nutrition and health care team – Nature of work - Professional qualifications and requirements of a dietician -roles and responsibilities of dietician- Dietetic Association-the nutrition care process – nutrition assessment - Disease diagnostic tests- nutrition intervention, nutrition monitoring and evaluation and directions – Food Service in hospitals – Different aspects to be considered – Management of human and Non-human resources

UNIT-II: Diet counseling:

Diet counseling- definition- the process- theories and approaches to counseling, reality theory, behavioral counseling, cognitive- behavioral approaches- psycho education and rational emotive therapy - directive and non – directive counseling – counseling strategies: individual and group counseling – factors to be considered- role of communication in the process of counseling

Unit III: Therapeutic Diets-

Definitions- Purpose and scope- routine Hospital diets- Normal and General diets – Therapeutic modifications of normal diets meeting the requirements of different disorders – Basis for diet prescriptions: general factors and nutrition considerations
Planning therapeutic diets – use of food guides and food exchange systems – principles of preventive diet plans.

IV: Special Feeding Methods:

Peripheral Vein Feeding - Enteral and Parenteral Nutrition:

Nutrition support in stress and critically ill conditions – surgery, infections and burns. Methods of feeding – oral feeding, tube or enteral feeding – Placement of tube - formula characteristics - osmolality, Residual filter, other characteristics - steps in formula selection- Total Parenteral Nutrition, calculation of nutrient count in IV solution- TPN by central vein - catheters – the TPN solution- administration– Tube feeding of infants and children - complications associated with tube feeding – Ethical issues in clinical nutrition.

PRACTICALS:

Visit the local hospitals to study:

1. Food preparation and service to patients.
2. Personnel Management, Cost Control and Sanitation aspects.
3. Hospitals, Visits to each hospital (6 Practical Sessions)
4. To prescribe the diets for the patients from different wards and do diet counseling.
5. Presentation of case reports.
6. Study of TPN solution and administration.
7. Therapeutic modification of normal diet.
8. Use of food exchange lists in planning therapeutic diets.

TEXT BOOKS:

1. Theiele. V.F. Clinical Nutrition. C.V. Misby Co., Missouri, 1980.
2. Wohl. M.G., R.S. Goodhart, Modern nutrition in health and disease. Lea and Febiyor. Philadelphia.
3. B. Srilakshmi, Dietetics, 4th edi. 1969, 3rd edi. New Age International (P) Ltd., Publishers Bangalore, Chennai, Hyderabad, 2001.
4. Anderson. L. et. al. “Nutrition in Health and Disease”. 17th edi. J.B. Lippin Cott Company, Philadelphia, Toronto, 1982.
5. Whitney NE, Cataldo BC, Rolses RS, “ Understanding Normal and Clinical Nutrition” West Pub. Company. St Paul, New York, Los Angeles, San Fransisco, 1987.

6. Pennington CR, "Therapeutic Nutrition"- A practical guide,1988.

REFERENCE BOOKS

1. West B and L Wood; "Food Service in Institutions". John Wiley and Sons Inc. New York.
2. Seymour L. Haspern, "Quick reference to clinical nutrition". J.B. Lippin Cott Company.
3. Mahtabs. Bamji and N.Pralhad Rao "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi, 2004.
4. Heather Hedrick Fink, Alan E. Mike sky "Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America. 2012
5. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA 2011.
6. N.MentaNitin.Jmenta.Nutrition and Diet for Children Simplified Meenakshi Jaypee Brothers Medical Publishers (P) LTD 2014.
7. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins Nutrition in Clinical Practice Second Edition.2007.
8. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.2012.
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11. Dr.M Swami Nathan, Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.2010.
12. ShubhanginiA.Joshi, Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.2010.

JOURNALS:

1. Journal of American Dietetic Association.
2. Foods and Nutrition - Notes and Reviews.
3. Indian Journal of Nutrition and Dietetics.
4. American Journal of Clinical Nutrition.

SEMESTER II

FSND 201: FOOD CHEMISTRY AND ANALYSIS

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

THEORY:

UNIT-I : Water Chemistry and Dispersed Systems:

- i. Water chemistry – Chemistry of Water, Free, Bound And Entrapped Water, Water Activity And Moisture Determination.
- ii. Dispersed systems – Liquid dispersions, Gels, Emulsions, Foams

UNIT-II : Carbohydrates and Lipids

- i. Carbohydrates – classification , structure, physic – chemical properties of monosaccharides
 - pentoses, and hexoses , oligosaccharides – Maltose, Lactose, sucrose and poly sacchharides – starch , cellulose.
- ii. Lipids – Nomenclature, classification – Milk fats, Animal fats , vegetable fats.
 - Physical properties – crystallization , plasticity
 - Chemical properties – Thermal decomposition , hydrogenation, inter esterification

UNIT-III: Proteins and amino acids

- i. Proteins and amino acids – classification, structure, physical properties
- ii. Functional and Chemical properties – protein hydration, solubility, interfacial properties Emulsification and foaming, Gelation , Dough formation

UNIT-IV: Food Analysis

- i. Methods of sampling, Determination of total ash
- ii. Principles and methods of chemical analysis
 - Carbohydrates – qualitative and quantitative analysis of starch and sugars
 - Proteins – Electrophoresis, mickrojheldhal method
 - Fats – analysis of solid and liquid fats, Rancidity
 - Determination of vitamin and minerals – vitamin-C, Iron, phosphorus , calcium

PRACTICALS:

1. Qualitative analysis of carbohydrates.
2. Qualitative analysis of proteins and amino acids
3. Qualitative analysis of fats and oils
4. Qualitative analysis of hydrolysis of starch
5. Determination of starch and sugars
6. Estimation of crude fiber
7. Estimation of proteins - micro kjeldal method
8. Separation of proteins and amino acids – Electrophoresis
9. Determination of fat in solid and liquid foods.
10. Determination of moisture
11. Determination of Total ash
12. Estimation of calcium
13. Estimation of phosphorus
14. Estimation of Iron
15. Estimation of vitamin C
16. Qualitative analysis of enzymes in plant foods
17. Qualitative analysis of enzymes in animal foods
18. Demonstration of estimation of minerals using atomic absorption spectro photometer (AAS)

REFERENCES :

1. Andrew L.Winton and Katebarber Winto, “Techniques of food analysis”, agrobios, odhpur, (3001).
2. Deman J M, “Principles of Food Chemistry”, AVI Publishing, 1970.
3. Fennema O R,” Food Chemistry”, Marcel Dekker Publishers, 1996.
4. Lowe B., "Experimental Cookery", John Wiely and Sons Inc, New York, 1965.
5. Mahindru S N,” Food Additives - Characteristics, Details and Estimation”, Tata Mc.Graw. Hill Publishing Company Ltd., New Delhi – 3000.
6. Meyer L.H, “Food Chemistry”, Affiliated East West press pvt. Ltd. Bombay – 1987.
7. Norman N Potter Joseph H and Hotchkirs, “Food Science”, 5th edition, CBS, Publishers and Distributor, New Delhi,1996.
8. Oser BL, Hawk's,” Physiological chemistry”, TATA, Mc.Graw Hill – Publishing Co., Ltd., Bombay – 1965.
9. Fennema Owen R, “Principles of Food science part – I”. "Food, Chemistry", marcel Dekker Inc, New York, 1976.
10. Ranganna S; "Handbook of Analysis and quality control for fruit and vegetable products" 2 nd edition, Tata MC Graw – Hill publishing company Limited, New Delhi – 1986.
11. Shakuntala Manay N and Shadakshara Swamy M, “Foods, facts and principles”, New-Age International Publishers(p) Ltd., New Delhi, 1987.
12. Panda H, “The complete Technology Book on starch and it’s derivatives”, Asia Pacific Business Press Inc. Publishers, Delhi,Website : www.niir.org.
13. Lillian Hoagland Meyer, “Food Chemistry” First Edition, CBS publishers and Distributors, New Delhi, 2004.
- 14.Yeshajahu Pomeranz and Clifton E. Meloan “Food analysis-Theory and Practice,” Third Edition, CBS publishers and Distributors, New Delhi, 2004.
15. Kanes K. Rajah “Fats in Food Technology”, First Edition, Blackwell publishing, 2002.

