

**DEPARTMENT OF HOME SCIENCE
S.V.U. COLLEGE OF SCIENCES
SRI VENKATESWARA UNIVERSITY: TIRUPATI**



**RESTRUCTURED CURRICULUM FOR
M.Sc. FOOD TECHNOLOGY (Self-Supporting Course) PROGRAMME
TO BE IMPLEMENTED WITH EFFECT FROM THE ACADEMIC
YEAR 2017-2018**

**SYLLABUS
Choice Based Credit System (CBCS)**

DEPARTMENT OF HOME SCIENCE
FOOD TECHNOLOGY (SSC)

Vision

To be a premiere centre for excellence in higher education in the areas of specialization fostering nurturing and building careers for students and to be an apex body playing a pivotal role in planning and monitoring community development.

Mission

The Department of Home Science is committed to empower the students in capacity building skills through teaching, research and community oriented extension activities, thereby widening the scope for self development and Employability and preparing them as socially useful and responsible citizens

The academic programmes, research and extension activities are planned and executed meticulously so as to reflect the vision and mission of the Department, focusing on the empowerment of students through quality education by updating syllabus with current trends and providing appropriate knowledge and skills compete at the global level. The Department through motivated staff always strives towards reaching proficiency through teaching and community oriented extension programmes.

DEPARTMENT OBJECTIVES:

The Department is having the following objectives:

1. Enable the students to understand the interrelation of food and health.
2. To foster knowledge across the life span in inter connected Human development factors to become efficient counselors and early childhood educators.
3. Develop sensitivity towards the community problems and train the students in Extension and out reach activities.
4. To focus on training students in application of techniques to process and preserve the food.

The department of Home Science has been adopting the systematic procedure for development, revision and implementation of the curriculum for four different post-graduate programmes offered viz., Food Science Nutrition and Dietetics (FSND), Human Development and Child Welfare (HDCW), Extension Management and Communication Technology (EMCT)

and Food Technology (FT) . The learning outcomes of each course are framed such that they help students to gain theoretical knowledge as well as skills to meet local, national and global trends. The curriculum of each course has practicals, field visits, visit to institutions and a mandatory internship programme, which focus on imparting essential skills and hands-on experience and experiential learning thereby can excel when they get employment in Government and Non-Government Organizations to work individually as well as in teams. The cross cutting issues namely, technology, gender, child rights, human values and professional ethics are incorporated in core theories and electives to enable the students to lead a purposeful and independent life filled with moral and ethical values . Majority of the courses offered across all programmes do focus on nurturing employability/entrepreneurship/skill development. The outcomes of each programme have the emphasis on commitment to the contribution to the interest of the society as a whole and perform well in their careers

Programme Educational Objectives (PEO)

To enable students to:

1. Understand the methods and techniques of production, processing, preservation, packaging and labeling, safety and quality assurance of different foods.
2. Gain knowledge in development of new food products and evaluation in terms of physical, chemical, microbiological, safety attributes, sensory and shelf life.
3. Acquire skills in food formulations, processing, preservation and evaluation of foods for their safety with reference to standards nationally and globally.
4. Apply of food processing and preservation technologies in research and food industry.

PROGRAMME OBJECTIVES:

1. To provide the theoretical and practical knowledge with regard to the various aspects of food i.e., science, Technology, microbiology and quality control measures involved in food products as well as their preservation techniques.
2. To identify, Understand and analyze the difficulties related to food technology and make the students to take proper decisions for the same.
3. To make the students learn about concepts in designing and developing of new food products to meet the current demands of consumers as well as industries.
4. To enable the students to get scientific knowledge through different food technology papers so that they can enhance their skills towards research and development.
5. To acquire the knowledge through different aspects such as unit operations in food processing, food packaging, preservation methods, dairy processing and bakery, confectionery, meat, poultry and fish processing and preservation methods.

6. To strengthen the students skills to work in different groups as well as an individual while they enter into the food industries, institutions, research and quality control laboratories, academic institutions and governmental agencies.
7. To provide effective interpersonal skills by conducting seminars and Presentations in each paper.
8. To attain the knowledge with regard to government policies and regulations of food quality and safety.
9. To facilitate the student to understand the personal and professional ethics towards the role of food technologist in the whole process of food product development.
10. To make the students to find the solutions for the problems occurred in industries by applying effective technologies in developing of by products as well as value added foods.
11. To assist the students towards entrepreneur through new food product development by conducting market research, shelf life studies and test marketing of food products.
12. To gain the knowledge and skills related to Academic, research, employee and entrepreneurial roles in the broad field of food technology for their holistic development.

PROGRAMME OUTCOMES:

1. Demonstrate and apply comprehensive knowledge and understanding gained in food Science, food chemistry, microbiology, Technology of various foods and food products, food processing, Food product development quality control and Community nutrition in an integrated manner to the development, processing, and preservation of safe, nutritious, and high-quality foods.
2. Identify, Understand and analyze problems related to food technology and make suitable decisions to find an appropriate solution for the same as identify the factors responsible for food spoilage, food contaminants and adulterants and the methods to detect and control the same.
3. Design and develop food products by apply the concepts of Food Technology in creative manner to meet the needs and demands of the customers and industry. Formulate and develop tailor made products as per the needs of customers such as specialty foods.
4. Students develop a scientific knowledge with a sense of enquiry through various food technology papers. Able to strengthen research skills in order to meet the global challenges associated within all aspects of the food science and technology to develop their capacity to undertake research into the science of foods from farm to fork.

5. Demonstrate knowledge in various aspects of food and its application in food industry, concept of unit operations in food processing, conventional and advanced methods of food science, processing, preservation, methods of packing, post-harvest practices bakery and confectionery, meat, poultry and fish processing, food fermentation, dairy processing so as to develop food products. Able to Utilize advanced instruments and technologies to process and analyze food products and to solve food safety and quality related problems.
6. Able to work as individual as well as in teams with others from different backgrounds and confident to work in diverse socio-cultural settings with multicultural groups and teams in food industries, institutions, food research and quality control laboratories, academic institutions and governmental agencies as well as an entrepreneur.
7. Able to communicate orally and in writing related to discipline-specific, technical and non-technical aspects with effective interpersonal skills. seminars and Presentations in each paper enhances their confidence, ability to express themselves & presentation skills. Can effectively communicate scientific knowledge to meet the needs of industry and the consumer for the production and marketing of safe and quality foods.
8. Have knowledge in regulations governing on legal, safety, security and health issues and Able to follow food laws, regulations and safety standards in application of food additives preservatives etc. and apply the principles of Hazard Analysis and Critical Control Points (HACCP) to ensure safe food processing.
9. Understand and apply personal and professional ethics and responsibilities of food technologist in product development, quality, documentation and publications.
10. Find solutions for industrial and societal problems by effective utilization of byproducts, developing value added foods and transfer of technologies for sustainable development.
11. Screen business ideas, conduct market research, acceptability, quality control, shelf life studies and test market of the food products to avoid risks in commercialization of food products.
12. Acquire ability to gain knowledge and skills which are necessary throughout their life as professionals seeking to expand their career prospects into a wide range of Academic, research, employee and entrepreneurial roles in the broad field of food technology for their holistic development.

SRI VENKATESWARA UNIVERSITY COLLEGE OF SCIENCES
DEPARTMENT OF HOME SCIENCE
CHOICE BASED CREDIT SYSTEM (C.B.C.S) SYLLABUS AND SCHEME OF EXAMINATION
(WITH EFFECT FROM THE ACADEMIC YEAR 2017-18)
MS FOOD TECHNOLOGY

Semester-I							
S.No	Course Code	Components of Study	Title of the Course	No. of Credits	IA Marks	End Sem Exam marks	Total Marks
1	FT-101	Core- Theory	Food Chemistry and Analysis	4	20	80	100
2	FT-102	Core- Theory	Food Science and Experimental Foods	4	20	80	100
3	FT-103	Core- Theory	Cereal Grains, Legumes and Oilseed Technology	4	20	80	100
4		Practical-I	Food Chemistry and Analysis	2	-	--	50
5		Practical -II	Food Science and Experimental Foods	2	--	--	50
6		Practical -III	Cereal Grains, Legumes and Oilseed Technology	2	--	--	50
7	FT-104	Compulsory Foundation	Essentials of Food and Community Nutrition	2	10	40	50
8	FT-105	Elective Foundation	Human Values and Professional Ethics - I	4	20	80	100
	TOTAL			24			600

Semester-II							
S.No	Course Code	Components of Study	Title of the Course	No. of Credits	IA Marks	End Sem Exam marks	Total Marks
1	FT-201	Core- Theory	Technology of Horticulture produce	4	20	80	100
2	FT-202	Core- Theory	Food Microbiology and Safety	4	20	80	100
3	FT-203	Core- Theory	Dairy Technology	4	20	80	100
4		Practical-I	Technology of Horticulture produce	2	-	-	50
5		Practical -II	Food Microbiology and Safety	2	-	-	50
6		Practical -II	Dairy Technology	2	-	-	50
7	FT-204	Compulsory Foundation	Research Methodology	2	10	40	50
8	FT-205	Elective Foundation	Human Values and Professional Ethics – II	4	20	80	100
	TOTAL			24			600

Semester – III							
S.No	Course Code	Components of Study	Title of the Course	No. of Credits	IA Marks	End Sem Exam marks	Total Marks
1	FT-301	Core- Theory	Food processing and Preservation Technology	4	20	80	100
2	FT-302	Core- Theory	Live Stock and Sea Food technology	4	20	80	100
3		Practical –I	Food Processing and Preservation Technology	4	-	-	100
4		Practical-II	In plant training.	4	-	--	100
5	FT-303	Generic Elective*	(a)Unit operations in Food Industry. (b) Spices, Condiments and Plantation Crops (c) Nutrition in Emergencies	4	20	80	100
6	FT -304	Open Elective* (For other departments)	(a)Fundamentals of Food, Nutrition and Health (b)Nutritional Assessment	4	20	80	100
TOTAL				24			600

*Among the Generic Elective a student shall choose any one

Semester- IV							
S.No	Course Code	Components of Study	Title of the Course	No. of Credits	IA Marks	End Sem Exam marks	Total Marks
1	FT-401	Core- Theory	Food Safety Standards and Quality Control	4	20	80	100
2	FT-402	Core- Theory	Food Product Development and Marketing	4	20	80	100
3	FT-403	Core - Theory / Project Work	Nutrition for Health and Fitness/Project Work	4	20	80	100
4		Practical	Food Safety standards and Product Development	4	-	-	100
5	FT-404	Generic Elective*	(a) Institutional food service management (b)Basic Food Engineering (c)Food Packaging	4	20	80	100
6	FT- 405	Open Elective* (for other departments)	(a) Child Welfare Programmes (b)Disaster Management	4	20	80	100
TOTAL				24			600

*Among the Generic Elective a student shall choose any one

FT 101: FOOD CHEMISTRY AND ANALYSIS

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

Course Objectives

1. Acquire knowledge on chemical composition of different foods.
2. Understand the physical, chemical, and functional properties of foods.
3. Know the principles and working applications of different analytical techniques associated with food.
4. Comprehensive knowledge on techniques of analysing the nutrient components in foods.

