

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



**RESTRUCTURED CURRICULUM FOR
M.Sc. HOME SCIENCE – FOOD SCIENCE NUTRITION AND DIETETICS
(REGULAR) PROGRAMME
TO BE IMPLEMENTED WITH EFFECT FROM THE ACADEMIC
YEAR 2020-2021**

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

Department 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.

Department 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

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 outreach 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 practical, 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 and contribution to the interest of the society as a whole and perform well in their careers.

Programme Objectives

To enable the students:

1. To provide human resource in the field of Food Science, Nutrition and dietetics to cater the needs of the Community at local, regional and National levels.
2. To give skill and hands on experience in the thrust areas of the programme and prepare students for research.
3. To give training both in theory and practical for higher studies and competitive exams.
4. To facilitate by giving quality education for employability, entrepreneurship and skill development.
5. To inculcate the corporate social responsibility by profession and personal development there by developing the community by various curriculum and cocurricular activities.
6. To conduct field studies, Internship and project work as part of curriculum for developing data base for interventions and further studies and help policy makers to improve the health status of the population in the community.

Programme Educational Objectives (PEO)

To enable students to:

1. Understand the relationships between Food Science, Nutrition and Metabolism.
2. Gain knowledge on fundamental science involved in Food science, food processing and preservation, food quality, developing diet plans for different age groups and disease conditions.
3. Acquire skills in applying knowledge of Food science, Nutrition, and therapeutic nutrition in community and human health.

4. Interpret nutritional research through informed knowledge of food science, nutrition and diet therapy in community and health.

Program outcomes

By studying Food Science Nutrition and Dietetics course the student is able to

1. Apply knowledge in Food science nutrition and dietetics to understand the chemical components- nutrients and non-nutrient constituents their physico chemical and functional properties, spoilage, processing, preservation, packaging of different foods. To assess nutritional status of individuals in various life-cycle stages and determine nutrition-related problems and diseases by applying knowledge of metabolism and nutrient functions, food sources, and physiologic systems in community, hospital, and in any situations.
2. Identify and understand different problems related to food science, food microbiology, food adulteration and nutritional problems in different stages of life in health and disease- its consequences and dietary management and apply knowledge to tackle these problems.
3. Design food products applying the principles of food science and nutrition to meet the challenges of nutritional problems.
4. Conduct research in different fields of nutrition using human and animal models, designing new food products, food service establishments.
5. Apply appropriate techniques to design, process, preserve, analyze and authenticate the different components of foods and food products.
6. Function effectively in different facets as dietitian, quality control systems, food analysts, research and development, food product designing, different food service establishments, and policymaking.
7. Communicate effectively Nutrition information in person and with community. Acquire skills in writing research report, documentation, case studies, seminar presentations, group discussions, and marketing strategies.
8. Describe social and environmental dimensions within nutrition and the life sciences. Able to demonstrate the National and International food laws, regulations and safety standards in application of food additives to ensure safe food.
9. Know Professional and social ethics as researcher, dietitian, community mentor, food business operator.

10. Apply knowledge of Nutrition and food science for sustainable development of the society in terms of socio cultural aspects, attitudes, and practice balanced diet in health and disease, food quality and safety regulations, food adulteration, food safety and hygiene.
11. Develop and design their own food business plan in terms of food business operators and food service establishments.
12. Learn new concepts of Nutrition science in global perspective and prepare themselves for life long learning process.

SRI VENKATESWARA UNIVERSITY COLLEGE OF SCIENCES: TIRUPATI
DEPARTMENT OF HOME SCIENCE
CHOICE BASED CREDIT SYSTEM (C.B.C.S), SYLLABUS AND SCHEME OF EXAMINATION
(WITH EFFECT FROM THE ACADEMIC YEAR 2021)
M.Sc., FOOD SCIENCE NUTRITION AND DIETETICS (FSND)

SEMESTER-I

Sl. No.	Course Code	Components of Study	Title of the Course	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	FSND-101	Core-Theory	Food Chemistry and Analysis	4	20	80	100
2	FSND-102	Core-Theory	Food Science and Experimental Foods	4	20	80	100
3	FSND-103	Core-Theory	Clinical Nutrition and Dietetics-I	4	20	80	100
4	FSND-104	Practical-I	Food Chemistry and Analysis Practical	2	-	-	50
5	FSND-105	Practical-II	Food Science and Experimental Foods Practical	2	-	-	50
6	FSND-106	Practical-III	Clinical Nutrition and Dietetics-I Practical	2	-	-	50
7	FSND-107	Compulsory Foundation	Essential of Food and Community Nutrition	2	10	40	50
6	FSND-108	Elective Foundation	Human Values and Professional Ethics-I	4	20	80	100
		Total		24			600

**DEPARTMENT OF HOME SCIENCE
M. Sc. FOOD SCIENCE NUTRITION AND DIETETICS**

**CHOICE BASED CREDIT SYSTEM (CBCS)
(With effect from academic year 2020-2021 onwards for students
admitted into First Semester)**

**SEMESTER – I
FSND 101: FOOD CHEMISTRY AND ANALYSIS
(Common to M.Sc. Food Science Nutrition & Dietetics and MS Food Technology
Course)**

Course Objectives

- Acquire knowledge on chemical composition of different foods.
- Understand the physical, chemical, and functional properties of foods.
- Know the principles and working applications of different analytical techniques associated with food.
- 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, physico–chemical properties of monosaccharides- pentoses, and hexoses , oligosaccharides – Maltose, Lactose, sucrose and poly sacchharides – 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- kjheldhal 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. (2019).Food Chemistry”, First Edition, CBS publishers and Distributors, New Delhi.
2. Fennema R. (2019). Food Chemistry. Marcel Dekker Inc. New York.
3. Ranganna S. (2019). Handbook of analysis and quality control for fruits and vegetables, 2nd edition. Tata McGraw Hill.
4. 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	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3			2	2						
CO2	3	3			2	3						
CO3	3				3	3		1				1
CO4	3				2	2		1				1

3-High, 2- Medium, 1- Low

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

Course Objectives

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

CORE –THEORY

UNIT I: Foods of Plant Origin

- Cereals and Millets: 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 and Functional properties of Milk.
- Egg: Structure, grading, quality and Functional properties of eggs.
- Meat and Poultry: Structure, Muscle composition, Postmortem changes, Heat-induced changes in meat, Tenderness – Tenderizers.
- 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, raw materials and their role, Indian confectionery.
- Fats and oils: Sources, Composition, Absorption, Functional properties of fat, Rancidity.