JOURNALS :

1. Journal of Food Science and Technology
2. Indian Food Industry, A publication of Association of Food Scientists and technologists..
3. Food Chemistry
4. Journal of Food Science
5. IFCON'93 and IFCON'88 proceedings of IFCON 3003 : International food convention, Food technology update, Mysore.

FSND 202: NUTRITIONAL BIOCHEMISTRY

THEORY:

UNIT - I

Metabolism of Macro Nutrients - An overview of sources, structure functions, Digestion and Absorption of Carbohydrates, Lipids and proteins.

- Carbohydrates - Transport and Delivery to the tissues. Storage - Glycogenesis. Mobilization - Glycogenolysis. Utilization of Glucose for the energy needs of the cell - Glycolysis or Embden Mayer Hoff pathway. Lactic acid cycle. Metabolism of pyruvate. Tricarboxylic acid cycle or krebs citric acid cycle. Formation of Glucose from other metabolites - Gluconeogenesis. Metabolism of other sugars - Regulation of Blood Glucose level.
- Lipids - Storage and transport. Break down of Fatty acids - β oxidation. Synthesis of Fatty acids. Metabolism of triacyl glycerols. Cholesterol Metabolism. Lipids of biological significance - Lipo proteins and prostaglandins in health and disease.
- Proteins and Amino Acids - classification of amino acids – peptides and proteins. Protein Classification as based on composition. Nitrogen Balance Dynamic state of Proteins. Metabolism of amino acids - Oxidative determination, non-oxidative determination, transamination, Amino Acid decarboxylation, Tran's peptidation. Formation and Disposal of Ammonia - Hepatic coma, creatine and Creatinine - biosynthesis. Uric acid – Metabolism of Individual Amino Acids.
- Protein bio synthesis - Nucleic acid - DNA, RNA, Bases - Purines and Pyrimidines, Pentose sugar -Synthesis of Nucleic Acids - Steps of replication - Initiation, Elongation and Termination - Transportation and Translation.

UNIT – II

- i. Interrelation between carbohydrate, lipid and protein in Normal conditions, Adaptations under starvation and heavy exercise – High energy compounds of biological significance – ATP, CP.(Adenosine triphosphate and creatine phosphates)
- ii. Role of Enzymes in the metabolism of nutrients: Enzymes - General characteristics classification and nomenclature -kinetics of enzyme activity - Assessment of enzyme Activity - Structure of enzymes - Mechanism of Enzymatic action - Cofactors and Coenzymes - Principal coenzymes in the metabolism of Nutrients.
Hormones: Functions of Hormones - Mechanisms of action of hormones - central nervous system and endocrines. Hormones of significance in nutrient metabolism - Pituitary growth Hormone - Hormones of Adrenal cortex - Cortisol and mineral corticoids - Adrenal Medullary Hormones - Nor epinephrine and epinephrine - Thyroid Hormones - Insulin and glucagon of the pancreas – Neurotransmitters.

UNIT - III

Micro Nutrients - Vitamins - An overview of structure, sources, Fat soluble and water soluble Vitamins. Physiological function – Deficiency stages, Factors influencing bioavailability of Vitamins - Assessment of requirements.

UNIT – IV:

Micro Nutrients - Minerals –and Trace elements- An overview of sources, Physiological functions of Calcium, Phosphorus, Iron, Iodine, Zinc, Selenium, Copper, Flourine and the

Electrolytes. Sodium, Potassium and Chloride – Requirements in Health and Deficiency / disease.

PRACTICALS:

1. Estimation of blood glucose.
2. Oral Glucose Load Test
3. Estimation of Serum Proteins by Biuret / Reinhold Method
4. Estimation of Serum Triglycerides.
5. Estimation of Serum Cholesterol.
6. Estimation of Serum Iron
7. Estimation of Serum Iron Binding Capacity
8. Estimation of Haemoglobin
9. Microscopic Examination of Blood Smear for types of blood cells.
10. Estimation of Packed cell volume in the blood.
11. Estimation of Iodine.
12. Estimation of Serum Calcium / Urinary Calcium.
13. Estimation of Plasma Vitamin A.
14. Estimation of Serum Vitamin C.

REFERENCES:

1. Victor L. Davidson and Donald B. Sisman – “Biochemistry”, The National Medical Series for Independent Study. Harward Publishing, 1994.
2. Keith Wilson and John Walker. “ Practical Biochemistry Principles and Techniques”. 5th Edition. Cambridge University Press, 2000.
3. David L. Nelson and Michael M. Cox. Lehninger “Principles of Biochemistry.”, 3rd Edn. MacMillan worth Publishers, 2001.
4. Talwar G.P.” Text book of Biochemistry and Human Biology” 2nd Edn. National Book Trust in India, 1989.
5. Nath R.L.” Text book of Medicinal Biochemistry.” New age International (P) Limited, Publishers, New Delhi, 1996.
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9. Hames B.D., Hooper, N.M. and Houghton J.D. - Instant Notes in Biochemistry Bio-Scientific Pub., Ltd. UK, 1998.
10. Harold Varley”ractical clinical Biochemistry”-4th Edn.CBS. Publishes. Delhi.
11. Jayaraman, J.”Laboratory Manual in Biochemistry,” New Age International Publishers, 1981.

FSND 203: CLINICAL NUTRITION AND DIETETICS- II

THEORY:

UNIT I: Dietary management in metabolic disorders

- ii. **Diabetes Mellitus** – classification- Etiology- symptoms – Diagnosis- complications – management through Diet – glycaemic index of foods - use of food exchange lists- Insulin- Exercise- Oral hypoglycemic drugs.
- iii. **Gout and Inborn Errors of Metabolism**
Gout: Etiology – Clinical symptoms – Role of Proteins and purines – Dietary management.
Inborn errors of metabolism – phenyl ketonuria (PKU) maple syrup urine disease (MSUD) - Galactosemia – Tyrosinemia – Homosystinuria – Dietary management
- iv. **Obesity and Underweight**
Prevalence and Classification- Etiology-Energy Balance- Metabolic Aberrations and clinical Manifestations-Consequences
Management of Obesity-Dietary and Lifestyle Modifications - Preventive Aspects
Underweight- Etiology- Metabolic Aberrations and clinical Manifestations-Dietary Management.

UNIT II: Dietary Management in-

i. Gastro intestinal Disorders

The Physiology of Gastro Intestinal system an overview- Its role in wellness- Diseases of the Upper Gastro intestinal tract-Dysphasia-Gastro Esophageal Reflux Disease(GERD), Hiatal Hernia and Esophagitis-Diseases of the Stomach and Intestine- Peptic Ulcer- Dumping syndrome- celiac disease-Gluten Sensitive Enteropathy-Lactose intolerance- Inflammatory Bowel disease (IBD)- Chronic Ulcerative Colitis and Chohn's Disease- Short Bowell Syndrome- Intestinal gas and Flatulence - constipation- diarrhea - Dietary Management.

ii. Disorders of Liver, Gallbladder and Pancreas

Vital Hepatitis- Cirrhosis- Liver Transplantation- Gallbladder Disorders: Chollelithiasis- Choledocholithiasis- Cholecystitis- Pancreatitis- Cystic Fibrosis - Dietary Management.

UNIT III: Dietary Management in -

i. Cardiovascular Diseases -

The Cardiovascular system- Functions(an overview)-Etiology-Risk factors- Prevalence- Common Disorders: Dyslipidemia, Coronary Artery Disease(Atherosclerosis), Hypertension(HT), Angina Pectoris, Myocardial Infarction(MI), Congestive Cardiac Failure, Rheumatic Heart Disease- Prevention and dietary Management of CVD.

ii. Kidney Diseases-

The Excretory System and functions – Kidney Function Tests (an Overview) - Etiology-Symptoms and Dietary Management in Acute and Chronic Nephrotic Syndrome, Acute Renal failure (ARF)- Chronic Renal failure(CRF)-End Stage Renal Disease(ESRD)- Dialysis- kidney Transplantation.

UNIT-IV: Dietary Management in Specific diseases/ Conditions and interaction of food, nutrients and drugs:

i. Nutrition during specific diseases

- a. AIDS
- b. Alcoholism
- c. Pulmonary Disorder
- d. Nervous Disorders

ii. Nutrition and Drug Interactions: Effect of drugs on food intake, digestion and absorption-Effect of food and nutrients on drug digestion, absorption and metabolism.