CORE –THEORY

UNIT-I: Water Chemistry and Dispersed Systems:

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

UNIT-II: Carbohydrates and Lipids

- Carbohydrates – Classification , structure, physical – chemical properties of monosaccharides- pentoses, and hexoses , oligosaccharides – Maltose, Lactose, sucrose and polysaccharides – starch , cellulose.
- 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

- Proteins and amino acids – Classification, structure, physical properties.
- Functional and Chemical properties – Protein hydration, solubility, interfacial properties Emulsification and foaming, Gelation , Dough formation.

UNIT-IV: Food Analysis

- Introduction to food analysis- Methods of sampling, Determination of total ash; Principles and methods of chemical analysis
 - Carbohydrates – qualitative and quantitative analysis of starch and sugars.
 - Proteins – Electrophoresis, micro-kjeldhal method.
 - Fats – analysis of solid and liquid fats, Rancidity.
 - Determination of vitamin and minerals – vitamin-C, iron, phosphorus , calcium.
- Basic principles and applications of spectroscopy- UV, UV- visible, AAS, AES, Electromagnetic Resonance.
- Chromatography- principles and applications of Chromatography- HPLC, GC/ MS and LC/ MS.

REFERENCES

1. Lillian Hoagland Meyer. (2004). Food Chemistry”, First Edition, CBS publishers and Distributors, New Delhi.
2. Yeshajahu Pomeranz and Clifton E. Meloan. (2004). Food Analysis-Theory and Practice,” Third Edition, CBS publishers and Distributors, New Delhi.
3. Kanesh K. Rajah. (2002). Fats in Food Technology, First Edition, Blackwell publishing.
4. Meyer H.L. (1987). Food Chemistry. Litton Educational Publication. USA.
5. Fennema R. (2005). Food Chemistry. Marcel Dekker Inc. New York.
6. Ranganna S. (2011). Handbook of analysis and quality control for fruits and vegetables, 2nd edition. Tata Mc Graw Hill.

7. Nielsen S.S. (2002). Introduction to the chemical analysis of foods, CBS Publishers and Distributers, Pvt. Ltd.

Course Out comes

Upon completion of this course, students will be able to

CO 1 Acquire knowledge on the physico chemical properties of compounds in foods.

CO 2 Apply the functional properties of foods in processing and preservation.

CO 3 Perform skills in qualitative and quantitative estimation of nutrients in different foods.

CO 4 Describe the chemical components and their functions in Food applications.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			3	2							3
CO2	3		2		3	2				1		3
CO3	3		3		3							3
CO4	3		3	3	3		3	2				

3-High, 2- Medium, 1- Low

FT 102: FOOD SCIENCE AND EXPERIMENTAL FOODS
(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Course Objectives

1. Knowledge on Plant and Animal foods composition, processing and preservation of nutritive values.
2. Understand the principles of cookery of different foods and methods of evaluation.
3. Acquire Knowledge on different processing techniques on nutritive quality of foods.
4. Knowledge on standardisation of foods for different processing techniques.

CORE –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.

TEXT BOOKS & REFERENCE BOOKS:

1. Belle Lowe.(1998).*Experimental Cookery*, John Wiley & Sons, INC, New York,.
2. Griswold. R.M. (1962).*The Experimental Study of Foods*. Houghton and Mifflin company, Boston, New York.
3. Marjorie P. Penfield & Adamarie Campbell.(1990). *Experimental Food Science*, Third Edition, Academic Press, New York.

4. N.ShakuntulaManay& M. Shadaksharswamy.(2001).*Foods- Facts and Principles*, second edition, New Age International Publishers, New Delhi.
5. Norman N Potter.(2007).*Food Science*, Fifth edition, An Aspen Publication, Mariland.
6. Paul,E. and Palmer A.H.(2002). *Food Theory and Application*, John Wiley & Sons, New York.
7. SethiMohini.(2011).*Food Science: Experiments and Application*, second edition, Jain book Agency, New Delhi.
8. Srilakshmi,B.(2001).*Food Science*, 2nd edition New Age International (P) Ltd., Publishers, Bangalore, Chennai & Hyderabad.
9. Subbulakshmi&Shobha A. Udipi.(2001).*Food processing and preservation*. New Age International (P) Ltd., Publishers Bangalore, Chennai.
10. Swaminathan, M.(1979).*Food science and Experimental foods*. Ganesh & Co., Madras.
11. Vijayakhader.(2001).*Text book of food science and Technology*, ICAR, New Delhi.
12. Sumathi,R. Mudamby and ShaliniM.Rao.(2003). *Food science*, New age international Pvt.ltd., publishers, New Delhi.
13. Edwards, W.P. (2007). *The science of bakery products*, RSC publishing, Cambridge.

. Course Out Comes

Upon completion of this course, students will be able to

CO 1 Acquire knowledge on the functional properties of Plant and Animal foods.

CO 2 Standardize the weights and measures of various food items.

CO 3 Demonstrate the role of ingredients in cookery.

CO 4 Apply different techniques in evaluation of food.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											3
CO2	3		3		3		3		3		2	3
CO3	3	2	3	2	3					2		3
CO4	3	2	3	1	3	2	3		3		2	3

3-High, 2- Medium, 1- Low

FT 103: CEREAL GRAINS, LEGUMES AND OILSEED TECHNOLOGY

CORE –THEORY

Course Objectives

1. Know the structure and composition of cereal grains, pulses and oil seeds.
2. Learn Post harvest technology and processing of cereals, pulses and oilseeds
3. Understand the mechanism of the equipment, Machinery and tools required for processing of cereals, pulses and oilseeds
4. Attain to prepare and evaluate Traditional and commercially processed foods with cereals, pulses and oilseeds

UNIT-I

- Cereal grains and millets: Composition, Structure of rice, wheat, maize, corn, jowar, bajra, ragi and Italian millet, etc.
- Post-Harvest Technology – storage, transport handling – prevention of insects, spoilage and post-harvest losses - fumigation.

UNIT-II

- Milling Technology: Large scale - small scale milling- turbo milling- classification– unit operations in milling industry- flouring- value addition to flours- enrichment- fortification of products - use of biproducts.
- Breakfast cereals: products with rice, wheat, corn, corn sugars, barley and oats etc.
- Processing Methods: soaking, parboiling, germination, fermentation and malting.
- Baking Technology: unit operations in baking - yeast fermentation –baked products.
- Convenience and Ready to Eat foods.

UNIT-III

- Legumes, pulses and oil seeds:
- Processing of commonly used legumes and pulses: Soaking- germination- fermentation – flouring – value addition products.
- Soybean Technology: Soya products- protein isolates - concentrates and by products.
- Processing of nuts and oilseeds: Extraction of oils- expelling – rendering- solvent extraction – refining and hydrogenation for peanuts, coconuts and other oilseeds.

UNIT-IV

- Equipment- machinery and tools required for unit operations- processing - cereals, legumes- oils and fats for large scale and small scale units.
- Quality control standards for different cereal, millet, legume and oilseed based products.

REFERENCE BOOKS:

1. Edwards, W. P.(2007).*The science of Bakery Products*, The Royal Society of Chemistry, Thomas Graham House, Cambridge.
2. Fast R.B. and Caldwell E.F. (1990). *Breakfast cereals and how they are made?*, American Association of Cereal Chemists" St Paul. MN.
3. Maya Badri.(2008).*Cakes*, First Edition, Gnosis publishers, Delhi.
4. NIIR Board, *The complete Technology Book on Bakery Products*, National Institute of Industrial Research, Delhi, Website – www.niir.org.
5. Norman N Potter. (2007).*Food Science*, Fifth edition, An Aspen Publication, Mariland.

6. Norman N. Potter – Joseph. H. Hotchkirs, (1996). *Food Science*. CBS Publishers and distributors, New Delhi.
7. Panda, H. *The Complete Technology Book on Snack Foods*, National Institute of Industrial Research, Delhi, Website: www.niir.org.
8. Peter C Morris and James H Bryce. (2004). *Cereal Biotechnology*, First Edition, Wood head publishing limited, Cambridge, England.
9. Subba Lakshmi G, and Shobha A. Udipi. (2001). *Food Processing and preservation*, New Age International (P) Ltd Publishers, New Delhi.
10. Vijaya Khader. (2001). *Text Book of Food science and Technology*, Directorate of Information and publications of Agriculture, Indian Council of Agricultural Research, New Delhi.

Course Outcomes

After the completion of the course, the students will be able to –

- CO1. Gain knowledge about basic composition and structure of cereal grains, pulses and oil Seeds.
- CO2. An in-depth understanding of the science and technology associated with Post-harvest technology and processing of cereals, pulses and oilseeds.
- CO3. Able to operate and handle the equipment, Machinery and tools required for processing of cereals, pulses and oilseeds.
- CO4. Prepare various food products including the by-products of cereal grains, pulses and oil Seeds.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											3
CO2	3	3		3	3							3
CO3	3				3	2						3
CO4	3		3		3				2	3	3	3

3-High, 2- Medium, 1- Low

PRACTICAL- I: FOOD CHEMISTRY AND ANALYSIS

Course Objectives

1. Know the principles and working applications of different analytical techniques associated with food.
2. Comprehensive knowledge on techniques of analysing the nutrient components in foods.

PRACTICALS:

1. Volumetric analysis of acids and bases
2. Determination of moisture
3. Qualitative analysis of carbohydrates
4. Qualitative analysis of hydrolysis of starch
5. Determination of starch and sugars
6. Qualitative analysis of proteins and amino acids
7. Estimation of proteins - micro-kjeldhal method
8. Separation of proteins and amino acids – Electrophoresis
9. Qualitative analysis of fats and oils.
10. Determination of fat in solid and liquid foods.
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 spectrophotometer (AAS or AES).

Course Out comes

- CO 1 Perform skills in qualitative and quantitative estimation of nutrients in different foods.
- CO 2 Describe the chemical components and their functions in Food applications.

: PRACTICAL-II: FOOD SCIENCE AND EXPERIMENTAL FOODS

Course Objectives

- Acquire Knowledge on different processing techniques on nutritive quality of foods.
- Knowledge on standardisation of foods for different processing techniques.