UNIT IV: Sensory Evaluation

- Sensory Attributes of food quality and its characteristics.
- Requirements to conduct sensory evaluation- Sensory panel, Preparing and Presenting Samples for Testing, Panel booth.
- Sensory Tests - Analytical and Affective Tests.

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

REFERENCE BOOKS:

1. Belle Lowe. (1998). Experimental Cookery, John Wiley & Sons, INC, New York.
2. Norman N Potter. (2007). Food Science, Fifth edition, An Aspen Publication, Maryland.
3. Griswold. R.M. (1962). The Experimental Study of Foods. Houghton and Mifflin company, Boston, New York,
4. Sethi Mohini. (2011). Food Science: Experiments and Application, second edition, Jain book Agency, New Delhi.
5. Vijayakhader. (2001). Text book of Food science and Technology, ICAR, New D
6. G. Subbulakshmi & Shobha A. Udipi. (2001). Food processing and preservation. New Age International (P) Ltd., Publishers Bangalore, Chennai. Hyderabad.
7. B. Srilakshmi. (2001). Food Science, 2nd edition New Age International (P) Ltd., Publishers, Bangalore, Chennai & Hyderabad.
8. Swaminathan, M. (1979). Food science and Experimental foods. Ganesh & Co., Madras.
9. N. Shakuntala Manay & M. Shadakshar Swamy. (2001). Foods- Facts and Principles, second edition, New Age International Publishers, New Delhi.

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	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3			2	2						2
CO2	3	3			2	2						2
CO3	3	3	2		2	3						1
CO4	3	3	2		3	3						1

3-High, 2- Medium, 1- Low

FSND 103: CLINICAL NUTRITION AND DIETETICS-I

Course Objectives

- Understand the concepts of nutrients its relation to health.
- Describe the role and responsibilities of Dietitian in Hospital.
- Knowledge on Therapeutic modification of diets and diet planning.
- Knowledge on diet planning for diseases and drug interactions.

CORE THEORY

UNIT I: Dietician and Diet Counseling:

- Dietetics, Dietician: Definition, types, role and responsibilities of dietician.
- Diet counseling: Theories and Approaches to counseling- Reality Theory, Cognitive-Behavioral approach, Directive and non-directive Counseling.
- Counseling strategies: Individual and Group counseling.
- Motivation and Intervention model in diet counseling.
- Activities that facilitate behavioral change.

Unit II: Therapeutic Diets:

- Definitions: Normal diets, Therapeutic modifications of the normal diets.
- Principles in planning therapeutic diets, use of food guides and food exchange systems.
- Progressive diets: clear, fluid, soft and regular diets.
- Special feeding methods: Enteral and Parenteral Nutrition, Types, methods and formulation of feedings.

UNIT III: Dietary Management in Metabolic Disorders

- **Diabetes Mellitus:** classification, Etiology, symptoms, Diagnosis, complications, treatments. Glycaemic index and load, Dietary management of Diabetics, hypoglycemia.
- **Gout and Inborn Errors of Metabolism**
Gout: Etiology, Clinical symptoms , Role of Proteins and purines, Dietary management.
Inborn errors of metabolism: phenyl ketonuria (PKU) maple syrup urine disease (MSUD), Galactosemia, Tyrosinemia, Homosystinuria, Dietary management
- **Obesity and Underweight**
Overweight and obesity: Classification, Etiology, assessment, factors affecting weight gain, Consequences. Management of Obesity- Dietary and Lifestyle Modifications, Preventive Aspects.
Underweight: Etiology- assessment, Consequences and Dietary Management.

UNIT-IV: Food and Drug Interactions:

- Risk factors for food and drug interactions.
- Effect of food on drug therapy.
- Effect of drug on food and nutrition.
- Modifications of drug action by food and nutrition.
- Effect of drug on nutritional status.

PRACTICALS:

1. Visit the local hospitals to study food preparation and service to patients.
2. Planning of therapeutic modification of different diets.
3. Preparation of therapeutic modification of different diets.
4. Visits to hospitals (6 Practical Sessions) to collect case reports.
5. To prescribe the diets for the patients from different wards and do diet counseling.
6. Preparation of diets related to case study and Presentation of case reports.
7. Planning and preparation of different RT Feeds.
8. Use of food exchange lists in planning therapeutic diets.
9. Planning of diabetic diets for different age groups.
10. Preparation of diabetic diets for different age groups.
11. Planning of high fiber and low carbohydrate diets for different grades of obese patients.
12. Preparation of high fiber and low carbohydrate diets for different grades of obese patients.

TEXT BOOKS:

1. B. Srilakshmi. (2001). Dietetics, 4th ed. 1969, 3rd ed. New Age International (P) Ltd., Publishers Bangalore, Chennai, Hyderabad.
2. Whitney NE, Cataldo BC, Rolles RS. (1987). Understanding Normal and Clinical Nutrition West Pub. Company. St Paul, New York, Los Angeles, San Francisco.
3. Mahtabs. Bamji and N. Pralhad Rao. (2004). Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing Co. Pvt Ltd. New Delhi.
4. Michelle McGuire, Kathy A Beerman. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA
5. David L. Katz Wolters Kluwer/Lippincott Williams and Wilkins. (2007). Nutrition in Clinical Practice Second Edition.
6. C. Gopalan, B. V. Ramasastri and S. C. Bala Subramanian. (2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.
7. Dr. M Swami Nathan. (2010). Food and Nutrition Volume-1 & 2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
8. Shubhangini A. Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mcgraw Hill Education Private Limited New Delhi.