TEXT BOOKS:

1. Theiele. V.F. Clinical Nutrition. C.V. Misby Co., Missouri, 1980.
2. Wohl. M.G., R.S. Goodhart, Modern nutrition in health and disease. Lea and Febiyor. Philadelphia.
3. B. Srilakshmi, Dietetics, 4th edi. 1969, 3rd edi. New Age International (P) Ltd., Publishers Bangalore, Chennai, Hyderabad, 2001.
4. Anderson. L. et. al. "Nutrition in Health and Disease". 17th edi. J.B. Lippin Cott Company, Philadelphia, Toronto, 1982.
5. Whitney NE, Cataldo BC, Rolses RS, "Understanding Normal and Clinical Nutrition" West Pub. Company. St Paul, New Yok, Los Angeles, San Fransisco, 1987.
6. Pennington CR, "Therapeutic Nutrition"- A practical guide, 1988.

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1. West B and L Wood; "Food Service in Institutions". John Wiley and Sons Inc. NewYork.
2. Seymour L. Haspern, "Quick reference to clinical nutrition". J.B. Lippin Cott Company.

3. Mahtabs. Bamji and N.Pralhad Rao “Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi, 2004.
4. Heather Hedrick Fink, Alan E. Mike sky “Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America. 2012.
5. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA 2011.
6. N.MentaNitin.Jmenta.Nutrition and Diet for Children Simplified Meenakshi Jaypee Brothers Medical Publishers (P) LTD 2014.
7. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins Nutrition in Clinical Practice Second Edition.2007.
8. C.Gopalan, B.V.RamasastrinandS.C.BalaSubramanian. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.2012.
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12. ShubhanginiA.Joshi, Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.2010.

JOURNALS:

1. Journal of American Dietetic Association.
2. Foods and Nutrition - Notes and Reviews.
3. Indian Journal of Nutrition and Dietetics.
4. American Journal of Clinical Nutrition.

FSND 204: FOOD MICROBIOLOGY AND SAFETY

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

THEORY:

UNIT-I: Food and microorganisms:

- Food as a substrate for microorganisms, physical, chemical and biological factors affecting microbial growth.
- Bacteria, Molds, Yeasts and Viruses : General characteristics, classification – structure – growth – morphological characteristics – cultural characteristics – Food Bacteriology in Food Industry.

UNIT-II: Food Spoilage

- Microorganisms causing spoilage – principles underlying spoilage – chemical, physical and physiological changes caused by microorganisms.
- Spoilage of different foods

UNIT III:

- Natural and environmental contaminants
- Food contamination : Sources of contamination in :
 - Cereals and cereal products
 - Sugars and sugar products

- Legumes, nuts and oilseeds
- Fruits and Vegetables
- Eggs and poultry
- Meat and Meat products
- Fish and Other sea foods
- Milk and Milk products
- Spices and condiments
- Preserved foods – canned, bottled, dehydrated

UNIT-IV

- i. Food safety – concept, factors affecting food safety - physical, chemical and biological hazards.
- ii. Food hazards of microbial origin – food borne disease, food borne intoxications, food borne infections, food born toxic infections.

PRACTICALS:

- Morphological and cultural characteristics of bacteria, yeast and molds – Identification and testing. Testing of spoilage
- Testing the presence and type of organisms in relation to raw and processed foods and products - Media preparation – Inoculation of organisms.

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1. Jay J.M. “Modern Food Microbiology” 4th edition – Van Nostrand Reinhold company, New York, 1996.
2. Miller BM and Litsky W, “Industrial Microbiology”, Mc Graw Hill book company, New York, 1996.
3. Rainbow, C. and A.H.Rose (eds) “Biochemistry of Industrial Micro Organisms” – Academic Press Inc., New York, 1986.
4. Robberts, T.A., and Skinner F.A. (Eds) “Food Microbiology advances and prospects” – Academic press Inc, N.York, 1992.
5. Weiser H.H. and Mountney G.J. and of Gould A., “Practical Food Microbiology and Technology” 3rd edi., AVI publishing company Inc West Post, Conn, 1985.
6. William C.Frazier and Dennis C West HOFF “Food Microbiology” 4th edition, Tata Mc Graw – Hill – Publishing Company Ltd – New Delhi, 1995.
7. Phyllis Entis “Food Safety old habits new perspectives” 1st edition, ASM Press, Washington, D.C, 2007.
8. Modi HA, “Food Borne illnesses” 1st edition, Aaviskar publishers, Jaipur, 2008.
9. Michael j, Waites, Neill. Morgan et al, “Industrial Microbiology- An introduction” 1st edition, Black well Science, London , 2000.
10. Adams MR, Moss MO, “Food microbiology,” 1st edition, New age international (P) Ltd Publishers, New Delhi, 2002.
11. Mansi EI-Mansi and Charlie Bryce “Fermentation Microbiology and biotechnology” 1st edition, Taylor and Francis Group, Kundli, 2004.
12. George J.Banwart “Basic Food Microbiology” Second edition, CBS Publishers and Distributors, New Delhi, 2002.
13. Adams MR and Moss MO, “Food Microbiology” Second edition, Panima Publishing Corporation, New Delhi, 2003.
14. Tauro P, KK Kapoor KK and Yadav KS “An introduction to Microbiology” 1st edition, New age International (P) Ltd. Publishers, New Delhi, 2003.
15. James M Jay, “Modern Food Microbiology,” 4th edition, CBS publishers and Distributors, New Delhi, 2005.
16. William C. Frazier and Denni S.C. Westhoff, “Food Microbiology,” 4th edition, Tata MC Graw-Hill publishing company Ltd, New Delhi, 2004.
17. Narng S.P, “Food Microbiology Method of enumeration” 1st edition, A.P.H. Publishing corporation, New Delhi, 2004.
18. Kalaichelvan PT, “Microbiology and Biotechnology,” A laboratory Manual, 1st edition, MJP Publishers, Chennai, 2005.

JOURNALS:

1. Advances in Food Research
2. Advances in applied Microbiology
3. Bacteriological Reviews
4. Indian Journal of food technology
5. Journal of Applied Bacteriology

6. Journal of Dairy Science
7. Journal of Food engineering
8. Journal of Food Production

FSND: 205: HUMAN VALUES AND PROFESSIONAL ETHICS - I
(Revised Syllabus with effect from 2015-2016)

Unit-I:

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

Unit-II:

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom. Good behavior and respect for elders, Character and Conduct.

Unit-III:

Ahimsa (Non- Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigraha (Non- stealing). Purusharthas (Cardinal virtues)-Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires). Moksha (Liberation).

Unit-IV:

Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths – AryaAstangamarga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.

Unit-V:

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

REFERENCES:

1. John S Mackenzie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
3. "Management Ethics' integrity at work' by Joseph A. Petrick and John F. Quinn. Response Books: New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Halighton.
10. SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. Chowkarnba Sanskrit series. VolLII and III, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
11. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral.Issues, Judith A. Boss. May Field Publishing Company - 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications
15. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar

SEMESTER III

FSND 301: STATISTICS and COMPUTER APPLICATIONS

(Common to all Branches of M.Sc Home Science and MS Food Technology Course)

THEORY

PART - A - STATISTICS

UNIT-I

- i. Statistics: Meaning, Definition and Scope, limitations.
Role of Statistics in Research.
- ii. Descriptive statistics:
 - Classification and tabulation of data.
 - Graphic presentation of data.
 - Diagrammatic presentation of data.
 - Measurement of central tendency, variation, and dispersion.
 - Normal distribution, Frequency distribution, histogram, frequency polygons, curve Ogive.
- iii. Testing of hypothesis:
 - Type I and Type II errors. Levels of significance.
 - Correlation, coefficient of correlation, rank correlation.
 - Regression and prediction.

UNIT-II

Inferential Statistics

- i. 't' test for Large samples (mean and proportions) small samples
- ii. χ^2 - test of significance of association
- iii. Analysis of variance – one way, two way
(The student needs to understand only application and calculation procedures)

PRACTICAL:

1. Graphic presentation of data.
2. Diagrammatic representation of data.
3. Calculation of Averages – Arithmetic mean, mode of median.
4. Calculation of standard deviation, quartile deviation.
5. Calculation of product moment correlation to Rank correlation.
6. Fitting a straight line equation and testing the goodness of fit.
7. Calculating χ^2 to find the significance of association.
8. Calculation of 't' statistic to give inference for small sample and large sample.
9. Analysis of variance – one way; two way classification.