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

Course Out Comes

- CO 1 Demonstrate the role of ingredients in cookery.
- CO 2 Apply different techniques in evaluation of food.

PRACTICAL-III: CEREAL GRAINS, LEGUMES AND OILSEED TECHNOLOGY

Course Objectives

- To gain knowledge on various processing techniques of cereals, legumes and oilseeds
- To acquire knowledge in various food applications and product preparations.

PRACTICALS:

1. Market survey on Cereal, Legumes, Oil Seed grains and their products
2. Fermentation processing in Cereals and Pulses.
3. Soaking, Germination and Malting.
4. Flouring, Popping & Flaking.
5. Processing of Soy based Products.
6. Baking- Varieties of Cakes and Pizza.
7. Preparation of Cookies, Biscuits and doughnuts.
8. Traditional and Commercial Processed foods of Grains.
9. Preparation & Evaluation of Ready to Eat breakfast foods.
10. Visits to Food Industries.

Course Outcomes

- CO1 Able to identify and handle various processing techniques.
- CO2 Hands on experience in product preparations.

FT 104: Essentials of Food and Community Nutrition
(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

COMPULSORY FOUNDATION- THEORY

Course Objectives

1. Knowledge about nutrients in food and their functions.
2. Understand the consequences of deficiency of taking nutrients.
3. Comprehensive knowledge on the role of nutrients in different stages of human life.
4. Knowledge about the different methods of nutritional assessment

UNIT-I : Food Composition and its essentials

- Food groups – Classification – food composition and nutritive values of different foods, Functions of foods. Balanced Diet.
- Nutrition through life span – Infancy, Pre-school children, childhood, Adolescence, Adulthood and Ageing – Nutritional requirements and 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 : Community Nutrition

- Macronutrients and micronutrients – Carbohydrates, protein, fats, vitamins (A, D, E, K, C and B complex) and minerals (Calcium, phosphorous, sodium, Iron, zinc, Iodine and fluorine) - Definition, classification, food sources, Recommended Daily Allowance (RDA), biological functions, deficiency diseases and its symptoms.
- Methods of Assessment: Direct and Indirect methods of Nutritional assessment of human groups, Techniques for assessment of age and use of reference standards for the assessment of nutritional status.
- Government Nutrition Programmes- ICDS and Mid Day Meal Programme (MDMP).

LEARNING EXPERIENCES

1. Assessment of Nutritional Status using Anthropometry, Dietary and Clinical methods.
2. Planning of Diets for Different Age Groups and Physiological Conditions.
3. Planning Diets for Different Nutritional Deficiencies like PEM, Iron Vitamin-A, Obesity.
4. Planning and Preparation of Programmes for Significant Days like Breast Feeding Week Nutrition Week, World Food Day.
5. School Lunch Programme at Sri Venkateswara University Laboratory Nursery School.
6. Preparation of Visual Aids for Nutrition Education, and Method Demonstration on a Nutrition Recipe.

REFERENCES - TEXT BOOKS

1. Gopalan, C (Editor) - Basic Issues in Combating Malnutrition - NFI Publication.
2. Gopalan, C (Editor) - Women Nutrition in India. NFI Publication.
3. Jelliffe, D.B."Assessment of Nutritional Status of the Community", WHO Monograph. Series No. 53. WHO Geneva 1966.

4. Mehtab S. Bamji, "Text book of Human Nutrition", Oxford & IBH Co.PVT.LTD, New Delhi, 1996.
5. Monograph on Integrated Training on National Programmes for Mother and Child Development of Women and Child Department, Government of India, New Delhi.
6. Health Promotion Seymour L. Harpen M.D: Quick reference to clinical nutrition 1979.
7. Sutor C.W Hunter M.F. Nutrition principles. J.B. Lippincott Company Philadelphia 1980.
8. Swaminathan, M. Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
9. West B and L Wood; "Food Service in Institutions". John Wiley and Sons Inc. New York.
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12. 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
13. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA 2011.
14. N.MentaNitin.Jmenta.Nutrition and Diet for Children Simplified MeenakshiJaypee Brothers Medical Publishers (P) LTD 2014.
15. Davidl. Katzwolters Kluwer/LippincottWilliams and Wilkins Nutrition in Clinical Practice Second Edition.2007.
16. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.2012.
17. MadhuSharma Pediatric Nutrition in Health and Disease, Jaypee Brother's Medical Publishers (P) Ltd New Delhi London Philadelphia Panama.2013.
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19. Dr.M Swami Nathan, Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.2010.
20. ShubhanginiA.Joshi, Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.2010.

Course Out comes

Upon completion of this course, students will be able to

CO 1 Know the nutritional problems of the community.

CO 2 Acquire knowledge about food groups, RDA and steps in planning a diet.

CO 3 Skills in planning and calculating nutritive values for the foods and recipes.

CO 4 Identify the signs and symptoms of different nutrient disorders in community.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											3
CO2	3	3		3	3							3
CO3	3				3	2						3
CO4	3		3		3				2	3	3	3

3-High, 2- Medium, 1- Low

H-High, M- Medium, L- Low

FT 105: HUMAN VALUES AND PROFESSIONAL ETHICS – I
(Revised Syllabus with effect from 2016-17)

Elective Foundation–THEORY

Course Objectives

This course helps the students to;

1. Define the term 'ethics', 'good and bad values', crime and punishment and religious tolerance.
2. Understand the importance of good character, conduct and values embedded in various religions.
3. Apply knowledge of professional ethics and correlate the concepts in addressing the ethical issues outside the class room.
4. Demonstrate knowledge of ethical values in non-class room activities, internships and field work and resolve the moral issues. .

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 Mackenjie: 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 Maitra, S.K: Hindu Ethics .
6. William Lilly: Introduction to Ethics

7. Sinha: A Manual of Ethics
8. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Halighton.
9. SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. Chowkarnba Sanskrit series. VolLII and III, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
10. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
11. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.
12. Analyzing Moral.Issues, Judith A. Boss. May Field Publishing Company - 1999.
13. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad. Cosmo Publications
14. Text Book for Intermediate First Year Ethics and Human Values. Board of Intermediate Education- Telugu ~ Akademi, Hyderabad.
15. I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar

Course Outcomes:

After studying the course, students will able to ;

- CO1. Define the term ‘ethics’ , ‘good and bad values’, crime and punishment and religious tolerance.
- CO2. Understand the importance of goodcharacter, conduct and values embedded in various religions.
- CO3. Apply knowledge of professional ethics and correlate the concepts in addressing the ethical issues outside the class room.
- CO4. Demonstrate the ability to face difficult situations in non-class room activities, internships and field work and resolve them confidently.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3						1	3	3			3
CO2						2			3			3
CO3						3		3	3			3
CO4						3		3	3			3

3-High, 2- Medium, 1- Low

II SEMESTER

FT-201: TECHNOLOGY OF HORTICULTURE PRODUCE

Course Objectives:

1. Attain an overview on the classification and composition of fruits and vegetables
2. Acquaint with the post-harvest handling technologies of fruits and vegetables to reduce postharvest losses and their value addition.
3. Equip with the knowledge of processing and preservation of fruits and vegetables.
4. Impart the expertise in Production and manufacture of fruits and vegetable based food products and preserves

CORE –THEORY

UNIT-I: Vegetables

- Types and composition of vegetables: Green leafy, root and other vegetables - Harvesting Indices.
- Processing and preservation: washing-cutting-trimming-blanching-chilling-Refrigeration freezing-canning-drying-packaging and Marketing - spoilage and quality control measures.

UNIT-II: Fruits

- Types and composition of fruits: citrus fruits-oranges- Grape fruits- Lemons-peaches etc - pomes -apples and pears etc., Aggregate fruits- raspberries-strawberries and black berries - Harvesting indices.
- Processing and preservation: freezing-blanching - Ascorbic acid drip - storage - packaging and marketing - spoilage and quality control measures.

UNIT-III:Fruits and Vegetable based products

- Processing methods: fruit juices- extraction- classification-Deaeration blends - fruit bars – Jellies-Jams - Ready to serve beverages.
- Dried fruits and vegetables- fruit pulp- pickles - powders - sauces –processed curries-soups-dehydrated products- fruit toffies- fruit concentrate products.

UNIT-IV: Fruit and Vegetable Industry

- Equipment of processing and preservation: Unit operations; transport, Machinery for specific products - Maintenance of quality standards - packaging, labeling and Marketing strategies.

REFERENCE BOOKS:

1. Arthey,D and Dennis,C.(1991). *Vegetable processing*, Chapman Hall, London, New York.
2. Arthey,D. and Shurst,P.(1995). *Fruit processing*, Chapman and Hall, London, New York.
3. Gould,W.A. *Tomato production Processing and Technology*. 2nd edition, CTI publication Baltimore M.D.
4. Kader,A.A.(1992). *Post Harvest Technology of Horticultural Crops*, 2nded, University California, Oakland, CA.
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6. NPCB Board, *Potato and potato products*, Delhi, www.niir.org.
7. Shrivastava, A. K. (2004). *Agriulcture and Food*, 1st edition, APH publishing corporation, New Delhi.

8. Tariano, V. (2002). *Fruit and Vegetable biotechnology*, 1st edition, Wood head publishing Ltd, Cambridge, England.
9. VijayaKhader. (2004). *Preservation of fruits and Vegetables*, 2nd edition, Kalyani publishers, Ludhiana.
10. Woodford, R.C.(2005). *Citrus classification*, 1st edition, Biotech Books, Delhi.

Outcomes

After the completion of the course, the students will able to –

- CO1. Application of Post-Harvest handling technologies to reduce the postharvest losses.
- CO2. Learn the processing and preservation methods to prevent the spoilage of Fruit & vegetables.
- CO3. Develop various Fruits & vegetables based products and preserves
- CO4. Assess the quality of fruit and vegetables and their products.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		3	3							3
CO2	3	3		3	3							3
CO3	3		3	2	3	2			2	3		3
CO4	3	3		2	3	2		2	2		3	3

-

- 3-High, 2- Medium, 1- Low

FT-202:FOOD MICROBIOLOGY AND SAFETY
(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Objectives

1. Obtain knowledge about important genera of microorganisms associated with food.
2. Acquaint food contaminants and their sources
3. Understand the various factors associated with growth, food spoilage and food-borne diseases of different microorganisms.
4. Acquire the food safety rules and regulations for the prevention of microbial risks.

CORE- THEORY

UNIT-I: Food and Microorganisms:

- Food as a substrate for microorganisms: factors affecting microbial growth-physical-chemical - biological.
- Bacteria, Molds, Yeasts and Viruses: General characteristics, classification – morphological characteristics – cultural characteristics. Significance of food microbiology

UNIT-II: Food Spoilage

- Microorganisms causing spoilage – chemical- physical - physiological changes caused by microorganisms.
- Spoilage: Different types of food spoilages.