Course Outcomes

Upon completion of this course, students will be able to

CO 1 Apply the concepts of therapeutic nutrition in different diseases.

CO 2 Calculation of Nutrients and modification of the diets for different diseases.

CO 3 Planning and preparation of diets for different disease conditions.

CO 4 Able to know patient Diet counselling.

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3	3	2								2
CO2	3	3	3	2								2
CO3	3	3	3	3						2		1
CO4	3	3	3	3		3	3		2	2		1

3-High, 2- Medium, 1- Low

FSND 104 Practical I-FOOD CHEMISTRY AND ANALYSIS

Course Objectives

- Know the principles and working applications of different analyticals techniques associated with food.
- 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, Hydrolysis of Starch.
4. Determination of starch and sugars
5. Qualitative analysis of proteins and amino acids
6. Estimation of proteins - Micro-Kjeldhalmethod
7. Separation of proteins and amino acids – Electrophoresis
8. Qualitative analysis of fats and oils.
9. Determination of fat in solid and liquid foods.
10. Determination of Total ash
11. Estimation of calcium
12. Estimation of phosphorus
13. Estimation of Iron
14. Estimation of vitamin C
15. Demonstration of estimation of minerals using atomic absorption spectro photometer (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.

FSND 105 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.

FSND 106 Practical III-CLINICAL NUTRITION AND DIETETICS-I

Course Objectives

- Knowledge on Therapeutic modification of diets and diet planning.
- Knowledge on diet planning for diseases and drug interactions.

PRACTICALS:

1. Visit the local hospitals to study food preparation and service to patients.
2. Planning of therapeutic modification of different diets.
3. Preparation of therapeutic modification of different diets.
4. Visits to hospitals (6 Practical Sessions) to collect case reports.
5. To prescribe the diets for the patients from different wards and do diet counseling.
6. Preparation of diets related to case study and Presentation of case reports.
7. Planning and preparation of different RT Feeds.
8. Use of food exchange lists in planning therapeutic diets.
9. Planning of diabetic diets for different age groups.
10. Preparation of diabetic diets for different age groups.
11. Planning of high fiber and low carbohydrate diets for different grades of obese patients.
12. Preparation of high fiber and low carbohydrate diets for different grades of obese patients.

Course Out comes

- CO 3 Planning and preparation of diets for different disease conditions.
- CO 4 Able to know patient Diet counselling.

FSND 107: ESSENTIALS OF FOOD AND COMMUNITY NUTRITION
(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Course Objectives

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

COMPULSORY FOUNDATION- THEORY

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. Jelliffe, D.B. (1966). Assessment of Nutritional Status of the Community, WHO Monograph. Series No. 53. WHO Geneva.
2. Swaminathan, M. (2010). Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
3. Mahtabs. Bamji and N.PralhadRao. (2010). Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. Pvt Ltd. New Delhi.
4. Michelle McGuire, Kathy A Beer man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA.
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.

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	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3		2			2					2
CO2	3	3	3	2			3					2
CO3	3	3	3	2					2			2
CO4	3	3	3	2			3		2			2

3-High, 2- Medium, 1- Low

FSND108: HUMAN VALUES AND PROFESSIONAL ETHICS - I (Revised Syllabus with effect from 2019-2020)

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. .

ELECTIVE FOUNDATION-THEORY

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- mahavrata and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.

Unit-V:

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

REFERENCES:

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

Course Outcomes:

After studying the course, students will be able to ;

CO1. Define the term 'ethics', 'good and bad values', crime and punishment and religious tolerance.

CO2. Understand the importance of good character, 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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3				3	2			3	2		1
CO2	3				3	2			3	2		1
CO3	3				3	2			3	2		1
CO4	3				3	2			3			1

3-High, 2- Medium, 1- Low

SEMESTER-II

Sl. No.	Course Code	Components of Study	Title of the Course	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	FSND-201	Core-Theory	Nutritional Bio chemistry	4	20	80	100
2	FSND-202	Core-Theory	Food Microbiology and Safety	4	20	80	100
3	FSND-203	Core-Theory	Clinical Nutrition and Dietetics-II	4	20	80	100
4	FSND-204	Practical-I	Nutritional Bio chemistry Practical	2	-	-	50
5	FSND-205	Practical-II	Food Microbiology and Safety Practical	2	-	-	50
6	FSND-206	Practical-III	Clinical Nutrition and Dietetics-II Practical	2	-	-	50
7	FSND-207	Compulsory Foundation	Research Methodology	2	10	40	50
6	FSND-208	Elective Foundation	Human Values and Professional Ethics-II	4	20	80	100
		Total		24			600

FSND 201: NUTRITIONAL BIOCHEMISTRY

Course Objectives

- Understand the metabolism of nutrients in human physiology.
- Acquire knowledge on factors affecting digestion ,absorption of nutrients.
- Creating awareness on enzymes and its role in nutrient metabolism.
- Knowledge on role of therapeutic nutrition/diets in person to person metabolism.

CORE THEORY

UNIT - I

Metabolism of Carbohydrates and Lipids

- **Carbohydrates** :Sources, structure, functions, digestion and absorption of carbohydrates. Carbohydrate metabolism- Glycolysis, Krebs cycle, Electron Transport Chain (ETC), Oxidative Phosphorylation, Glycogenolysis, glycogenesis and Gluconeogenesis.
- **Lipids** :Sources, structure, functions, digestion and absorption of lipids. βoxidation of fatty acids and Cholesterol Metabolism. Lipids of biological significance - Lipoproteins and prostaglandins in health and disease.