PART – B - COMPUTER APPLICATIONS

UNIT-III

- i. Introduction of Computer - Block diagram. The P.C and its component, Memory Capacity, Physical storage of data, various devices, Hardware and Software operating - DOS commands for file handling.
- ii. MS Office and its component - Word and its applications / creating documents -Editing spell check, auto correct and print preview, creating tables and sorting data in tables, Mail Merge and its usage.

UNIT-IV

- i. MS Excel for data analysis, Work sheet and its structure - data entry-editing -Sorting filtering and Copying. Statistical functions in Excel - Data analysis park for performing descriptive statistics - t-test, ANOVA Correlation and regression. Graphs in Excel - Various types of graphs, Editing graphs, cut and copy operations.

- ii. Power Point Presentation and Internet Explorer.

PRACTICALS

1. All relevant practical skills regarding usage of Computers.
2. Analysis of data using computers.

TEXT BOOKS

1. Saxena, S. (2000). A first course in Computers, Vikas Publishing House Pvt. Ltd., New Delhi.
2. Rajaraman, V. (1999). Fundamentals of Computers, Printice Hall India Pvt. Ltd., New Delhi.
3. Kirlinger, F.N. (1983). Foundations of behavioural research Surjeeth Publications, New Delhi.
4. Singh (1992). Technique and Method of social survey research and statistics, Prakashan Kendra Publishers, New Delhi.
5. Goode J.W. and Hatt P.K. Methods in Social Science Research Mc. Graw Hill- Co. New York.

FSND 302: ADVANCED HUMAN NUTRITION

THEORY:

UNIT-I Nutrition, Brain and Behaviour:

- Brain – Structure, composition and functions
- Neurotransmitters- Nutrient precursors of neurotransmitters – Tryptophan, tyrosine, choline and lecithin
- Role of neurotransmitters in Brain function
- Role of Nutrients on Brain growth and development with special reference to protein, zinc, iodine and folic acid

UNIT-II Nutrition and immunity

- Innate immunity
- Acquired immunity – cell mediated immunity, Humoral immunity
- Role of nutrients in immunity
- Effect of malnutrition on immunity

UNIT-III Endemic nutrition problems and their management

- Fluorosis – Aetiology, prevalence, symptoms and nutritional management
- Iodine deficiency disorders - Aetiology, prevalence, symptoms and nutritional management
- Osteoporosis - Aetiology, prevalence, symptoms and nutritional management

UNIT-IV Principles of Nutrition and management systems in

Emergencies - Droughts, Famines, Floods – Disaster management system

- Assessment of food needs in emergency situations
- Food distribution strategy – Identifying and reaching the vulnerable group – Targeting Food Aid.
- Mass and Supplementary Feeding / Special foods/rations for nutritional relief
- Household food security and nutrition in emergencies

Special needs

- High altitudes and Low temperatures ,Space nutrition,

PRACTICALS:

1. Assessment of cognitive competencies in different grades of malnutrition
 - Grade-I
 - Grade-II
 - Grade-III
2. Assessment of immune competencies on vulnerable groups
 - Women
 - Old age
3. Determination of fluorine content in water
4. Determination of T3, T4 and TSH
5. Determination of Bone density

6. Determination of osteoporosis
7. Planning and evaluation of menus for floods, High altitudes, space nutrition

TEXTBOOKS AND REFERENCE BOOKS:

1. Gopalan C. and Kamala Krishna Swamy (Editors) "Nutrition in Major Metabolic diseases", Oxford University Press - New Delhi -1997 (Chapter 3 on: Obesity PP: 46-64, Chapter 8, Nutritional disorders P.147 to 175 and Chapter 9 - Nutrition and Cancer -PP 176 to 200. Chapter I: Modern Nutritional Science - New Challenges and Opportunities PP 1 to 20).
2. Eleanor. NOSS. Whitney and Sharon Rady Rolfes, "Understanding Nutrition" (8th edition) An International Thomson Publishing Company, Albany, New York, USA, Wadsworth Publishing Company. 1999 - (Chapter: 8, 11, 14, 18 and 20).
3. Frances Sizer and Eleanor. N. Whitney: "Nutrition concepts and Controversies". (8th edition); Wadsworth, Thomson learning, USA, 2000. (Chapters: 1, 2, 6, 7, 8, 9, 10, 13 and 15).
4. Gordon M. Wardlaw and P.M. Insel : "Perspectives in Nutrition" (3rd edition) Mosby, Boston, USA, 1996. (Chapter : 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 20).
5. Joseph Boozek and Beat Schurch (Editors) : "Malnutrition and Behaviour" : Critical assessment of Key issues ". Nestle Foundation, Lausanne, Switzerland - Publication Series - Vol.4, - 1983. (Chapter 1,2,3,4,5 and 6).
6. Judith M. Brown "Nutrition Now" (2nd edition)/West/Wadsworth - International Thomson Publishing Company, Albany, Boston, USA, 1999. (Chapters: 1, 2, 6, 8, 9, 10, 16, 20, 21, 22, 23, 27, 29, 30 and 32).
7. Helen A. Guthrie and Mary Frances Picciano "Human Nutrition", Mosby, Boston, USA, 1995. (Chapters: 6, 7, 10, 11, 12, 16 and 18).
8. M.S. Bamiji, N. Prahlad Rao and Vinodini Reddy (Editors) : "Text Book of Human Nutrition" Oxford and IBFI Publishing Co. Pvt. Ltd., New Delhi -1998.(Chapters: 1, 8, 14,15, 16,19, 20, 24, 27).
9. Baby Depuru, "Some Selected Biochemical, behavioural and environmental correlates of Malnutrition in Children", U.G.C. S.V. University, 1999.
10. World Cancer Research Fund and American Institute for Cancer Research, "Food, Nutrition and the Prevention of Cancer - a global perspective". WCRF - America Institute of Cancer Research - Washington - 1997.
11. John. W. Kimball, "Introduction to Immunology" (Third edition) : Maxwell, Macmillan - International editions. Macmillan Publishing Company, New York -1990. (1 to 16 chapters All Chapters).
12. Gopalan.c. and Suminder Kaur, "Women and Nutrition in India", NFI Special Publication Series - 5 - 1989 NFI, New Delhi.
13. Richard B.J and Myoon A.M. : "Advances in human nutrition", Vol. I Panthex Publishers - INC, Illinois -1980.
14. Heather Hedrick Fink, Alan E. mike sky "Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America. 2012
15. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA 2011.
16. N.MentaNitin.Jmenta.Nutrition and Diet for Children Simplified MeenakshiJaypee Brothers Medical Publishers (P) LTD 2014.
17. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins Nutrition in Clinical Practice Second Edition.2007.
18. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.2012.
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Journals and Reference Materials

1. American Journal of Clinical Nutrition
2. Nutrition Research
3. Journal of Nutrition
4. British Journal of Nutrition
5. Nutrition Reviews
6. Asia Pacific Journal of Nutrition
7. Proceedings of Nutrition Society of India
8. NFI Bulletins, Special Publication, Series and Scientific reports Series
9. European Journal of Clinical Nutrition.

FSND 303: NUTRITION FOR HEALTH AND FITNESS

THEORY:

UNIT-I

Definitions- Nutrition, Health, Physical activity, Physical Fitness Benefits of exercise on Health and fitness, Physical activity Recommendations, components of physical fitness, Assessment criteria of age specific fitness and health status- Evaluation of physical fitness- FITT Principles.

UNIT-II

Energy metabolism in physical activity- Aerobic and Anaerobic metabolic pathways, energy requirements and assessment of energy expenditure based on physical activity.

UNIT-III

Nutritional and physical performance- carbohydrate, fat, protein and exercise, vitamins, minerals and fluid needs during exercise, nutrition in post exercise recovery. Special conditions- weight management and obesity.

UNIT-IV

Sports nutrition, classification of sports events, RDA for sports person, Nutritional requirements and special needs of sports person, pre, during , post sports events, water and electrolyte balance, ergogenic aids, Endurance and fatigue in sports performance- Assessment-strategies, Role of National agencies towards improvements of sports performance

PRACTICALS:

1. Assessment of physical fitness in different age groups/sex.
2. Assessment of Energy expenditure based on physical activity record
3. Planning diets and formulating dietary guidelines for Fitness and health
4. Planning diets and formulating dietary guidelines for Obesity management
5. Study of life styles and Physical Activity patterns
6. Assessment of Nutritional status of sports person.
7. Visits to weight management on fitness centers.