UNIT III: Food Contamination

- Natural and environmental contaminants - Food contamination- Sources of contamination

in:

- Cereals, Legumes, nuts and oil seeds.
- Sugars and sugar products.
- Fruits and Vegetable products.
- Milk and Milk products.
- Spices and condiments
- Eggs, poultry and Meat.
- Fish and Other sea foods.
- Processed foods.

UNIT-IV: Food Safety

- Food safety: concept- factors affecting food safety –physical- chemical – biological hazards.
- Food hazards of microbial origin – food borne disease- food borne intoxications- food borne infections.

REFERENCES:

1. Adams, M.R. and Moss, M.O. (2003). *Food Microbiology*, Second edition, Panima Publishing Corporation, New Delhi.
2. George J. Banwart. (2002). *Basic Food Microbiology*, Second edition, CBS Publishers and Distributors, New Delhi, 2002.
3. James, M. Jay. (2005). *Modern Food Microbiology*, 4th edition, CBS publishers and Distributors, New Delhi.

4. Kalaichelvan,P.T. (2005). *Microbiology and Biotechnology,A laboratory Manual*, 1st edition, MJP Publishers, Chennai.
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12. Kamal, D. *Introduction to food microbiology* ,Cyber tech. publications,
13. Neelima,G., Garg,K.L. and Mukerji, K.G.*Laboratory manual of food microbiology*, I.K. International Publishing House Pvt.Ltd.
14. Vanisha, N. *A text book on food contamination and safety*,

Outcomes

After the completion of the course, the students will able to –

CO1. Identify the important genera and factors associated with food spoilage.

CO2. Elucidate the food contaminants in different types of food commodities

CO3. Describe the characteristics of food borne diseases, infections and intoxications and their identification.

Co4. Demonstrate the use of standard methods and procedures for the microbiological analysis of food.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3									3	3
CO2	3	3		2							2	3
CO3	3	3										3
CO4	3	3			2			2			3	3

3-High, 2- Medium, 1- Low

FT- 203: DAIRY TECHNOLOGY

Course Objectives:

1. Impart the knowledge of milk grading and their composition.
2. Illustrate the technologies of processing of milk and milk products.
3. Provide in-depth knowledge in various unit operations and developments in dairy processing.
4. Demonstrate the manufacturing of various dairy products and exemplify the quality of dairy products.

CORE-THEORY

UNIT-I: Milk

- Definition- Composition of milk- Procurement quality tests- grading of milk-Storage - chilling at procurement site –Transportation.
- Processing: Homogenization-pasteurization - sterilization -aseptic packaging.
- Quality tests.

UNIT-II: Milk products

- Types of milk- whole milk, low fat milk, toned and double toned milk, skimmed milk, condensed milk, concentrated milk, fortified and double fortified milk, flavored milk.
- Processing of milk products-Cream, Butter, Butter oil, ghee, skim milk powder, Dairy whiteners, peda, khova, Milk shakes, kulfees, ice cream.
- Fermented Milk products - Cheese, Cheese spread, yoghurt, Dahi,shrikhand, Lassi and similar products.

UNIT-III: Milk Industry - Unit operations of Milk processing

- Advances in fluid milk processing - Application of Ultra filtration - Mono filtration - Micro filtration – Reverse osmosis - Ion exchange and Electro dialysis processes;
- UHT processing of milk - Irradiation of Milk.

UNIT-IV: Developments in milk processing

- Application of immobilized enzymes and developments in Bio-technology;
- Application of Stabilizers and emulsifiers in Dairy products.
- Quality testing - Storage, preservation, packaging, labeling and Marketing.
- Current trends in cleaning and sanitization of dairy equipment.

REFERENCE BOOKS

1. Fox, P.F. (1992). *Advanced dairy chemistry*, Chapman and Hall, London, New York.
2. KosiKowski, F.V.(1997). *Cheese, and fermented milk foods*, 2nded, F.V. KosiKowski, Brooktondale, New York.
3. Kurmann, J.A., Rasic, J.L. and Krogcr, M.(1992). *Encyclopedia of fermented fresh milk products; An international inventory of fermented Milk, Cream, Buttermilk, Whey and related products*, Chapman and Hall, London, New York.
4. Mahindru, S.N. Milk and Milk products, APH publishing corporation, New Delhi.
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6. NIIR Board. *The complete Technology Book of Daily and Poultry Industries with farming and processing*, Asia Pacific Business Press, New Delhi.
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8. Robinson, R.K. (1994). *Modern dairy Technology*, 2nd ed: Chapman and Hall, London, New York.

9. Sukumar,De. (2007).*Outlines of Dairy Technology*, Oxford University Press, Oxford.
10. Tina Mattila-Sandholm and Marie Saarela.(2008). *Functional dairy products*, 1st edition, Woodhead publishing limited, Cambridge, England.
11. Varnam,A.F. (1994). *Milk and Milk products - technology*, Chemistry and Microbiology - Chapman and Hall, London, New York.

Outcomes

After the completion of the course, the students will able to –

- CO1. Gain knowledge of milk composition, types and grades of milk
- CO2. Comprehend the technology of processing of milk and milk products
- CO3. Apprehend the manufacturing and quality analysis of different dairy products.
- CO4. Perceive hygiene and sanitation practices in dairy industry.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											3
CO2	3		2	2	3							3
CO3	3	2	3		3	1		2	1	1	2	3
CO4	3	2						3		3	2	3

3-High, 2- Medium, 1- Low

PRACTICALS-I: TECHNOLOGY OF HORTICULTURE PRODUCE

Course Objectives:

- To enable the students on various fruit and vegetable processing techniques.
- To attain practical knowledge in production and preparation of products.

PRACTICALS

1. Vegetable and fruit Maturity Indexes at post harvesting stage.
2. Preparation of vegetable soups and sauces.
3. Preparation of Dehydrated vegetables.
4. Preparation of vegetable preserves.
5. Pickling of vegetables.
6. Preparation of RTS beverages.
7. Preparation of jams and jellies
8. Preparation of fruit preserves.
9. Quality standards measurements of vegetable and fruit products.
10. Visits to fruit and vegetable processing units.

Course Outcomes:

CO1 Learn the processing and preservation methods to prevent the spoilage of Fruit & vegetables.

CO2 Develop various Fruits & vegetables based products and preserves

PRACTICALS-II: FOOD MICROBIOLOGY AND SAFETY

Course Objectives

- Acquire knowledge on laboratory techniques to identify microorganisms in food.
- Creating awareness on role and significance of microbial inactivation, adaptation and environmental factors (i.e., aW, pH, temperature) on growth and response of microorganisms in various environments.

PRACTICALS:

1. Simple Staining and Gram's Staining.
2. Media preparations.
3. Total Plate count.
4. Yeast and molds.
5. Isolation techniques.
6. Inoculation of organisms.
7. Testing the type of organisms in fruits and vegetables.
8. Testing the type of organisms in milk and its products.
9. Testing the type of organisms in processed foods.
10. Identification of morphological characters of an organism

Course Out comes

CO1 Apply techniques to identify different microorganisms in foods.

CO2 Compare the role and significance of microbial inactivation, adaptation and environmental factors (i.e., aw, pH, temperature) on growth and response of microorganisms in various environments.

PRACTICALS-III: DAIRY TECHNOLOGY

Course Objectives:

- To acquire knowledge of milk grading and processing of milk and milk products.
- To demonstrate the manufacturing of various dairy products and exemplify the quality of dairy products.

PRACTICALS

1. Market survey of different types of milk, products and bi products of milk.
2. Analysis of raw Milk, Market milk, and other milk products.
3. Product development with milk - evaluation.
4. Preparation of low fat, high protein dairy products,
5. Preparation of miscellaneous milk products.
6. Product development with bi-products of milk.
7. Principles of Ultra filtration of milk.
8. Principles of Reverse osmosis of Milk.
9. Principles of U.H.T. processing of milk.
10. Visit to Dairy plant.

Course Outcomes -

- CO1 Gain knowledge of milk composition, types and grades of milk.
CO2 Apprehend the manufacturing and quality analysis of different dairy products.

FT- 204: RESEARCH METHODOLOGY

(Common to all Branches of MSc Home Science and
MS Food Technology Course)

Course Objectives

This course helps the students to;

1. Get awareness about terms like ‘variables’, ‘hypothesis’, research ‘and recognize the purpose of doing a research.
2. Understand different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research.
3. Critically apply knowledge to select a sample by using different sampling methods like probability and non-probability sampling.
4. Develop a research proposal in the appropriate scientific style.

COMPULSORY FOUNDATION –THEORY

UNIT – I: Research Purpose and Types

- Research – Significance, meaning, objectives, Approaches, Research process, Criteria of good research, Variable- types –Types of Research : Historical, descriptive, experimental, case study, survey research, participatory research, Fundamental, applied and action, exploratory research.
- Research hypothesis-Characteristics of good hypothesis.

UNIT –II : Methods of Data Collection and Sampling

- Different Methods and techniques of data collection: Interview, Observation, Social mapping, Participatory assessment Techniques, Data Gathering Instruments, Observation check list, Questionnaire, Interview schedule, Measurement scales.
- Sampling Methods : *Probability sampling*- Simple random, systematic random sampling, two Stages and multi stage sampling, cluster sampling and *Non-probability sampling* - Purposive, quota and volunteer sampling / Snowball Sampling.
- Research Proposal – Preparation.

LEARNING EXPERIENCE

1. Identification of different variables in specialization of study.
2. Framing of hypothesis-Null and alternate Hypothesis
3. Preparation of schedule/questionnaire.
4. Preparation of research proposal
5. Study of an article in a journal-Abstract, Methodology, Results and Bibliography

REFERENCES

1. Bandarkar, P.L. and Wilkinson T.S. (2000) : “*Methodology and Techniques of Social Research*”, Himalaya Publishing House, Mumbai.
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3. Bajpai S.M. (1987). “*Methods of Social Survey and Research*” KitabGhat, Kanpur-3

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

Course Outcomes

After studying the course, students will able ;

CO1. Define terms like ‘variables’, ‘hypothesis’ ,research’ and state the purpose of doing research

CO2. Understand different types of search and can compare the advantages and disadvantages of each type of research

CO3. Critically know the procedures for identifying an ideal sample for scientific research.

CO4. Prepare a research proposal in the appropriate scientific style .