UNIT – II

Proteins and Amino Acids

- Sources, structure, functions, digestion and absorption of proteins.
- Classification of amino acids – peptides and proteins. Metabolism of amino acids - Amino Acid decarboxylation, Tran's peptidation. Formation and Disposal of Ammonia - Hepatic coma, creatine and Creatinine - biosynthesis.
- Nucleic acid - DNA, RNA, Bases - Purines and Pyrimidines, Synthesis of Nucleic Acids - Steps of replication - Initiation, Elongation and Termination. Protein biosynthesis.
- Enzymes – Classification, structure, functions of enzymes; factors affecting enzyme activity.
- Hormones -Classification and functions of hormones.

UNIT - III

Vitamins

- Fat Soluble Vitamins: Sources, physiological functions, requirements and deficiency
- Water Soluble Vitamins: Sources, physiological functions, requirements and deficiency.
- Metabolism of vitamin A and vitamin D.

UNIT – IV

Minerals and Trace elements

- Sources, Physiological functions, requirements and deficiency of Calcium, Phosphorus, Iron, Iodine, Zinc, Sodium, Potassium, Chloride and Fluorine.
- Electrolytes
- Metabolism of Calcium and Phosphorus.

REFERENCES:

1. Keith Wilson and John Walker. (2000). Practical Biochemistry Principles and Techniques". 5th Edition. Cambridge University Press.
2. David L. Nelson and Michael M. Cox. Lehninger. (2001). Principles of Biochemistry, 3rd Edn. MacMillan worth Publishers.
3. Talwar G.P. (1989). Text book of Biochemistry and Human Biology" 2nd Edn. National Book Trust in India.
4. Nath R.L. (1996). Text book of Medicinal Biochemistry. New age International (P) Limited, Publishers, New Delhi.
5. Harold Varley. (2010). Practical Clinical Biochemistry"-4th Edn. CBS. Publishes. Delhi.
6. Jayaraman, J. (1981). Laboratory Manual in Biochemistry," New Age International Publishers.

Course Out comes

Upon completion of this course, students will be able to

CO 1 Understand the metabolism of food and nutrients in humans.

CO 2 Know metabolism of nutrients in healthy and disease individuals.

CO 3 Acquire skills in Qualitative and quantitative estimation of metabolites in biological fluids.

CO 4 Know Skills in analysing enzymes and its metabolites.

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3		3								
CO2	3	3		3								
CO3	3			3	3	2						2
CO4	3			3	3	2						2

3-High, 2- Medium, 1- Low

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

Course Objectives

- Understand important pathogens and spoilage microorganisms in foods and the conditions under which they will grow.
- Knowledge on the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods.
- 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.

CORE- THEORY

UNIT-I: Food and Microorganisms: Introduction to Food Microbiology

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

UNIT II: Food Contamination and methods for detection of Microorganisms

- 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.
- Physical, Chemical, Biological, Immunological and Molecular methods of detection.

UNIT-III: Microbial Food Spoilage and Food –Borne Diseases

- Microorganisms causing spoilage – chemical- physical - physiological changes caused by microorganisms.
- Spoilage: Different types of food spoilages.
- Food hazards of microbial origin – food borne disease- food borne intoxications- food borne infections.

UNIT-IV: Food Safety and Applications

- Food safety: concept- factors affecting food safety –physical- chemical – biological hazards.
- Applications of Food Microbiology.

REFERENCES:

1. William.C.Frazier and Denni, S.C. Westhoff. (2004). *Food Microbiology*, 4th edition, Tata MCGraw-Hill publishing company Ltd, New Delhi.
2. Adams,M.R. and Moss,M.O.(2003). *Food Microbiology*, Second edition, Panima Publishing Corporation, New Delhi.
3. George J. Banwart. (2002). *Basic Food Microbiology*, Second edition, CBS Publishers and Distributors, New Delhi, 2002.
4. James,M.Jay.(2005). *Modern Food Microbiology*, 4th edition, CBS publishers and Distributors, New Delhi.
5. Neelima,G., Garg,K.L. and Mukerji, K.G.*Laboratory manual of food microbiology*, I.K. International Publishing House Pvt.Ltd.

Course Out comes

Upon completion of this course, students will be able to

CO 1 Identify the important pathogens and spoilage microorganisms in foods.

CO 2 Categorize the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods.

CO 3 Apply techniques to identify different micro organisms in foods.

CO 4 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.

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3	2									
CO2	3	3	2									
CO3	3	3	2	2	2	2						2
CO4	3	3	2	2	2	2						2

3-High, 2- Medium, 1- Low

FSND 203: CLINICAL NUTRITION AND DIETETICS-II

Course Objectives

- Understand the diet principles for gastro intestinal, cardio vascular, renal, and other major diseases.
- Knowledge on diet principle for Surgical patients.
- Comprehensive knowledge in Dietary modifications for the management of diseases.
- Creating Knowledge in preparation and service of diets to these patients.

CORE THEORY

UNIT I: Dietary Management in-

i. Gastro intestinal Disorders

- Diseases of the Upper Gastro intestine - Gastro Esophageal Reflux Disease (GERD), Esophagitis, Hiatal Hernia.
- Diseases of the Stomach: Gastritis, Peptic Ulcer, Dumping syndrome.
- Diseases of intestine: Inflammatory bowel disease, Celiac disease, ulcerative colitis.
- Common GI problems: Diarrhea, constipation, Flatulence, Food sensitivities.

ii. Disorders of Liver, Gall Bladder and Pancreas

- Disorders of liver: fatty liver, Hepatitis, cirrhosis, Hepatic coma.
- Gallbladder Disorders: Cholelithiasis, Cholecystitis.
- Disorder of pancreas: pancreatitis, cystic fibrosis.

UNIT II: Dietary Management in –

i. Cardiovascular Disorders -

- Dyslipidemia, Atherosclerosis, Coronary Heart disease (CHD), Hypertension (HT), Congestive Heart Failure, Angina pectoris, myocardial infraction (MI), Rheumatic Heart Disease (RHD).

ii. Renal Disorders-

- Nephrotic syndrome, glomeular nephritis, renal failure, Nephrolithiasis, urinary tract infection, dialysis.