REFERENCES:

1. Shils, M.E., Olson, J.A., Shike, N. and Ross, A.C.(Ed)(1999): “Modern Nutrition in Health and Disease”, 9th Edition, Williams and Wilkins.
2. Whitney, E.N. and Rolfes, S.R.(1999): “Understanding Nutrition”, 8th Edition, West/Wadsworth, An International Thomson Publishing Co.
3. Prizkova, J, Nutrition, “Physical activity and health in early life”, Ed. Wolinsky, I., CRC Press.
4. McArdle, W.Katch, F. and Katch, V. (1996) “Exercise Physiology, Energy, Nutrition and Human Performance”, 4th edition, Williams and Wilkins, Philadelphia.
5. Ira Wolinsky(ed) (1998): “Nutrition in Exercise and Sports”, 3rd Edition, CRC Press.
- 6.Sizer, F. andWhitney, E.(2000): “Nutrition – Concepts and Controversies”, 8th Edition, Wadsworth Thomson Learning.
7. Mahan, I.K. and Ecott-Stump, S.(2000): Krause’s “Food, Nutrition and Diet Therapy”, 10th Edition, W.B. Saunders Ltd.
8. Mahtabs.Bamji and N.PralhadRao “ Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi, 2004.
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17. ShubhanginiA.Joshi, Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.2010.

JOURNALS

1. Medicine and science in Sports and Exercise International Journal of Sports Nutrition

FSND 304 A : NUTRITION RESEARCH TECHNIQUES

THEORY

UNIT I: Nutrition Research

Types of nutrition research studies- longitudinal, cross sectional, epidemiological, prospective and retrospective, Surveillance, in vivo and in vitro, experimental, laboratory and field studies, Immunological, Metabolic and Bioavailability studies.

UNIT II: Nutritional research with Animal and Human Models

1. Animal nutrition experiments:

Role of animal models in nutrition research, need for extrapolation of animal research results to human populations, Maintenance of animal laboratory, Principles of formulation of diets , classification and Composition, Feeding Techniques, Research with animal models.

2. Human Nutrition Research:

Definition – different areas of nutrition research with human models.

UNIT III: Research techniques for different fields

- Methods of studying the nutritional requirement : Population survey of dietary intake of nutrients, Growth studies, Depletion and repletion studies, Nutrient balance studies, Nutrient turnover, Obligatory losses of nutrients.
- Methods of estimation of protein quality : Protein efficiency ratio(PER), Digestibility co efficient, Biological value(BV),Net Protein Utilization(NPU), Net Protein Ratio (NPR), Chemical score, Protein Digestibility Corrected Amino Acid Score (PDCAAS), Net Dietary Protein Calories Percent (NDPCP).

UNIT IV

- Techniques to measure body composition.
- Techniques to measure food consumption.
- Computer applications in nutrition research.
- Ethics in nutrition research- animal & human.

PRACTICALS:

a. Human Nutrition Research-

1. Reviewing of contemporary human nutritional research methods and techniques.
2. Assessment of Body composition.
3. Assessment of food consumption data.
4. Computer applications for Diet survey, planning, calculations and data processing.

b. Nutrition Research with Animal models-

1. Growth and development studies
2. Supplementation studies.

REFERENCE BOOKS AND TEXT BOOKS:

1. Swaminathan M: Advanced Text book on "Food and Nutrition" (Applied aspects) Vol. II BAPPCO, The Bangalore Printing and Publishing Co. Ltd., (Chapters 21, 24) Bangalore, 1995.
2. Tara Gopaldas and SubhadraSeshadri (Editors) "Nutrition, Monitoring and assessment" Oxford University Press, New Delhi - 1997.
3. Whitney. E.N, and S.R.Rolfes, 'Understanding Nutrition', (8th edition) Chap. 6 and Appendix `J'.Measures of Protein Quality - West/Wadsworth - 1999.
4. Ruth .L. Pyke and Myrtle .L. Brown, "Nutrition an Integrated approach", Chapter 15, Wiley eastern Publications, New Yark. 1997.
5. Vitamin Manual: Scope Monograph, Upjohn Company, 1961.
6. Manual (WHO) Measuring Change in Nutritional Status. WHO, Geneva - 1983.
7. Mayanard, L.A and J.K. Loosli "Animal Nutrition", 5th edition McGraw Hill book company, New York 1992.
8. George. H. Beaton and E.W. Mchenery, "Nutrition" Vol I, II and III, Academic Press. INC: London, 1964.
9. Channey M.S. and M.L.Ross." Nutrition" 8th edition surgeetpublication : 7.K.Kolhapur Road, Delhi, 1979

JOURNALS:

1. Journal of Nutrition Research
2. American Journal of Clinical Nutrition
3. British Journal of Nutrition
4. Proceedings of Nutrition Society of India
5. Annual Review of Nutrition
6. Laboratory Animals Information Service Centre, NIN (ICMR) Hyd.
7. Rat News Letters
8. Nutrition Reviews
9. Indian journal of nutrition and dietetics

FSND 304-B : NUTRITION IN EMERGENCIES AND DISASTERS

THEORY:

UNIT-I

- i. Natural/Manmade disasters resulting in emergency situations:
 - Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies.
 - Factors giving rise to emergency situation in these disasters.
 - Illustration using case studies from Indian subcontinent
- ii. Nutritional problems in emergencies in vulnerable groups
 - Causes of malnutrition in emergency situations
 - Major deficiency diseases in emergencies
 - Protein – Energy Malnutrition / Starvation / Under Nutrition.
 - Specific Nutrient deficiencies - Energy, Vitamins, Minerals
- iii. Communicable disease: Surveillance and treatment.
 - Control of communicable diseases in emergencies – Role of immunization and sanitation.

UNIT-II

- Assessment and surveillance of Nutritional status in emergency affected populations.
- Scope of assessment of malnutrition in emergencies
 - Indicators of malnutrition. Clinical signs for screening acute malnutrition
 - Anthropometric assessment of nutritional status. Indicators and cut-offs indicating seriously abnormal nutrition situation: Weight for height based indices, MUAC, social indicators.
 - Organization of nutritional surveillance and individual screening.

UNIT-III

- i. Nutritional Relief and Rehabilitation
 - Assessment of food needs in emergency situations
 - Food distribution strategy – Identifying and reaching the vulnerable group – Targeting Food Aid.
 - Mass and Supplementary Feeding
 - Therapeutic Feeding
 - Special foods/rations for nutritional relief
 - Local production of special foods
 - Local foods in rehabilitation
 - Organisation of mass feeding/general food distribution
 - Feeding centers
 - Transportation and food storage
 - Sanitation and hygiene,
 - Evaluation of feeding programmes
 - Household food security and nutrition in emergencies
- ii. Public nutrition approach to tackle nutritional problems in emergencies

UNIT-IV

- i. Introduction to Epidemiology – types of epidemiology, collection of epidemiological data, secondary routine data, Descriptive epidemiology, Cross sectional Analysis, prevalence and incidence, risk factors, risks and odds, relative and attributable risks
- ii. Principles of Nutritional Epidemiology, Measurement issues, Measurement of disease, Occurrence and Measurement of association, Exposure and outcome, Socio demographic and Psycho social variables.
- iii. Design and Planning of Nutritional Epidemiological studies – assessing and

supplying And Evaluating Epidemiological studies – Discussion of selected case studies

PRACTICALS:

1. Training in rapid assessment of Nutritional status
2. Assessment of needs, Nutrition, Health. Collection of epidemiological data hand an experiences.
3. Planning and preparation of Nutrient Dents Foods to be used in
 - i. Famine
 - ii. Drought and
 - iii. specific Nutrient Deficiency states
4. Simulating exercises – Planing, execution and evaluation of emergency programes.
5. Survey of causative factors of communicable diseases – Case study Experiences on the Management of the same
6. Study of drought and famine relief programmes available with Governmental and Non-Governmental agencies

REFERENCE:

1. Goyet, Fish. V.; Seaman, J. and Geijer, U. (1978): “The Management of Nutritional Emergencies in Large populations”, World Health Organisation, Geneva.
2. Field Exchange, Newsletters by Emergency Nutrition Network, Dept. of Community Health and General Practice, Ireland.
3. World Disasters Report – Focus on Public Health, International Federation of Red Cross and Red Crescent Societies.
4. The Management of Nutrition in Major Emergencies WHO – in Collaboration with UNCHCR, International Federation of Red Cross and Red Crescent Societies and EFP
5. Disasters – International Public Nutrition and Emergencies: The Potential for improving practice. Special Issue – Vol.23/4, Dec. 1999
6. Guidelines and Research publications of OXFAM, Oxfor, UK ((1998-1977) (1991,1999) WFP, Rome, WFP/UNCHCR Rome and Geneva, FAO, Rome. WHO, Geneva (1997)

FSND :304 C: FOOD PACKAGING

THEORY:

UNIT-I

- Food Packaging – Definition - Need and functions of packaging;
- Principles in the development of protective packaging.
- Deteriorative changes in food stuff and packaging methods for prevention.