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3			3		3	2		2		2	3
CO2				3		3	3				2	3
CO3		1		3		3			2		3	3
CO4				3		3	3		3			3

3-High, 2- Medium, 1- Low

FT-205: HUMAN VALUES AND PROFESSIONAL ETHICS - II (Revised Syllabus with effect from 2016-17)

Elective Foundation– Theory

Course Objectives

This course helps the students to;

1. Associate the terms 'value education' 'self-introspection' and 'self-esteem' which are the core aspirations of all human beings.
2. Understand the importance of ethics in different fields like medical, business, environment and social ethics and ethics of media.
3. Apply the knowledge to assess issues and problems in each profession and correlate the concepts in addressing the ethical issues while choosing and joining a profession.
4. Develop all round and well balanced personality of the students and shapes them to become morally finer, socially responsible and physically fit persons of the society.

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 health care 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.Characteristics 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.

REFERENCES:

1. John S Mackenjie: 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.
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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

Course Outcomes

After studying the course, students will able ;

- CO1. Associate the terms 'value education' 'self-introspection' and 'self-esteem' which are the core aspirations of all human beings.
- CO2. Understand the importance of ethics in different fields like medical, business , environment and social ethics and ethics of media.
- CO3. Apply the knowledge to assess issues and problems in each profession like medical, business , environment and social ethics and ethics of media and correlate the concepts in addressing the ethical issues while choosing and joining a profession.
- CO4. Apply skills for anger management, care of elderly, environmental protection and thereby develop well balanced personality and will contribute to society as morally finer, socially responsible and physically fit persons.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											3
CO2									3			3
CO3	1								3			3
CO4		2			2			1	3			3

3-High, 2- Medium, 1- Low

III SEMESTER

FT- 301: FOOD PROCESSING AND PRESERVATION TECHNOLOGY (Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Objectives:

1. Understand the principles and scope of food processing and preservation.
2. Get an overview on various techniques/methods in food processing and preservation.
3. Acquire to knowledge of emerging technologies and their applications in food processing and preservation.
4. Equip with skills required for process and preserve various food products.

CORE-THEORY

UNIT I: Food processing and preservation – An Introduction

- Need, Purpose and scope-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: Methods of food processing and preservation

- Processing and preservation by Heat - Principles of thermal processing, blanching, pasteurization, UHT processing, thermal sterilization, canning, extrusion.
- 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.

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

REFERENCE BOOKS & TEXT BOOKS

1. Anuradha Subramanian.(1998). *Concise Food Science*, Soundariya Publication, Erode.
2. Fellows,P. and Ellis,H. (1990). *Food Processing Technology: Principles and Practice*,New York.
3. Harry. W. Von Loesecke.(1998). *Drying and dehydration of Foods*, Allied Scientific,NewDelhi.
4. Jelen,P. (1985). *Introduction to Food Processing*, Prentice Hall, Reston Virginia, USA.
5. Lewis, M.J. (1990). *Physical Properties of Food and Food Processing Systems*, Woodhead, UK.
6. Norman, N. Potter, Joseph H. Hotchkiss.(1996). *Food Science*, 5th edition, CBS Publishers & Distributors, New Delhi.
7. Rama swamy,H. and Marcote,M. (2005).*Food processing- principals and applications*, a. Tamil Nadu.
8. Vijayakhader.(2000). *Text book on food storage and preservation*, Kalyani Publishers,

9. NIIR Board. *Modern technology on food preservation*, Asia Pacific Business Press, New Delhi.
10. NIIR Board of consultant and engineers.

Outcomes:

After the completion of the course, the students will be able to –

CO1. Conceptualize principles of traditional and novel food processing and preservation technology.

CO2. Understand the applications and limitations of food processing and preservation technology.

CO3. Comprehend the functions and applications of food preservatives and additives.

CO4. Apply appropriate technologies to process and preserve the foods to extend their shelf life.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				3						2	3
CO2	3	2			3			1			2	3
CO3	3			2	3			3	3	2	3	3
CO4	3		3	3	3	2		1	3		3	3

3-High, 2-Medium, 1-Low

FT -302: LIVE STOCK AND SEA FOOD TECHNOLOGY

Objective:

1. Understand the grades, structure, composition and nutritional quality of various livestock and seafood
2. Comprehend the slaughtering, carcass processing, post-mortem changes.
3. Illustrate the processing technology of meat, poultry, fish and eggs.
4. Develop skills in value addition of meat, fish and poultry products

CORE-THEORY

UNIT-I: Selection & Grading:

- Grading of livestock for Meat, Buffaloes, sheep, goat, pigs, rabbits
- Grading of eggs.
- Grading of poultry and avian species.
- Grading of fish and sea food.
- Quality grades.

UNIT-II: Meat:

- Meat production - Structure and physico-chemical properties of muscle meat: composition and nutritive value, conversion of muscle into meat, post mortem changes in meat, rigor mortis, cold shortening, pre-rigor processing; stunning and slaughtering methods.
- Aging of meat, meat tenderization- natural and artificial methods; cooking methods for meat.
- Storage and preservation and processing of Meat – Meat food products.

UNIT-III: Egg and Poultry:

- Egg: Structure, composition and nutritive value of eggs, Storage and shelf life problems. Quality evaluation of eggs -candling, albumen index, Haugh unit, yolk index etc. - National and international quality standards,
- Egg preservation: grading of eggs, whole egg preservation, pasteurization, dehydration, freezing, egg products: egg powder, value added egg products.
- Poultry Industry – Desi Birds – Classification – Poultry processing – Composition and nutritive value- Avian meat products.
- Slaughtering and evaluation of poultry carcasses;
- Storage and preservation and processing of Poultry – Poultry products.

UNIT-IV: Sea food:

- Fish: Commonly cultivated fish- types-fish processing: factors affecting quality of fresh fish.
- Shellfish, marine fish, shrimp, oysters, clams and crabs: processing and factors affecting their quality.
- Procurement– shipboard operations – preservation methods – processing plant operations – freezing – cold storage, canning – inspection.
- Valueadded sea food products.

REFERENCE BOOKS :

1. Aitkeer, A.(1990). *Fish handling and Processing*, 3rd, Aberdeen Ministry of Agriculture, Edinburgh.
2. Hall, G.M. (1992). *Fish Processing Technology*, blackie. New York.
3. Lawrie,R. A.Lawrie's. (1998).*Meat Science*, 5th Ed, Woodhead Publisher, England.

4. Parkhurst&Mountney.(1997). *Poultry Meat and Egg Production*, CBS Publication, New Delhi.
5. Pearson & Gillet. (1997). *Processed Meats*, 3 Ed, CBS Publication, New Delhi.
6. Sen, D.P. (2005). *Advances in Fish Processing Technology*, Allied Publishers Pvt. Limited.
7. Shahidi, F. and Botta, J.R. (1994). *Seafoods: Chemistry, Processing, Technology and Quality*, Blackie Academic & Professional, London.
8. Shai Barbut. (2005). *Poultry Products Processing*, CRC Press.
9. Stadelman, W.J. and Owen, J.C. (2002). *Egg Science and Technology*, 4th Ed. CBS Publication New Delhi.

Outcomes

After the completion of the course, the students will be able to –

CO1. Acquire knowledge of the structure, composition, nutritional quality of various ,livestock and seafoods.

CO2. Understand the slaughtering, carcass processing methods used for processing meat.

CO3. Gain an insight of the concept and methods of processing technology of meat, poultry and fish.

CO4. Prepare various value added products of egg, meat, poultry and sea foods.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											3
CO2	3				3				2		1	3
CO3	3				3			2			2	3
CO4	3		3	2	3	2		2	2	3	3	3

3-High, 2-Medium, 1-Low

PRACTICAL-I: FOOD PROCESSING AND PRESERVATION TECHNOLOGY

Course Objectives:

- To acquire knowledge of emerging technologies and their applications in food processing and preservation.
- To demonstrate various processing techniques and products of various 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.

Course Outcomes:

CO1 Understand the applications and limitations of food processing and preservation technology.

CO2 Application of appropriate technologies to process and preserve the foods to extend their shelf life.

Practical-II- FT: In-plant Training

Objectives

1. Provide hands on experience with regard to different areas in food industries.
2. Acquaint and gain knowledge related to unit operations, quality control and safety aspects of food industry
3. Gain knowledge associated with basic process requirements, documentation and maintenance of a food industry.
4. Emphasize the prominence of food plant sanitation, food laws and regulation in food industry

The students will undergo training for six weeks in Food Industries and submit a detailed report and present a seminar at the end of the placement period

List of Industries where students can be placed:

- Dairy Industries
- Fruit Pulp Industries
- Beverage Production Industries
- Baking and confectionary industries
- Other Food Processing Industries

An evaluation report for 100 marks along with a certificate of internship is issued by the Institution. A copy of the certificate is enclosed along with report.

Outcomes

After the completion of the course, the students will be able to –

CO1. Apply their knowledge and skills to work in their placement food industry.

CO2. Use effective oral and written communication skills in the areas of production, quality control and Marketing of the respective industries.

CO3. Work independently and professionally and as part of a team in a workplace environment.

CO4. Demonstrate the role of a food technologist in the significant activities of food industry.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3			3	3	3	3	3	3	3
CO2	2		2	2		3	3				3	3
CO3	2					3	3			2	3	3
CO4	3	3	3	2	3	3	3	3	3	3	3	3

3-High, 2- Medium, 1- Low

FT- 303(A): UNIT OPERATIONS IN FOOD INDUSTRY

Generic Elective - Theory

Course Objective

1. Understand the principle of Unit operation in food industry
2. Learn important preliminary operations in food processing industries
3. Impart knowledge on Safety, sanitation and Effluent Treatment in food industry
4. Management Strategies in food Industry at different post processing operations as storage and packaging foods etc

Unit 1: Food Industry:

- Plant and machinery for different types of Food Industries and processing Units of 1.Cereals, 2.Pulses and legumes, 3.For oilseeds, 4.Sugars and sugar products, 5.Vegetables and Fruits, 6.Milk and Milk products, 7.Eggs, poultry and meat products, 8.Fish and Sea foods, 9.Beverages, 10. Spices and condiments, etc.,
- Management Strategies In food Industry at different Stages and for different components like, power supply electricity - water, procurement of raw material - Storage - product production - preservation - packaging materials - Management of Hygiene and sanitation and personnel management.

Unit 2: Food Processing:

- Unit operations for Individual food processing - Handling - Cleaning - Separation - Pumping - Heat exchange evaporation - Drying - Packaging and Quality control.

Unit 3: Food Processing Environment:

- Safety and sanitation - Hazards and Risks - HACCP and quality management systems - Effluent Treatment.

Unit 4: Food Packaging:

- Principles - Functions - Requirements - Materials and containers - Forms - Packages with special features of environmental safety -labelling protocols.
- Suitable packaging materials for different foods - cereals, cereal products - Legumes and pulses - oils - Sugars and confectioneries - Vegetables - Fruits and Fruit products - Milk and Milk products - eggs & Poultry and poultry products - Meat and Meat products - Fish and fish products - Spices, condiments, and - Beverages and Labelling procedures.