UNIT-III: Dietary Management in Specific diseases /conditions

i. Nutrition during specific diseases

- a. **Cancer:** Types, Etiology, Risk factors, consequences, Nutrition in prevention, treatment and management of cancer.
- b. **HIV/AIDS:** Classification, Etiology, Risk factors, consequences, Nutrition in prevention, treatment and management of HIV/AIDS.

UNIT-IV: Nutrition in Stress, Infection and burns

- i. **Stress:** type of stress, metabolism, Nutrition in stress.
- ii. **Surgery:** Nutritional management in pre and post surgery.

- iii. **Infections:** Nutritional management in infections.
- iv. **Burns:** Nutrition for patient with burns-nutritional needs, nutrition support and management.

REFERENCE BOOKS:

1. B. Srilakshmi. (2001).Dietetics, 4th edi. 1969, 3rd edi. New Age International (P) Ltd., Publishers Bangalore, Chennai, Hyderabad.
2. Whitney NE, Cataldo BC, Rolses RS. (1987).Understanding Normal and Clinical Nutrition” West Pub.Company. St Paul, New Yok, Los Angeles, San Fransisco.
3. Mahtabs.Bamji and N.PralhadRao. (2004).Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. Pvt Ltd. New Delhi.
4. Michelle McGuire, Kathy A Beer man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, Wadsworth Cengage Learning, Belmont, USA
5. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. (2012). Nutritive Value of Indian Foods.National Institute of Nutrition, Indian Council Medical Research Hyderabad.
6. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of ICMR.2010.
7. Dr.M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
8. ShubhanginiA.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 Apply the concepts of threupatic modification of diets for the diseases.

CO 2 Calculate nutrients and modify diets for the diseases.

CO 3 Skills in Planning and preparation of diets for different disease conditions.

CO 4 Able to know patient Diet service management and counselling.

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3				2	2		2	2		2
CO2	3	3				2	2		2	2		2
CO3	3	3	2	3		3	3		3	2		2
CO4	3	3	2	3		3	3		3	2		2

3-High, 2- Medium, 1- Low

FSND 204 Practical I- NUTRITIONAL BIOCHEMISTRY

Course Objectives

1. Creating awareness on analysis of Biochemical parameters.
2. Knowledge on Analytical techniques of quantification of biological parameters and its comparison with normal and abnormal values.

PRACTICALS:

1. Estimation of Blood glucose.
2. Estimation of Serum Proteins by Biuret / Reinhold Method
3. Estimation of Serum Triglycerides.
4. Estimation of Serum Cholesterol.
5. Estimation of Serum Iron / kit method
6. Estimation of Haemoglobin
7. Microscopic Examination of Blood Smear for types of blood cells.
8. Estimation of Packed cell volume in the blood.
9. Estimation of Serum Calcium / Urinary Calcium.
10. Estimation of Serum Vitamin C.

Course Out comes

CO 3 Acquire skills in Qualitative and quantitative estimation of metabolites in biological fluids.

CO 4 Know Skills in analysing enzymes and its metabolites.

FSND-205 Practical 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

CO 1 Apply techniques to identify different microorganisms in foods.

CO 2 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.

FSND 206 Practical III- CLINICAL NUTRITION AND DIETETICS-II

Course Objectives

- Comprehensive knowledge in Dietary modifications for the management of diseases.
- Creating Knowledge in preparation and service of diets to these patients.

PRACTICALS:

1. Planning of diets for gastritis, peptic ulcer, diarrhea and constipation.
2. Preparation of diets for peptic ulcer, diarrhea and constipation.
3. Planning of diets for cirrhosis of liver and hepatitis for different age groups.
4. Preparation of diets for cirrhosis of liver and hepatitis for different age groups.
5. Planning of fiber rich and antioxidant rich diets.
6. Preparation of fiber rich and antioxidant rich diets.
7. Planning of diets for hypertension, coronary heart disease (CHD) and myocardial infarction (MI) for different age groups.
8. Preparation of diets for hypertension, coronary heart disease (CHD) and myocardial infarction (MI) for different age groups.
9. Planning of diets for nephritic syndrome, glomerulonephritis and urinary calculi.
10. Preparation of diets for nephritic syndrome, glomerulonephritis and urinary calculi.
11. Planning of low carbohydrate, low fat and high PUFA diets.
12. Preparation of low carbohydrate, low fat and high PUFA diets.
13. Planning of diets for burns patients and post-operative patients.
14. Preparation of diets for burns patients and post-operative patients.

Course Out comes

CO 1 Skills in Planning and preparation of diets for different disease conditions.

CO 2 Able to know patient Diet service management and counselling.

FSND 207: RESEARCH METHODOLOGY
(Common to all Branches of MSc Home Science and
MS Food Technology Course)

COMPULSORY FOUNDATION – THEORY

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.
1. Understand different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research.
2. Critically apply knowledge to select a sample by using different sampling methods like probability and non-probability sampling .
3. Develop a research proposal in the appropriate scientific style.

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 EXPERIENCES

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.
2. Batnagar, G.L. (1990) :“*Research Methods and Measurements in Behavioural and Social Sciences*”, Agri. Cole publishing Academy, New Delhi.
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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1				3								
CO2				3								
CO3				3	2	1			3			1
CO4				3	2	1			3			1

3-High, 2- Medium, 1- Low

FSND 208 - HUMAN VALUES AND PROFESSIONAL ETHICS - II (Revised Syllabus with effect from 2015-16)

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 healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit-III:

Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions.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.
10. SusrptaSamhita: Tr.KavirajKunjanlal, KunjalalBrishagratha. Chowkarnba Sanskrit series. VolLII and III, Varnasi, Vol I 00,16'20,21-32 and 74-77 only.
11. CarakaSamhita :Tr.Dr. Ram Karan Sarma and VaidyaBhagavan Dash, Chowkambha Sanskrit Series office. Varanasi I, 11.111 VolIPP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon Wadsworth/Thomson Learning, 2001.