UNIT-II

- Packaging Materials – Concepts, Significance and Classification.
- Packaging – Development, Unit/Retail.
- Primary Packaging Media – Properties and applications
- Paper boards, metals, plastics, wood and plywood, glass, flexible etc.
- Labels, caps and closures and wards, adhesives, inks and lacquers, cushioning materials, wooden Boxes, strapping and Reinforcements.

UNIT-III

- Testing and evaluation of packing media – retail packs (including shelf life evaluation) and transport packages – quality control.
- Packaging systems and methods for food products – vacuum packaging, gas flush.
- Packaging, CAP and MAP, Aseptic and retort packing, Bag-in Box etc.
- Food products – General classification and packing types, varieties and trends.

- Storage, handling and distribution of packages (foods) – including palletisation and Containerization – Shelf life evaluation of packet products

UNIT IV

- Food Marketing and role of packaging
- Packaging Aesthetic and graphic design.
- Packaging – Laws and Regulations – FDA, FSSA, Packaging Commodity Rules, Weight and Measures Act etc.
- Coding and Marking Including bar coding.
Environmental and Eco issues and waste disposal.

PRACTICALS:

1. Collection and study of packaging materials from market for different food products.
2. Study of different packaging materials for strength, viscosity, Special needs etc.,
3. Shelf life evaluation of foods using different packaging materials.

REFERENCES

1. Sacharow and Griffin, Food Packing – AVI Publications.
2. Hotchikess Food and Packaging Interaction – American Chemical Society.
3. Stanley and Sacharow Food Packaging.
4. Darry, R.andT, Blackle: Principles and Application MAP – Academic and Professions.
5. Bhatia S.C. Canning and Preservations of Fruits and Vegetables – New Delhi, India
6. Dalzett J.M. Food Industry and The Environment – Chapman and Hall, London.
7. Robertson G.L. Food Packaging – New York, Marcell Dekker, Inc.
8. Bureau of G and Multon J.K Food Packaging Technology (vol. 1 and2) – VCH, publishers, INC, New York
9. Madhavaiah M and RV Goramma; “ Food Packaging Materials – Tata Mcoraw – Hill publishing company limited: New Delhi – 1996
10. Sood. S.K. and MridulaSaxena “Food Packaging” – NLERT – Booklet – New DelhI, 2002.

JOURNALS:

1. Food Industry
2. Food Packer
3. Journal of Food Science and Technology.

SEMESTER - IV

FSND 401 : FOOD QUALITY STANDARDS AND CONTROL

(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

THEORY:

UNIT-I - Food Quality, Assessment and evaluation.

- Definition and Physico Chemical attributes.
- Sensory perception; subjective/ organoleptic evaluation.
- Objective methods of evaluation.
- Chemical methods of evaluation.
- Microbial methods of evaluation.

UNIT-II - Food safety : Food Safety Standards Authority of India (FSSAI)

- Current rules and regulations
- Definitions of standards of identity and quality
- Food licensing and registration system
- International food safety measures

UNIT-III - Food safety

- Definitions
- Undesirable constituents-Naturally occurring contaminants.Heavy metals, pesticide residues,products of microbial growth etc .,Health hazards.
- Desirable constituents-chelating agents,acids,bases,buffer systems and salts; stabilizers,thickeners,polyhydrocalcinols,anticaking,firming,clarifying and bleaching agents;antioxidants,non-nutritional sweetness,antimicrobial agents.
- Gases and propellants.

UNIT IV - Food contaminants and Standards of Quality-

- Contaminants in milk and milk products
- Contaminants in fruit and vegetable products
- Contaminants in meat, poultry, eggs and fish
- Contaminants in fats and oils
- Contaminants in spices and condiments.
- Contaminants in Water and Beverages.
- Contaminants in Food grains and flours
- Contaminants in sugars

PRACTICALS:

Assessment of quality parameters in different foods

1. Survey of different foods in market
2. Cereals and pulses – label information, adulterants
3. Fats and oils – saturation , Rancidity
4. Fruit and vegetable products – Maturity , acidity , TSS, sugars
5. Coffee and tea , spices , Honey – Adulterants
6. Milk and milk products
7. Meat products
8. Determination of different preservatives
9. Determination of different colors
- 10.Document preparation for the approval of FSSAI

REFERENCES :

1. S.N.Mahindru ,”Food Safety –Concept and Reality” ,APH Publishing corporation, 5 ansari road ,Darya ganj, New delhi-2004
2. Rajesh Mehta and J.George –“Food Safety Regulation concerns and Trade –The developing country perspective ,Mac millan India Ltd ,2005.
3. Vanisha Nambiar, A Text book on “Food Contamination and Safety “ ANMOL Publications Pvt.Ltd. New Delhi -2004.
4. Amerine, M.A., Pangborn RM, and Roessler BB,” Principles of Sensory evaluation of foods”, Academic press New York, 1965.
5. The prevention of food adulteration Act, 1954 and Prevention of food adulteration Rules, 1955. (1998). Federation of Indian Industry, New Delhi.
6. Swaminathan.M., “Food Science and Eperimental foods” (1979) Ganesh and Company – Chennai.
7. Development in Milling and baking Technology (1991) Association of food scientists and Technologists, Mysore.
8. The prevention of food Adulteration Act 1954 (1997) Eastern Book Company, Lucknow.
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10. Blank.F.C., “Hand book of food and nutrition” (1999). AGRO Botanical Publishers, India.
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12. Ramesh V. Bhat and B.S. Narasinga Rao, “National Strategy for food quality control”(1985), National Institute of Nutrition, ICMR, Hyderabad.
13. Perpinstrum - Anderson, “World food trends and future food security”(1994) Food Policy Report, The International Food Policy Research Institute, Washington, D.C.
14. Mahtabs.Bamji and N.PralhadRao “ Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi, 2004.
15. Heather Hedrick Fink, Alan E. mike sky “Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America. 2012.
16. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA 2011.
17. N.MentaNitin.Jmenta.Nutrition and Diet for Children Simplified MeenakshiJaypee Brothers Medical Publishers (P) LTD 2014.
18. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins Nutrition in Clinical Practice Second Edition.2007.
19. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.2012.
20. MadhuSharma Pediatric Nutrition in Health and Disease, Jaypee Brother’s Medical Publishers (P) Ltd New Delhi London Philadelphia Panama.2013.
21. Nutrient Requirements andRecommended Dietary Allowance forIndians A Report of The Expert Group of Icmr.2010.
22. Dr.M Swami Nathan, Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.2010.
23. ShubhanginiA.Joshi, Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.2010.

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1. Journal of Food Science and Technology
2. Indian Food Industry, A publication of Association of Food Sciences and Technologists
3. Food Chemistry
4. Journal of Food Science
5. IFCON' 93 and IFCON'98 International food convention, Food technology update,

Mysore.

FSND 402: INSTITUTIONAL FOOD SERVICE MANAGEMENT

THEORY:

UNIT-I: Introduction to food service Industry, management and types of Food service establishments.

- Principles and functions of food service management.
- Need and importance
- Tools of Management.
- Management of resources.
- Types: Hotels and Restaurants - Hotels/Motels, restaurants, cafes, clubs public houses, winebars, speciality restaurants, fast foods, take-aways, street foods.
- Welfare and Industrial - Residential establishments - School, colleges, hostels, old people House, Hospitals, nursing homes, Industrial canteens, Temple feeding and Marriage feeding.
- Transport - Railway, Airlines and Sea.