Reference Books

1. ASTM.(1991). Standards on Packaging, American Society for testing and Materials", Philadelphia.
10. Russo, D.M.(2000). *The year 2000 - A Food Industry Forecast Agribusiness*.
11. Senaner, B., Asp, E. and Kinsey, J.(1991). *Food trends and changing consumer*, Eagan Press St., Paul M.N.
12. U.N.N.D. (1992). *Industry structure and Economic Performance in the food Manufacturing Industries*, Food Agri. Bus.Mark.
2. Bakker, M. (1986). *The Wiley encyclopedia of packaging Technology*, John Wiley and Sons, New York.
3. Earle, R.L. (1983). *Unit operations in Food Processing*, Pergarman Press, Oxford.
4. Fellow, P. *Food Processing Technology, Principles and Practice*, Prentice Hall, Engle Wood Cliffs, New York.

5. Hayes.G.D.(1987). *Food engineering data Hand Book*, Wiley, New York.
6. Karmas, E. and Harris, R.S.(1988). *Nutritional Evaluation of food Processing*, Chapman & Hall, London, New York.
7. Paine, F.A. (1987). *Modern Processing, Packaging and Distribution Systems for food*, Chapman and Hall, London.
8. Paine, F.A. and Paine, H.Y. (1992). *A hand book of Food Packaging*, 2nd Ed. Chapman & Hall, London & New York.
9. Rankin, M.D and Kill, R.C. (1993). *Food Industries Manual*, 23rd ed., Chapman & Hall, London.

Outcomes

After completion of the course, students will be able to:

- CO1 Understand and comprehend the principle of unit operations in food industry
- CO2. Operate important preliminary operations in food processing industries
- CO3. Choose suitable packaging materials for different foods.
- CO4. Identify the suitable unit operations for a specific purpose.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				3							3
CO2	3				3	1						3
CO3	3	2						1				3
CO4	3				3							3

3-High, 2- Medium, 1- Low

FT- 303(B):SPICES, CONDIMENTS AND PLANTATION CROPS

Generic Elective–Theory

Course Objective

1. Identify various spices, condiments and plantation crops.
2. Learn post-harvest technologies and processing of spices, condiments and plantation crops.
3. Illustrate various value added products of spices, condiments and plantation crops.
4. Perceive Standards, specifications, packaging and Quality control measures of spices, condiments and plantation crops.

UNIT I: Spices and condiments

- Introduction and History of Spices and condiments, Classification, composition, nutritive value.
- Definition of types of Major and Minor spices, post-harvest technology, processed products and their marketing in trade
- Production and processing of spices and condiments and its scope, Value addition of spices and spice products with different processing methods
- Different technologies involved in the preparation of spice powders, spice oils, oleoresins and products
- Flavoring agents and extracts, Flavoring components and concentrates
- Herbs and Greens as Spices and condiments

UNIT II: Plantation crops – A

- Definition of plantation crops and Classification.
- Coffee: Bean processing – Grading, blending, roasting of seeds, grinding, brewing; Coffee varieties & processing - Decaffeinated Coffee, Instant Coffee, extraction, Dehydration, Aromatization; Plant and machinery for coffee processing.
- Tea: Tea processing- leaves gathering, Grading, leaf processing; Types of tea& processing - dust tea, black tea, green tea, Oolong tea, Instant tea; Plant layout and machinery for tea processing.

UNIT III: Plantation crops - B

- Cocoa: Production, composition, grading, processing; cocoa products processing- cocoa mass, cocoa powder, cocoa butter, cocoa based beverages, malted milks and cocoa liquor.
- Coconut - Production, composition, Grading, post-harvest technology and treatments; processing of coconut, coconut milk and its applications.

UNIT IV: Quality control and commercial value

- Standards, specifications and Quality control measures of spices, condiments and plantation crops.
- Packaging of spices, spice products and plantation products.
- Commercial value of Spices, Condiments, plantation crops and their products in global market.

REFERENCE BOOKS

1. Alikonis, J.J. (1998). *Candy technology*, AVI publishing West Port, CT.
2. Shanmugavelu, K.G. *Spices and Plantation Crops*. Oxford & IBH Publishing Co.3rd

edition, Chapman and Hall, London, New York.

3. Thampan,P.K. *Hand Book of Coconut Palm*, IBA Publishing Company, New Delhi.
4. Gupta, S. *Hand Book of Spices and Packaging with Formulae*, Engineers India Research.
5. Minifie, B.W. (1986). *Chocolate, Cocoa and confectionery*. Science and Technology, Institute, NewDelhi.
6. Vijayakhader. (2001). "Text Book of Food science and Technology" ICAR, New Delhi. Academic Press. New Delhi.
7. Purseglove, J.W., Brown E.G., Green C.L., and Robins. *Spices Vol.I and Vol.II*, SRJ,New Delhi.
8. NIIR board of consultants and engineers. The complete book on spices and condiments, Asia pacific business press, New Delhi.

Outcomes

After the completion of the course, the students will able to –

CO1.Gain an in-depth knowledge on spices, condiments and plantation crops.

CO2.Apply post-harvest and processing technologies to improve the quality and safety of spices, condiments and plantation crops.

CO3.Recommend Standards, specifications, packaging and Quality control measures of spices, condiments and plantation crops.

CO4.Able to prepare various value added products of spices, condiments and plantation crops.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3										1	3
CO2	3			1	2							3
CO3	3							3	3		2	3
CO4	3		2						3	3		3

3-High, 2- Medium, 1- Low

FT- 303(C): NUTRITION IN EMERGENCIES AND DISASTERS

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

Course Objectives

- a. Understand the emergency situations in natural and manmade disasters.
- b. Gain knowledge on nutrition surveillance and treatment in emergencies.
- c. Knowledge on planning nutrition relief and rehabilitation in emergencies.
- d. Concepts on Epidemiology and its application in planning programs during emergencies.

Generic Elective - Theory

UNIT-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
- 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
- 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

- 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

- Public nutrition approach to tackle nutritional problems in emergencies

UNIT-IV

- 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.
- Principles of Nutritional Epidemiology, Measurement issues, Measurement of disease, Occurrence and Measurement of association, Exposure and outcome, Socio demographic and Psycho social variables.
- Design and Planning of Nutritional Epidemiological studies – assessing and supplying And Evaluating Epidemiological studies – Discussion of selected case studies.

REFERENCE:

1. World Disasters Report – Focus on Public Health, International Federation of Red Cross and Red Crescent Societies.
2. Disasters – International Public Nutrition and Emergencies: The Potential for improving practice. Special Issue – Vol.23/4, Dec. 1999.
3. Guidelines and Research publications of OXFAM, WFP, Rome. 1999.
4. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of ICMR. 2010.
5. Dr.M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
6. Shubhangini A.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.

Course Out comes

Upon completion of this course, students will be able to

CO 1 Acquire knowledge in nutritional problems in natural and man made disasters.

CO 2 Assess the nutritional status in emergency and plan surveillance and treatment to the affected.

CO 3 Acquire knowledge on nutrition epidemiology.

CO 4 Plan and Execute nutrition rehabilitation in emergencies.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3								3	3		
CO2		2		1						3		3
CO3	3		2					2				2
CO4	3					2			3			

H-High, M- Medium, L- Low

FT- 304 A: FUNDAMENTALS OF FOOD NUTRITION AND HEALTH

OPEN ELECTIVE - THEORY

Course Objectives

1. Knowledge on foods, food groups, balanced diet for different age groups.
2. Understand the importance of macro and micronutrients in daily diet.
3. Comprehensive knowledge on deficiency symptoms of different nutrients.
4. Able to get knowledge on nutritional problems in community.

UNIT-I: Food Composition

- Food groups – Classification – food composition and nutritive values of different foods, Functions of foods. Balanced Diet, RDA for all age groups.

UNIT-II : Macronutrients

- Carbohydrates: Definition, classification, food sources, Function in human body, Recommended Daily Allowance (RDA) and importance of fibre.
- Fats and Oils: Definition, classification, saturated and unsaturated fatty acids, cholesterol, Food sources, requirements, RDA and biological functions.
- Protein: Definition, classification, essential and non-essential amino acids, protein quality, supplementary value of protein, food sources, RDA and functions.

UNIT-III : Micronutrients

- Vitamins: Definition, classification
- Fat soluble Vitamins (A, D, E, K) - Functions, sources, RDA, Deficiency diseases and symptoms.
- Water soluble Vitamins (B complex and C): Functions, sources, RDA, Deficiency diseases and its symptoms.
- Macro minerals: Calcium, phosphorous, sodium, potassium, chloride- sources, biological functions, factors affecting availability, Deficiency diseases and symptoms.
- Micro minerals: Copper, zinc, Iron, Iodine and fluorine in human nutrition, biological functions, factors affecting availability, Deficiency diseases and symptoms.

Unit - IV: Major Nutritional Problems of the Community:

- Malnutrition - PCM, obesity, micronutrient malnutrition, government programmes to eradicate PCM, vitamin-A, iron and iodine deficiencies, principles of planning diets for different conditions of malnutrition.

REFERENCES - TEXT BOOKS

1. Jelliffe, D.B. (1966). Assessment of Nutritional Status of the Community. WHO Monograph. Series No. 53. WHO Geneva.

2. Mehtab S. Bamji. (1996). Text book of Human Nutrition, Oxford & IBH Co.PVT.LTD, New Delhi.
3. Swaminathan, M. (1999). Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
4. Mahtabs. Bamji and N.Pralhad Rao. (2004). "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi,
5. C.Gopalan, B.V.Ramasastri and S.C.BalaSubramanian.(2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.
6. MadhuSharma. (2013). Pediatric Nutrition in Health and Disease, Jaypee Brother's Medical Publishers (P) Ltd New Delhi London Philadelphia Panama.
7. M Swami Nathan .(2010). Food and Nutrition Volume-1 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
8. M Swami Nathan .(2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
9. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of Indian Council Medical Research.2010.
10. Dietary guidelines for Indians- a manual. National institute of nutrition. Hyderabad. 2011.
11. David L. Kartz. (2008). Nutrition in Clinical Practice. Lippincott Williams and Wilkins. USA.
12. Whitney E. N. (1983). Understanding normal and clinical nutrition. West publishing company. USA.

Course Out comes

Upon completion of this course, students will be able to

CO 1 Acquire knowledge on food groups and functions of food.

CO 2 Gain knowledge on importance of macro and micronutrients in different age groups.

CO 3 Identify signs and symptoms of different nutrient deficiencies.