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.

CO.4. Apply skills for anger management, care of elderly, environmental protection and there by develop well balanced personality and will contribute to society as morally finer, socially responsible and physically fit persons

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1				2		2			3			
CO2				2		2			3		2	
CO3						2			3		2	
CO4						2			3			

3-High, 2- Medium, 1- Low

SEMESTER-III

Sl. No	Course Code	Components of Study	Title of the Course	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	FSND-301	Core-Theory	Food Processing and Preservation Technology	4	20	80	100
2	FSND-302	Core-Theory	Advanced Human Nutrition	4	20	80	100
3	FSND - 303	Practical-I	Rural Work Experience	4	-	-	100
4	FSND-304	Practical-II	Internship	4	-	-	100
5	FSND-305	Generic Elective*	(a) Nutrition Research Techniques (b)Geriatric Nutrition (c)Nutrition in Emergencies and Disaster	4	20	80	100
6	FSND-306	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.

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

Objectives:

- Understand the principles and scope of food processing and preservation.
- Get an overview on various techniques/methods in food processing and preservation.
- Acquire to knowledge of emerging technologies and their applications in food processing and preservation.
- 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, 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, Ultrasonic, High Intensity Light, Pulse Electric Field, Ohmic Heating, Pulsed X-rays, Microwave, Radio Frequency, Minimal Processing, Edible Coatings and Films, Membrane Processing, Hurdle Technology, Nanotechnology and Application in foods.

LEARNING EXPERIENCES

1. Preservation of food by traditional methods using sugar, salt and turmeric powder etc.
2. Preservation by using Chemical preservatives.
3. Preparation of Jams, Jellies, fruit Juices, Squashes, Sauces and bottling – Shelf life study.
4. Pickling with a variety of foods - Shelf life study.
5. Drying and dehydration of foods.
6. Refrigeration, Freezing and freeze drying of foods.
7. Extrusion processing.
8. Processing and preservation of fermented products.

REFERENCE BOOKS & TEXT BOOKS

1. Rama swamy, Hosali. and Marcote, M. (2005). *Food processing- principals and applications*, CRC press, Taylor and Francis group, New York.
2. G. Subbulaxmi and Shobha. A. Udipi (2008), *Food processing and Preservation*, New age international, New Delhi.
3. Vijayakhader. (2000). *Text book on food storage and preservation*, Kalyani Publishers, New Delhi.
4. Norman, N. Potter, Joseph H. Hotchkiss. (1996). *Food Science*, 5th edition, CBS Publishers & Distributors, New Delhi.
5. Fellows, P. and Ellis, H. (1990). *Food Processing Technology: Principles and Practice*, New York.
6. Harry. W. Von Loesecke. (1998). *Drying and dehydration of Foods*, Allied Scientific, New Delhi.
7. Jelen, P. (1985). *Introduction to Food Processing*, Prentice Hall, Reston Virginia, USA.
8. Lewis, M.J. (1990). *Physical Properties of Food and Food Processing Systems*, Woodhead, UK.

Course 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	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3					2			2		2
CO2	3	3		3			2			2		2
CO3	3	3	3	3		2						2
CO4	3	3	3	3		3						2

3-High, 2- Medium, 1- Low

FSND 302: ADVANCED HUMAN NUTRITION

Course Objectives

- Knowledge on the advance concepts of nutrition of Brain, Immunity and Sports.
- Understand the concepts of dietary management in endemic nutrition problems.
- Creating knowledge on the dietary management during emergencies.
- Comprehensive knowledge indesigning of foods in special needs like space, high altitudes and low temperatures.

CORE THEORY

UNIT-I Nutrition, Brain and Behaviour:

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

UNIT-II Nutrition and Immunity

- Innate immunity – Physical and Chemical barriers, cellular components, humoral components.
- Acquired immunity – cell mediated immunity- Phagocytosis, Cytokinesis, Humoral immunity- B and T Cells maturation.
- Role of nutrients in immunity
Effect of malnutrition on immunity

UNIT-III Endemic Nutrition Problems and their Management

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

UNIT-IV Principles of Nutrition and management systems in

Emergencies –

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

Special needs

- High altitudes and Low temperatures ,Space nutrition,

REFERENCE BOOKS:

1. Whitney and Sharon RadyRolfes. (1999). Understanding Nutrition” (8th edition) An International Thomson Publishing Company, Albany, New York, USA, Wadsworth Publishing Company.
2. M.S. Bamiji, N. PrahladRao and VinodiniReddy . (1998). Text Book of Human Nutrition" Oxford and IBFI Publishing Co. Pvt. Ltd., New Delhi.
3. 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.
4. Michelle McGuire, Kathy A Beer man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, WadsworthCengage Learning, Belmont, USA.
5. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian. (2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.
6. Nutrient Requirements andRecommended Dietary Allowance forIndians A Report of The Expert Group of ICMR.2010.
7. Dr.M. Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.

Course Out comes

Upon completion of this course, students will be able to

- CO 1 Acquire knowledge on advanced nutrition concepts and management
- CO 2 Demonstrate and apply the concepts and designing foods for brain, immunity and sports.
- CO 3 Skills to manage the diet in emergency situations.
- CO 4 Present knowledge on designing foods for special needs.

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3					2			2		2
CO2	3	3		3			2			2		2

CO3	3	3	3	3		2						2
CO4	3	3	3	3		3						2

3-High, 2- Medium, 1- Low

FSND-304- Practical- I: RURAL WORK EXPERIENCE

Course Objectives

The Rural work experience helps the students:

1. To expose students to the natural setting of the village situations, to understand the rural life by students.
2. To develop an understanding of rural life situations prevailing in villages with special reference to Home science among the students.
3. To familiarize with the socioeconomic conditions of people and their problems and several agencies and institutions involved in rural development.
4. To develop communication skills in students using extension teaching methods in the transfer of technology.
5. To develop confidence and competence to solve the problems.
6. To acquaint students with on-going extension and rural development programmes.
7. To impart diagnostic and remedial knowledge to the students relevant to real field situations through practical training.
8. To improve the overall nutritional status of rural communities by identifying the problems related to health and nutrition.
9. To impart the knowledge and skills in the fields like Food and nutrition, Human development, Textiles and clothing, Human resource management, can be provided to the needy families.
10. To develop leadership among people and help them in organizing groups to solve their problems.