UNIT-II: Infrastructure and Equipment in Food Science Institutions

- Building plans, outlays of work places - kitchen spaces, storage spaces and service areas.
- Equipment - Classification of equipment, selection of equipment, Design, installation, operation and maintenance.
- Menu – types of menu in Food service institutions, principles and planning
- Food service operation and types of food services - systems of service, mechanics of waiter service, self-service, vending and mobile catering.
 - Food services systems - Introduction, Standards of hygiene.
 - Cook-chill system and benefits.
 - Cook-freeze system and benefits.
 - sous-vide.
- Computers in service - Introduction, catering controls.

UNIT-III: Food safety in public catering.

- Health and Hygiene of personnel.
- Laws governing food service in public catering.
- Sanitation of food service establishments.
- Food safety in hotels, restaurants, street foods, industry and canteens, hospitals, hostels, airlines, railways, temple and mass feeding programmes.
- Laboratory support services in food safety.
- Food borne diseases and importance of surveillance
- Food safety awareness programmes to food handlers and consumers.
- Role of media in food safety education.

UNIT IV: Financial and Personnel Management

- Definition and scope of financial management.
- Cost concept, cost control and pricing.
- Book keeping and accounting.
- Personnel Management - Recruitment, selection and Induction, Job analysis, description Monitoring work employee facilities and benefits, Inservice Training. Skills required to operate and manage food service system.

PRACTICALS:

1. Survey of different types of food service establishments.
2. Standardization of recipes suitable for different food service establishment.
3. Portioning, costing and multiplication of the recipes.
4. Practice in preparation of volume meals at different costs suitable for different service systems.
5. Meal planning exercise for various food service systems
5. Exercise on preparation of work schedule
7. Visit to the following types of
 - Hotels / restaurant.
 - Welfare and industrial - transport.and writing report with regard to outlays, equipment, personnel etc. organizational set up.
8. Carrying out an evaluation study project on any aspect unit of food service.

REFERENCES

1. 1. Ronald Kinton and victor cesarani (1992),”The theory of catering”, Butler and Tanner Ltd. France and London.
2. Mohiniseti and Surjeet Mohan (1993), “Catering management - An integrated approach”, second edition, Wiley eastem limited, New Delhi.
3. Ramesh V. Bhat and R. Nageswara Rao (1996), “Food safety”, Bappco (Ltd). Mysore, Banglore.
4. Ramesh V. Bhat and R. Nageswar Rao (1992), “Food safety in public catering”, NIN, ICMR, Hyderabad.
5. Mahtabs.Bamji and N.PralhadRao “ Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi, 2004.
6. Heather Hedrick Fink, Alan E. mike sky “Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America. 2012
7. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA 2011.
8. N.MentaNitin.Jmenta.Nutrition and Diet for Children Simplified MeenakshiJaypee Brothers Medical Publishers (P) LTD 2014.
9. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins Nutrition in Clinical Practice Second Edition.2007.
10. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.2012.
11. MadhuSharma Pediatric Nutrition in Health and Disease, Jaypee Brother’s Medical Publishers (P) Ltd New Delhi London Philadelphia Panama.2013.
12. Nutrient Requirements andRecommended Dietary Allowance forIndians A Report of The Expert Group of Icmr.2010.
13. Dr.M Swami Nathan, Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.2010.

JOURNALS

1. Journal of Food Science and Technology
2. Indian Food Industry, A publication of Association of Food Sciences and technologists
3. IFCON' 93 and IFCON'98 International food convention, Food technology update, Mysore.

FT 403: FOOD PRODUCT DEVELOPMENT AND MARKETING

THEORY:

UNIT I: Innovations in product Development

- Introduction to the Product development and formulation - Need for Product development
- New Food Products - Definition, Classification, General characteristics of New food product - Classes of new Food products - Line extensions - Repositioning of existing products - New form of existing product - Reformulation - New packaging - Innovative products and Creative products and Value added products
- Factors affecting food product development - Corporate factors - Market place factors, technological pressures - Governmental issues and legislations

UNIT II: Food product development Process

Stages/Phases of new product development: Idea generation- Screening, Feasibility studies, Consumer research , Financial review, Product design and Formulation, Process development – Recipe development and scale up, Consumer trials , Test market, Quality assessment of new developed products -Sensory Evaluation, Shelf life Testing, packaging and labeling protocols. Costing/pricing and economic evaluation of the product, Product launch – product life cycle.

UNIT III: Speciality food products

Product development with reference to nutritional and health needs: Health foods, Medical foods, Therapeutic foods, Infant foods, Geriatric foods, Functional foods, Nutraceuticals, prebiotics and probiotics, Herbal foods, Sports drinks.

UNIT IV: Product Commercialization and Marketing

- Entrepreneurship, Test Marketing; evaluating results and analyzing.
- Ethics in food product development
- Intellectual property/ Patents

PRACTICALS

1. Market Survey to identify new products in terms of
 - Line Extension, Repositioning Existing Products, New form/Reformulation, New packaging of existing products, Innovative products and Creative Products.
2. Market Survey to identify
 - Nutrition products, Therapeutic products, Specialty products, Technology Driven products.
3. Identification of product for development
 - Idea generation, Screening of Ideas, Concept, Market research concerned product development.
4. Development of the product.
 - Formulation, Standardization, Scaling up.
5. Sensory evaluation
 - Designing of score card, Sensory Evaluation.
6. Food and Nutrition labeling and packaging.
7. Costing and Pricing.
8. Test Marketing.
9. Shelflife Studies.

REFERENCES

1. Proc. Food Processors Institute: A key to Sharpening your Competitive Edge. Food Processors Institute, Washington, DC.
2. Mike Stringer and Colin Dennis, "Chilled foods A comprehensive guide" 2nd edition :Woodhead publishing limited, Cambridge, England, 2000.
3. Andrew J.Taylor, "Food Flavour Technology", Sheffield Academic Press, 2002.
4. Debashri Ray "Nutritional Challenge and Total Quality Management" 1st edition; Sarup and Sons, New Delhi, 2002.
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6. Rita Singh "Food Biotechnology" volume 2, 1st edition, Global vision publishing house, Delhi, 2004.
7. Fuller, G.W.(1994) New Food Product Development: From Concept to Market place CRC, Press, New York.
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10. Graf, E. and Saguy, I.S. (1991), Food Product Development: From Concept to the Market Place, Van Nostrand Reinhold New York.
11. Oickle, J.G. (1990) New Product Development and Value Added. Food Development Division Agriculture, Canada.

JOURNALS

1. International Journal of Food Science and Technology
2. Food Technology
3. Journal of Food Science and Technology (IAFST), CFTRI, Mysore.
4. Trends in Food Science and Technology
5. Critical Reviews in Food Science and Nutrition
6. Food Packer
7. Food Industry (IAFST) Mysore: CFTRI.

FT 404 A: FOOD PROCESSING AND PRESERVATION TECHNOLOGY

(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

THEORY

UNIT I: Scope and significance of food processing and preservation

- Need and Purpose, Principles and Methods of food processing and preservation.
- Traditional Methods of food processing and preservation
- Preservatives and Additives - Classification, applications, permissible limits and safety aspects.

UNIT II: Modern Methods of food processing and preservation

- Processing and preservation by Heat - Principles of thermal processing, blanching, pasteurization, UHT processing, thermal sterilization, canning, extrusion, Different time- temperature- combinations, Thermal Death Curves , Margin of safety.
- Processing and preservation by Cold- Refrigeration and freezing, freezing time and rate, methods of freezing, effect on quality of foods.
- Processing and preservation by Dehydration and concentration – Types, Methods and their suitability for different food products, effect of dehydration and concentration on quality of foods- Low, High, and Intermediate Moisture foods.

UNIT III: Processing and preservation by Fermentation

- Definition, types, Importance, Technology, Benefits and Limitations.

- Processing and preservation of fermented foods -Cereal and pulse products
Vegetables, Milk products, Beverages, meat products

UNIT IV: Processing and preservation by Novel methods

Irradiation, high Pressure and ultrasonic, high intensity light, pulse electric field, ohmic heating, inductive heating and pulsed X-rays, Microwave and radio frequency, Minimal Processing, membrane processing, hurdle technology, Nanotechnology and applications in foods

PRACTICALS

1. Market survey of processed and preserved foods and to study the methods of processing, preservation, Additives and preservatives used, shelf life, cost and form of availability.
2. Preservation of food by traditional methods using sugar, salt and turmeric powder etc.
3. Preservation by using Chemical preservatives.
4. Preparation of Jams, Jellies, fruit Juices, Squashes, Sauces and bottling – Shelf life study.
5. Pickling with a variety of foods - Shelf life study.
6. Drying and dehydration of foods.
7. Refrigeration, Freezing and freeze drying of foods.
8. Extrusion processing.
9. Processing and preservation of fermented products.
10. Visits to different commercial food processing units and Industries.