CO 4 Illustrate the nutritional problems in community.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				3							3
CO2	3											3
CO3	2											3
CO4	2											3

3-High, 2- Medium, 1- Low

FT- 304 B: NUTRITIONAL ASSESSEMENT

Course Objectives

1. Learn the determinants of Nutritional Surveillance.
2. Understand the direct and indirect methods of nutritional assessment.
3. Knowledge on dietary assessment at individual and house hold level.
4. Identify the clinical symptoms and biochemical tests for different nutritional problems.

OPEN ELECTIVE- THEORY

UNIT-I

- Nutritional Surveillance: Need determinants, Nutritional Surveillance over view of the methods of assessment of Nutritional and health status.

UNIT-II

- Methods of assessment: Direct and Indirect methods of Nutritional assessment of human groups-ABCD- Techniques.
- Assessment of age: Using local events calendar
- Anthropometry Assessment: Measurement used, use of equipment, standards for comparison. Classification used to categorize malnutrition, cut of points used to distinguish current and long term malnutrition.
- Indicators of nutritional status
- Guidelines for interpretations of growth charts.

UNIT-III

- Dietary assessment: Methods and techniques for assessing dietary intakes of individual, house hold level and institutional level.

UNIT-IV

- Clinical assessment: Study of different methods and techniques for clinical assessment of nutritional status and diagnosis of sign of relation to various nutrient deficiencies.
- Biochemical assessment: Methods and techniques for major nutritional disorders, standards for comparison, field level assessment techniques.

REFERENCES - TEXT BOOKS

1. Jelliffe, D.B. (1966).Assessment of Nutritional Status of the Community. WHO Monograph. Series No. 53. WHO Geneva.
2. Mehtab S. Bamji. (1996). Text book of Human Nutrition, Oxford& IBH Co.PVT.LTD, New Delhi.
3. Swaminathan, M. (1999). Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
4. Mahtabs. Bamji and N.PralhadRao. (2004). "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi,
5. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian.(2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.
6. MadhuSharma. (2013). Pediatric Nutrition in Health and Disease, Jaypee Brother's Medical Publishers (P) Ltd New Delhi London Philadelphia Panama.

7. M Swami Nathan .(2010). Food and Nutrition Volume-1 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
8. M Swami Nathan .(2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
9. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of Indian Council Medical Research.2010.
10. Dietary guidelines for Indians- a manual. National institute of nutrition. Hyderabad. 2011.
11. David L. Kartz. (2008). Nutrition in Clinical Practice. Lippincott Williams and Wilkins. USA.
12. Whitney E. N. (1983). Understanding normal and clinical nutrition. West publishing company. USA.

Course Out comes

Upon completion of this course, students will be able to

CO 1 Acquire knowledge on Nutritional Surveillance.

CO 2 Apply direct and indirect techniques to assess nutritional status.

CO 3 Gain knowledge on methods of dietary assessment at individual and house hold level.

CO 4 Identify signs and symptoms of different nutrient deficiencies.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3					2						1
CO2	3											1
CO3	2		1			2						2
CO4						1						

3-High, 2- Medium, 1- Low

IV SEMESTER

FT- 401: FOOD SAFETY STANDARDS AND QUALITY CONTROL
(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Course Objectives

1. Understand the current food safety standards rules and regulations.
2. Knowledge on desirable and undesirable constituents and contaminants in foods.
3. Gain knowledge on subjective and objective methods.
4. Learn the methods of contaminants in food for quality assurance.

CORE-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,thickners,polyhydrocalcinols,anticaking,firming,clarifyingandbleachingagents;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

REFERENCES :

1. S.N.Mahindru . (2004). Food Safety –Concept and Reality,APH Publishing corporation, ansari road ,Darya ganj, New Delhi.
2. Rajesh Mehta and J.George . (2005).Food Safety Regulation concerns and Trade –The developing country perspective ,Mac millan India Ltd.
3. Vanisha Nambiar. (2004).A Text book on “Food Contamination and Safety “ ANMOL Publications Pvt.Ltd. New Delhi .

4. Amerine, M.A., Pangborn RM, and Roessler BB. (1965). Principles of Sensory evaluation of foods”, Academic press New York.
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.(1979). Food Science and Experimental Foods” 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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11. Norman N. Potter, Joseph H. Hotchkiss (1996) “Food Science” 5th Edition.CBS Publishers and Distributors, New Delhi.
12. Ramesh V. Bhat and B.S. Narasinga Rao. (1985). National Strategy for food quality control National Institute of Nutrition, ICMR, Hyderabad.
13. Mahtabs.Bamji and N.PralhadRao. (2004). Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. Pvt Ltd. New Delhi,

Course Outcomes

Upon completion of this course, students will be able to

CO1 Gain knowledge in current rules and regulations of food safety standards and quality assurance.

CO 2 Identify the contaminants and additives in foods.

CO 3 Select the appropriate analytical technique when presented with a problem.

CO 4 Demonstrate practical proficiency in a food quality analysis.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				3			3				3
CO2	3	3				2		3				3
CO3		3			2	2		3			2	3
CO4		3			3	3		3	2		3	3

3-High, 2- Medium, 1- Low

FT- 402: FOOD PRODUCT DEVELOPMENT AND MARKETING (Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Objectives:

1. Illustrate the new product categories in food market and their characteristics.
2. Elucidate the process of new food product development in food industry.
3. Exemplify various speciality food products and their applications.
4. Acquire the skill to design and development of new food product and analyse the quality of the product.

CORE-THEORY

UNIT I: New Food Products

- New food product: Definition- Introduction-Need for New food product development.
- Classification: Line extensions - Repositioning of existing products - New form of existing product - Reformulation - New packaging - Innovative products - Creative products and Value added products

UNIT II: New Food product development Process -Stages/Phases.

Ideation:Idea generation- Screening-Feasibility studies.

Consumer research.

Product design and Formulation.

Process development – Prototype development and scale up.

Quality assessment of new developed products -Sensory Evaluation-Shelf life - Testing-Packaging and labeling protocols.

Product life cycle.

UNIT III: Speciality food products

- Health foods-Medical foods-Therapeutic foods-Herbal foods-Fortified foods.
- Infant foods- Geriatric foods-Sports drinks.
- Functional foods- Designer foods and Nutraceuticals.
- Prebiotics and probiotics.

UNIT IV: Product Commercialization and Marketing

- Entrepreneurship – Financial review, Costing and Pricing, Test Market, Product launching and Commercialization.
- Ethics in food product development.
- Intellectual property/ Patents.

REFERENCES

1. Andrew, J.Taylor.(2002). *Food Flavour Technology*, Sheffield Academic Press.
2. Debashri, Ray.(2002). *Nutritional Challenge and Total Quality Management*, 1st edition;Sarup and Sons, New Delhi.
3. Fuller, G.W.(1994).*New Food Product Development: From Concept to Market place*, CRC, Press, New York.
4. Graf, E. and Saguy, I.S. (1991).*Food Product Development: From Concept to the Market Place*, Van Nostrand Reinhold New York.
5. Man, C.M.D. and Jones, A.A.(1994).*Shelf life Evaluation of Foods*, Blackie Academic and Professional, London.
6. Mike Stringer and Colin Dennis.(2002). *Chilled foods A comprehensive guide*, 2nd edition ,Woodhead publishing limited, Cambridge, England, 2000.
7. Oickle, J.G. (1990).*New Product Development and Value Added*, Food Development Division Agriculture, Canada.
8. Proc. Food Processors Institute: A key to Sharpening your Competitive Edge. Food Processors Institute, Washington, DC.

9. Rita Singh. (2004). *Food Biotechnology*. Volume 1, 1st edition, Global Vision publishing house, Delhi.
10. Shapton, D.A. and Shapton, N.F. (1991). *Principles and Practices for the Safe Processing of Foods*, Butterworth Heinemann Ltd, Oxford.

Outcomes:

After the completion of the course, the students will able to –

CO1. Apply a product development process to generate ideas, develop concept to test market.

CO2. Design food and nutritional label of food products.

CO3. Demonstrate the skills to conduct the organoleptic evaluation of food product.

CO4. Work collaboratively with a team in food product development.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		3		3	3	3		3	3	3	3
CO2	3		3		2		3	2	3		3	3
CO3	3		3		3	3				1	3	3
CO4	2		3			3	3		2		3	3

3-High, 2- Medium, 1- Low

FT-403: NUTRITION FOR HEALTH AND FITNESS

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

Course Objectives

1. Define the concepts of Health, Nutrition, physical activity, physical fitness and methods of evaluation.
2. Understand the Energy metabolism pathways during physical activity.
3. Describe the role of macronutrients in physical performance, weight management and obesity.
4. Understand the nutritional needs in different sports and the role of national agencies.

CORE-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

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.
9. 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
10. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA 2011.
11. N.MentaNitin.Jmenta.Nutrition and Diet for Children Simplified MeenakshiJaypee Brothers Medical Publishers (P) LTD 2014.
12. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins Nutrition in Clinical Practice Second Edition.2007.
13. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.2012.
14. MadhuSharma Pediatric Nutrition in Health and Disease, Jaypee Brother’s Medical Publishers (P) Ltd New Delhi London Philadelphia Panama.2013.
15. Nutrient Requirements andRecommended Dietary Allowance forIndians A Report of The Expert Group of Icmr.2010.
16. Dr.M Swami Nathan, Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.2010.
17. ShubhanginiA.Joshi, Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.2010.

Course Outcomes

Upon completion of this course, students will be able to

- CO 1 Gain knowledge on concepts of physical activity and physical fitness.
- CO 2 Describe the energy metabolism pathways in physical activity.
- CO 3 List the role of macronutrients in physical performance.
- CO 4 Demonstrate the importance of nutrients in Sports.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1									
CO2			1									
CO3	2		2							1	2	2
CO4	2		3					1	1	1	2	2

3-High, 2- Medium, 1- Low

PRACTICALS: Food Safety standards and Product Development

FT-401: FOOD SAFETY STANDARDS AND QUALITY CONTROL

Course Objectives

- Gain knowledge on subjective and objective methods.
- Learn the methods of contaminants in food for quality assurance.

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

Course Outcomes

- CO1 Select the appropriate analytical technique when presented with a problem.
CO2 Demonstrate practical proficiency in a food quality analysis.

FT-402: FOOD PRODUCT DEVELOPMENT AND MARKETING

Course Objectives:

- Exemplify various speciality food products and their applications.
- Acquire the skill to design and development of new food product and analyse the quality of the product.