The Rural Work Experience (RWE) is a compulsory course offered in IIIrd Semester M.Sc. students primarily to understand the rural situations, prioritize the rural problems and to develop skills & attitude of working with rural people for all-round development in rural area. This programme develops competency in the areas of technological, managerial and communication skills among the students. To develop communications skills in students using extension training methods through planning, preparing of Teaching Learning materials and providing education in the areas of Nutrition, Child development and transfer of technology.

Specific survey schedules are used for collection of general information, assessment of nutritional status of members of each household, measurement of developmental aspects and anthropometric data of children. After analysis of the collected data, needs of the people will be identified. Based on the felt needs, combination of methods of extension for effective dissemination of information will be planned, with the help of local leaders, students will stay in the village for 10-15 days and through participatory approach the action projects will be organized Lecturing, demonstrations, organization of exhibitions, dissemination of messages through role play, skits etc. are some of the techniques used. From the starting of the programme ,the total programme is monitored and evaluated meticulously by the staff of the Department.

The Rural Work Experience Programme, which carries 4 credits is mandatory for MSc., Home Science Students.

Course outcomes

After completion of the RWE programme, students will be able to;

CO 1 Understand and experience the rural life; their socio-economic conditions; problems of rural people; agencies involved in rural development

CO 2 Develop communicative skills, confidence, and competence, to solve the problems related to women, children and youth in the rural areas; use extension teaching methods in the transfer of technologies to the rural families; develop leadership among people and help them in organizing groups to solve their problems; improve the standard of living of the rural people.

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	2					3	3	2	2		1
CO2	3	2					3	3	2	2		1

3-High, 2- Medium, 1- Low

FSND-304- Practical- II: Internship

INTERNSHIP as dietitian in hospitals give practitioner skills for entry-level dietitians who are able to assume leadership roles to improve and maintain the nutritional care of diverse individuals, families and communities within national and global populations.

Course Objectives

- Able to prepare students to be competent as entry-level dietitians.
- Acquire knowledge in assessing and counseling patients in situations.
- Gain skills in planning and preparing therapeutic diets for different patients.
- Prepare graduates to be leaders and to participate in community service.

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

Course outcomes

CO 1 Prepare students as Dietitians

CO 2 Assess and counsel patients

CO 3 Apply Skills in planning and preparing diets for patients according to needs.

CO 4 Counsel communities in nutrition education.

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	
CO1	3	2								3	3		3
CO2	3	2								3	3		3
CO3	3	3	3		3					3	3		3
CO4	3	3				3	3			3	3		3

3-High, 2- Medium, 1- Low

FSND 305 A: NUTRITION RESEARCH TECHNIQUES

Course Objectives

- Understand the methods of nutritional status assessment.
- Knowledge on assessment techniques of protein quality in diets
- Comprehensive knowledge on research techniques using animal models.
- Gain knowledge in nutrition research techniques using Human models.

GENERAL ELECTIVE- THEORY

UNIT-I

Assessments of Nutritional Status:

- Direct methods** : Anthropometric, Biochemical, Clinical, Dietary assessments.
 - Anthropometric assessment: Introduction, Definition, Methods of measurements, Standardizations Classification of Nutritional status.
 - Biochemical assessment: Need for Biochemical test, Interpretation of biochemical test, Types of test.
 - Clinical assessments: Assessment of clinical signs in various disorders.
 - Dietary Assessments: Types of Diet surveys, methods of Diet surveys, analysis and interpretation, problems in Diet surveys and solutions.
- Indirect method** : Vital statistics and other Records

UNIT II

Methods of Estimation of Protein Quality:

Protein efficiency ratio (PER), Digestibility coefficient, Biological value (BV), Net Protein Utilization (NPU), Net protein Ratio (NPR), Chemical score, protein Digestibility corrected Amino Acid Score (PDCAAS), Net Dietary Protein Calories Percent (NDPCP).

UNIT III

Growth studies: Animal Models:

- Role of animal models in nutrition research; need for extrapolation of animal research results to human populations; Maintenance of animal laboratory; maintenance of records; Principles of formulation of diets- classification and composition.
- Growth and development of rats- role of different protein levels of the diet protein sources of the diet- body weight changes- feeding techniques- calculation of PER.
- Biological Assays with animal models: metabolic and balance studies: (for protein quality): Biological value- formulation of objectives, composition of diets- collections of urine and fecal, food intake assessment, determination of food and urine and fecal nitrogen – calculations of endogenous nitrogen – digestibility coefficient (DC) and Biological value (BV).

UNIT IV

Growth and Metabolic Studies with Human Subjects:

- Principles, objectives.
- Growth studies with infants on feeding different protein sources. (case study experiences and report of research studies)
- Growth studies with preschool children, school children and adolescents: Effect of supplementation
- Nitrogen balance studies, in growing children, adolescents and adults- Procedure for conducting metabolic and balance studies and interpretation of results.