REFERENCE BOOKS & TEXT BOOKS

1. Anuradha Subramanian, "Concise Food Science", Soundariya Publication, Erode, Tamil Nadu. 1998.
2. Harry. W. Von Loesecke, "Drying and dehydration of Foods", Allied Scientific Publishers, 1998.
3. Fellows, P. and Ellis H. 1990. Food Processing Technology: Principles and Practice, New York.
4. Norman, N. Potter, Joseph H. Hotchkiss "Food Science", 5th edition, CBS Publishers & Distributors, New Delhi. 1996.
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6. Lewis, M.J. 1990. Physical Properties of Food and Food Processing Systems. Woodhead, UK.
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8. Vijayakhader, "Text book on food storage and preservation", Kalyani Publishers, New Delhi. 2000.
9. Mahtabs. Bamji and N. Pralhad Rao "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi, 2004.
10. Heather Hedrick Fink, Alan E. Mike sky "Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America. 2012
11. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA 2011.
12. N. Menta Nitin. J. Menta. Nutrition and Diet for Children Simplified Meenakshi Jaypee Brothers Medical Publishers (P) LTD 2014.
13. David L. Katz Wolters Kluwer/Lippincott Williams and Wilkins Nutrition in Clinical Practice Second Edition. 2007.
14. C. Gopalan, B. V. Ramasastri and S. C. Bala Subramanian. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad. 2012.
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16. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of The Expert Group of Icmr. 2010.

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18. ShubhanginiA.Joshi, Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.2010.

JOURNALS

1. Advances in food research, yearly volumes.
2. British food journal.
3. Food Science.
4. Food Technology.
5. Journal of Food Science and Technology.
6. Indian journal of Nutrition and dietetics.
7. Scientific American.

FSND 404-B : GERIATRIC NUTRITION

THEORY:

UNIT-I: The process of Ageing – Physiological biochemical and body compositional changes – Theories of ageing. Socio-cultural and psychological aspects of ageing – Health seeking behaviour of the elderly.

UNIT-II: Food and Nutritional needs of the elderly – Dietary management – Special problem of women – menopausal, post-menopausal. Problems; Early nutrition and nutrition and health in later years.

UNIT-III: Chronic degenerative diseases and nutrition and health problems of the elderly – their etiology – genesis life style and living condition, management, prevention and control.

UNIT-IV: Policies and programmes of the government and NGO sectors pertaining to the elderly – old age homes – Day care and recreation centers – their need and scope.

PRACTICALS:

1. Assessment of Nutritional status of the aged
2. Planning and preparation of diets for the aged from different sections and living in different situations
3. Assessment of nutritional and health problems of the aged and planning counseling programmes
4. Visits to different old age home and evaluations of food intakes

REFERENCE:

1. Kumar, V. (1996): Aging – Indian Perspective and Global Scenario, Proceedings of International symposium of Gerontology and Seventh Conference of the Association Gerontology (India)
2. Bagchi, K.and Puri, S. (Ed)(1999): Diet and Aging-Exploring Some Facets, Soc. For Gerontological Research, New Delhi and Help Age India, New Delhi.
3. Chaudary, A.(Ed)(2001): Active Aging in the New Millennium, Pub. Anugraha, Delhi.
4. Shils, M.E., Olson, AJA., Shike, M. and Ross, A.C.(Ed)(1999): 9th Edition, Williams and Wilking.
5. Sharma, O.P. (Ed.) (1999): Geriatric Care in India – Geriatrics and Gerontology: A Textbook, M/S. ANB Publishers.
6. Aiken, L.R.(1978): The Psychology of Later Life, Philadelphia WB Saunders Company.
7. Bergmann, Klaus (1972): Aged: Their Understanding and Care, London Wolfe Pub.
8. Binstock, R.H. and E. Shanes(eds)(19986): Handbook of Aging and Social Sciences V.N. Reinhold Co, New York,.

9. Blau, Zana Smith (1983): Old Age in a Changing Society, New View Prints, New York
10. Bose, A.D. and K.D. Gangrade (1988): Aging in India: Problems and Potentialities, Abhinave Pub., New Delhi
11. Cook Alicia Skinner (1983): Contemporary Perspectives on Adult Development and Aging, New York, Macmillan.
12. Desai, K.G.(1985): Problems of the Retired People in Greater Bombay, TISS, Series No. 27.
13. Ghosh, B. (1988):Contemporary Social Poroblems in India, Bombay, Himalaya Pub.
14. Homban, D.(1978): Social Challenge of Aging London, Groom Helm.
15. Johnson Elizabeth (1982): Growing old: Social problem of Aging, New York, Holt Rinehart and Winston.
16. Kennedy Carroll(1988): Human Development, New York, Macmillan.
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19. Pinkston, P.H. and N.K. Linsk (1984): Care of the Elderly: A family approach, New York, Pergamon Press
20. Schiamberg Lawrence, B.(1985): Human Development, New York, Macmillan.
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23. Cox Harold (1984): Later life: The Reality of Aging, New Jersey, Perentice Hall Inc.
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26. Chemoff, R.(ed)(1991). Geriatric Nutrition: The Health Professional' Handbook, Gaithersburg. MD: Aspen
27. The Nutrition Screening Initiative (1994). Incorporating Nutrition Screening and Interventions into Medical Practice: A Monograph for Physicians.
28. Watson, R.R.(ed)(1985)CRC Handbook of Vitamins in the Aged ERC Press, Boca Raton, Florida
29. Bock, G.R.; and Whelen, J.(eds) The Childhood Environment and Adult Disease.Chichester, U.K. Wiley
30. Berg, R.L. and Casells, J.S.(1990) The Scond Fifty Years: Promoting Health and Preventing Disability Washington E.C. National Academy Press.
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FSND 404-C: IMPROVING HEALTH AND NUTRITION: IEC APPROACHES

THEORY:

UNIT-I

Introduction to IEC - Information, Education and Communication

Aims and Objectives: Importance of IEC, relevance to programmes.

IEC for Behavioural changes: Behaviour and determinants of behaviour, need for IEC

UNIT-II

i. Communication and Media

- Concept of communication and mass communication
- Scope of Communication
- Elements of Communication
- Models of Communication
- Communication Process
- Approaches to Communication

- Barriers to Communication
- Communication for Extension Education and Development

ii. Different Media, their characteristics and use

- Audio visual aids(Graphics aids, puppets and other three dimensional aids, display boards and projected and non-projected aids)
- Mass Media : Print - Radio/Recordings – Films - Television/Video – Advertising - Journalism

UNIT-III

Development of IEC programmes. Planning effective IEC Programmes – Board-based strategy and for specific objective. Identification of key messages for re-inforcement, preparation of IEC material. Refining of IEC messages. Social Mobilisation, social marketing and role of community. Training to use IEC.

Implementation to use of IEC, training supportive supervision and monitoring

IEC for different target groups:

- Policy makers
- Managerial level and middle level official from Government donor agencies and NGO's
- Grassroot functionaries
- Community

UNIT-IV

Impact Assessment

Case Studies of various IEC programmes specific National Programmes and IEC – Influence at mass level

PRACTICALS

- Field work: study of existing IEC approaches and materials in various programmes at micro and macro levels. Appraisal of techniques, tools, messages, coverage and outreach, costs and impact
- Planning and implementation of a Project: Identification of a problem/area for IEC Preparation of suitable IEC material for one-to one, group and mass communication including implementation, monitoring and evaluation.

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FSND:405- HUMAN VALUES AND PROFESSIONAL ETHICS - II
(Revised Syllabus with effect from 2015-16)

Unit-I:

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

Unit-II:

Medical ethics- Views of Charaka, Sushruta and Hippocrates on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit-III:

Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions.Characterics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit-IV:

Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and population, Justice and environmental health.

Unit-V:

Social ethics- Organ trade.Human trafficking.Human rights violation and social disparities, Feminist ethics.Surrogacy/pregnancy. Ethics of media- Impact of Newspapers, Television, Movies and Internet.

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