PRACTICALS

1. Market Survey to identify new products in terms of
 - Line Extension, Repositioning of Existing Products, New form, Reformulation, New packaging, Innovative products and Creative Products.
2. Market Survey to identify
 - Nutrition products, Therapeutic products, Specialty products, Technology Driven products.
3. New Food Product Development.
 - Ideation.
 - Formulation,
 - Standardization,
 - Acceptability studies.
 - Shelflife Studies.
 - Costing and Pricing.
 - Food and Nutrition labeling and packaging
 - Test Marketing

Course Outcomes

- CO1 Demonstrate the skills to conduct the organoleptic evaluation of food product.
CO2 Work collaboratively with a team in food product development.

FT- 404(A): INSTITUTIONAL FOOD SERVICE MANAGEMENT (Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Course Objectives

1. Understand the different types and management of food services.
2. Illustrate the infra structure plans, menus and equipment in food service establishments.
3. Know the food safety measures in food service establishments.
4. Knowledge on finance and personnel management.

Generic Elective- 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 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.

REFERENCES

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, Bangalore.
4. Ramesh V. Bhat and R. Nageswar Rao (1992), “Food safety in public catering”, NIN, ICMR, Hyderabad.
5. Mahtabs.Bamji and N.PralhadRao. (2004). Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi,
6. Heather Hedrick Fink, Alan E. Mike Sky. (2012). Practical Applications in Sports Nutrition, Third Edition, Library of Congress Cataloging in Publication Data. United States of America.
7. Michelle McGuire, Kathy A Beer Man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA.
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9. Davidl. Katzwolters Kluwer/LippinCottWilliams and Wilkins. (2007). Nutrition in Clinical Practice Second Edition.
10. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. (2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.
11. MadhuSharma. (2013). Pediatric Nutrition in Health and Disease, Jaypee Brother’s Medical Publishers (P) Ltd New Delhi London Philadelphia Panama..
12. Nutrient Requirements andRecommended Dietary Allowance forIndians A Report of The Expert Group of ICMR.2010.
13. Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.

Course Outcomes

Upon completion of this course, students will be able to

CO 1 Gain knowledge in management of food service establishments.

CO 2 Describe the infrastructure plan, menus and equipment used in food service establishments.

CO 3 Take food safety measures in food service establishments..

CO 4 Apply skills in finance and personnel management.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2				1					3
CO2	2		2									3
CO3	3	2				2		3				3
CO4							1	1				3

3-High, 2- Medium, 1- Low

FT- 404(B): Basic Food Engineering

Objective

1. Understand the basic Principles of food engineering.
2. Describe the types and properties of Refrigeration systems
3. An insight of agro processing equipments like pasteurizer, spray drier and sealing equipments.
4. Enumerate processing equipments and maintenance of processing equipments

Generic Elective - THEORY

Unit-1:Basic Principles of food engineering

- Unit dimensions and conversions: Unit operations, design of food process equipment's, elements of measuring instruments - machine elements and electrical elements.

Unit-2:Basics of Vapor Compression Cycles

- Properties of steam and Moist air - Boilers operation - Pressure vessels, evaporators - Boiler house and workshop.

Unit-3:Refrigeration in Food Industry

- Types of refrigeration systems - Refrigerants - Properties - Cold Storage - Design and Maintenance.

Unit-4: Equipments

- Driers, Cleaning equipment - graders and sorters - blending, pelletization and emulsification equipment - Material handling equipment - Maintenance of food processing equipment.
- Agro processing equipment's - Pasteurizers, Cream Separators, Spray driers and filling, sealing and packaging equipment.

Text Book and Reference Books :

1. Brennar, J.G. *et al.*,(1986). *Food engineering operations*, Elsevier Publishing Company, Amsterdam.
2. Treybal R. (1981). *Mass-Transfer operations*, McGraw Hill.
3. Watson E.L., Harper J.C. and Harper J.C.(1988). *Elements of Food Engineering*, Chapman and Hall, London, New York.
4. Batty, J.C. and Folkman, S.L.(1985). *Food Engineering Fundamentals*, Wiley, New York.
5. Care,Mc and Smith, E. (1985).*Unit Operations of Chemical Engineering*, 4thed., McGraw Hill Company.
6. Earle, R.L. (1983). *Unit operations in Food Processing*, Pergaman Press, Oxford.
7. Fryer G.S., *et al.*,(1997). *Chemical Engineering for Food Industries*, Blackie Academic Professionals.
8. Heldman D.R. and Lund D.B.(1992). *Handbook of Food Engineering*, Marcel Dekker, New York.
9. Le Maguer M. and Jellen P.(1986). *Food Engineering and Process applications*, Elsevier Applied Science Publishers, London.
10. Lewis M.J.(1987). *Physical properties of food and Food Processing System*, Ellis, Hardwood Publications.

Course Outcomes

CO1. Ability to apply principles of food engineering in industry.

CO2. Able to operate Food processing equipments

CO3. Acquaint with refrigeration system and material handling.

CO4. Gain an insight of agro processing equipments and handling techniques.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				3	3						3
CO2	2				3	3						3
CO3	2				3							3
CO4	2				3					2		3

3-High, 2- Medium, 1- Low

FT- 404(C):FOOD PACKAGING

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

Course Objective

1. Provide knowledge on packaging and packaging materials
2. An overview of the scientific and technical aspects of food packaging.
3. Enable the students to understand the regulations of packaging and packaging material testing.
4. Knowledge of the new innovations in food packaging to improve product stability and/or to extend the product shelf-life.

Generic Elective - 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.

REFERENCES

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

9. Sood. S.K. and MridulaSaxena.(2002). *Food Packaging*, NLERT – Booklet – New Delhi.
10. Stanley and Sacharow Food Packaging.

Outcomes

After the completion of the course, the students will able to –

- CO1.Exposure about packaging, packaging materials and packaging methods.
- CO2.Comprehend the overview of the scientific and technical aspects of food packaging
- CO3.Acquire knowledge on regulations of packaging and testing.
- CO4.Able to utilize some of the new innovations in food packaging to improve product stability and/or to extend the product shelf-life.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1									3
CO2	3		1					2			1	3
CO3	3		1					3			3	3
CO4		3	3		3			2	2	2	3	3

3-High, 2- Medium, 1- Low

FT- 405 (A): CHILD WELFARE PROGRAMME

OPEN ELECTIVE

Course Objectives

This course helps the students to;

1. Define the terms 'child' and 'child welfare', enlist children in need of care and difficult circumstances.
2. Understand the role of government, voluntary organizations responsible for the welfare and development of children .
3. Utilize the knowledge on child welfare programmes to disseminate information as preventive, promotive , developmental and rehabilitative manner to the disadvantaged people in the society
4. Apply the knowledge about monitoring and evaluation of organizations when visiting and observing child welfare organizations .

THEORY

UNIT – I :Child Welfare programmes

Need and History of Child Welfare programmes in India.

Existing Government and Voluntary Organizations for Children in India - ICDS, ICCW, CSWB, NIPCCD, NCERT, ICSW, Women Development and Child Welfare (WD&CW), Balbhavan society - Functions and services of all NGO's like RASS, PASS, Action AID, SOS - Principles, objectives and significance of organizations and activities.

UNIT – II :Different Child Welfare Organizations -

Orphanage, Juvenile homes, Home for street children and Observation homes
Administration, organization structure of Different organizations
Child labour- Child Trafficking -Prevention

UNIT-III : Monitoring and Evaluation of Child Welfare Institutions

Purpose and objectives of monitoring, monitoring of quality, indicators of monitoring, process of monitoring. Objectives and techniques of evaluation
Parameters for Evaluation Process of evaluation, evaluation personnel.

UNIT-IV: International Organizations

Principles, Objectives and Significance of International Organizations- UNICEF, WHO, CARE, CRY.

Changing philosophy and concept of programmes and services for children, Importance of Integrated approaches.

REFERENCES

1. Alfred.D.Souja (1973), 'Children in India', Critical Issues in Human Development, Indian Social Science Research Institute, Delhi.
2. Approaches to perspective plan on child development, NIPCCD, 1985.
3. D'Arcy, Davis-case (1989), Community Forestry: Participatory Assessment Monitoring and Evaluation, Rome: Food and Agriculture Organization.
4. Fecistein, M. (1986). Patterns in Evaluation, London: Macmillan.

5. Jayakaran, R.L. (1996). Participatory Learning and Action: User guide and manual, Madras: World Vision India.
6. Kumar, R. 'Child Development in India', Ashish Publishing House, New Delhi, Reprint 2003.
7. Paul Chowdary, D. Child Welfare and Development, Atmarani and Co., New Delhi.

Course Outcomes

After studying the course, students will able to;

- CO1. Define the terms 'child' and 'child welfare', enlist children in need of care and difficult circumstances viz., orphans, street children, abused, exploited, children affected by natural calamities and disasters etc.,
- CO2. Understand the role of government organizations like ICDS, NIPCCD and voluntary organizations like ICCW, SOS villages etc. responsible for the welfare and development of children.
- CO3. Utilize the knowledge on child welfare programmes to disseminate information as preventive, promotive, developmental and rehabilitative manner to the disadvantaged people in the society.
- CO4. Apply the knowledge about monitoring and evaluation of organizations when visiting and observing child welfare organizations.

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												2
CO2	2											2
CO3												2
CO4												2

3-High, 2- Medium, 1- Low

FT- 405 (B): DISASTER MANAGEMENT

COURSE OBJECTIVES

The Course helps the Student:

1. To know about natural disasters: manmade disasters; chemical hazards; National and International strategies to mitigate disaster management.
2. To understand natural disasters (like floods, drought, cyclone, earthquakes, global warming etc); Nuclear disasters; Biological disasters;.
3. To illustrate the efforts made by the NGOs, Community based organizations and local administration in disaster management.
4. Discriminate disaster responses of Armed forces and Police.

OPEN ELECTIVE- THEORY

UNIT I

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves, Climatic Change: Global warming, Sea Level rise, Ozone Depletion

UNIT II

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT III

Disaster Management- Efforts to mitigate natural disasters at national and global levels. International Strategy for Disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community-based organizations, and media. Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.

REFERENCES

1. Gupta HK. 2003. *Disaster Management*. Indian National Science Academy. Orient Blackswan. Hodgkinson PE & Stewart M. 1991.
2. *Coping with Catastrophe: A Handbook of Disaster Management*. Routledge. Sharma VK. 2001. *Disaster Management*. National Centre for Disaster Management, India.

COURSE OUTCOMES

After studying the course, Students will be able to

Co- I Gain in-depth knowledge about natural disasters; manmade disasters; chemical hazards : disaster management.

Co- II: Design and administer a schedule for collection of Information regarding the roles of NGOs, Community based organizations , central state, District and local Administration, Police and armed forces, in Disaster management

CO-PO Mapping

Coursee	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1									2
CO2	1											2

3-High, 2- Medium, 1- Low