REFERENCE BOOKS

1. Mahatab.S. Bamiji, N. PrahladaRao and VinodiniReddy . (1998). Text Book of Human Nutrition" Oxford and IBFI Publishing Co. Pvt. Ltd., New Delhi.
2. Swaminathan M. (1995).Advanced Text book on "Food and Nutrition" (Applied aspects) Vol. II BAPPCO, The Bangalore Printing and Publishing Co. Ltd., (Chapters 21, 24) Bangalore.
3. Tara Gopaldas and SubhadraSeshadri.(1997). Nutrition, Monitoring and assessment, Oxford University Press, New Delhi .
4. Whitney. E.N, and S.R.Rolfes. (1999). 'Understanding Nutrition', (8th edition) Chap. 6 and Appendix 'J'.Measures of Protein Quality - West/Wadsworth.
5. Ruth .L. Pyke and Myrtle .L. Brown. (1997). Nutrition an Integrated approach, Chapter 15, Wiley eastern Publications, New York.
6. Manual (WHO) Measuring Change in Nutritional Status. WHO, Geneva - 1983.
7. Mayanard, L.A and J.K. Loosli. (1992). Animal Nutrition, 5th edition McGraw Hill book company, New York

Course Outcome

Upon completion of this course, students will be able to

- CO 1 Assess nutritional status using ABCD techniques.
- CO 2 Apply advance research techniques in dietary assessment.
- CO 3 Do nutrition research using animal models.
- CO 4 Design nutrition research using human models.

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3			3	2		2					3
CO2	3			3	2		2					3
CO3	3			3			2					3
CO4	3			3			2					3

3-High, 2- Medium, 1- Low

FSND 305 B: GERIATRIC NUTRITION

Course Objectives

- Understand the physiological changes and theories of ageing.
- Knowledge on importance and consequences of diet in elderly.
- Awareness on degenerative diseases, life style genesis and its management through diet.
- Describe the government programs and policies for elderly.

GENERAL ELECTIVE- THEORY

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

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

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

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

REFERENCE:

1. Sharma, O.P. (Ed.) (1999): Geriatric Care in India – Geriatrics and Gerontology: A Textbook, M/S. ANB Publishers.
2. Mahtabs.Bamji and N.PralhadRao. (2004). Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi.
3. 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.
4. Michelle McGuire, Kathy A Beer man. (2011). Nutritional sciences From Fundamental to Food, Second Edition, WadsworthCengage Learning, Belmont, USA.
5. Swami Nathan M. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
6. ShubhanginiA.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 on process of ageing
- CO 2 Plan diet according to recommendations for elder people.
- CO 3 Describe diet plans for different disease conditions in elder people.
- CO 4 Illustrate the available government benefits for elder people.

CO-PO Mapping

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3										
CO2	3	3							2	2		
CO3	3	3	2			2			2	2		
CO4						3						2

3-High, 2- Medium, 1- Low

FSND305 C : NUTRITION IN EMERGENCIES AND DISASTERS
(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Course Objectives

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

GENERAL 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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3								3	3		3
CO2	3	2		2					3	3		3
CO3	3		2	2			2	2				3
CO4	3		3			2			3			3

3-High, 2- Medium, 1- Low

FSND 306 A: FUNDAMENTALS OF FOOD, NUTRITION AND HEALTH

OPEN ELECTIVE- THEORY

Course Objectives

- Knowledge on foods, food groups, balanced diet for different age groups.
- Understand the importance of macro and micronutrients in daily diet.
- Comprehensive knowledge on deficiency symptoms of different nutrients.
- 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 BOOKS

1. Swaminathan, M. (1999). Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
2. Mahtabs. Bamji and N.PralhadRao. (2004). "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi,
3. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian.(2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.
4. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of Indian Council Medical Research.2010.

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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3		3									2
CO2	3	3		3									2
CO3	3	3		3									2
CO4	3	3		3			3	2	2	2			2

3-High, 2- Medium, 1- Low

FSND 306 B: NUTRITIONAL ASSESSEMENT OPEN ELECTIVE- THEORY

Course Objectives

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

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 BOOKS

1. Mehtab S. Bamji. (1996). Text book of Human Nutrition, Oxford & IBH Co.PVT.LTD, New Delhi.
2. Swaminathan, M. (1999). Essentials of Food and Nutrition, Vol. I and Vol. II Ganesh and co. Madras.
3. Mahtabs. Bamji and N.PralhadRao. (2004). "Text book of Human Nutrition, Second Edition, Oxford and IBH Publishing co. PVT LTD. New Delhi,

4. C.Gopalan, B.V.RamasastriandS.C.BalaSubramanian.(2012). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council Medical Research Hyderabad.

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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3		2				2		3	3		3
CO2	3	2		3			2					
CO3	3	2		3			2					
CO4	3			3			2					

3-High, 2- Medium, 1- Low

SEMESTER-IV

Sl. No	Course Code	Components of Study	Title of the Course	No. of Credits	IA Marks	End SEM Exam Marks	Total
1	FSND-401	Core-Theory	Food Safety Standards and Quality Control	4	20	80	100
2	FSND-402	Core-Theory	Food Product Development and Marketing	4	20	80	100
3	FSND-403	Core-Theory/ Project work	Nutrition for Health and Fitness/Dissertation	4	20	80	100
4	FSND-404	Core-Practical	Food Safety Standards and Product Development Practical's	4	-	-	100
5	FSND-405	Generic Elective*	(a) Institutional Food Service Management (b) Baking Technology (c) Food Packaging	4	20	80	100
6	FSND-406	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.

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

Course Objectives

- Understand the current food safety standards rules and regulations.
- Knowledge on desirable and undesirable constituents and contaminants in foods.
- Gain knowledge on subjective and objective methods.
- 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,clarifyingand bleaching agents; antioxidants, non- nutritional sweetness, antimicrobial agents.
- Gases and propellants.

UNIT IV -Food contaminants and Standards of Quality-

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

REFERENCES :

1. VanishaNambiar. (2004). A Text book on “Food Contamination and Safety “ ANMOL Publications Pvt.Ltd. New Delhi .
2. S.N.Mahindru . (2004). Food Safety –Concept and Reality,APH Publishing corporation, Ansari road ,Darya ganj, New Delhi.
3. Rajesh Mehta and J.George . (2005). Food Safety Regulation concerns and Trade –The developing country perspective ,Mac millan India Ltd.
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. Norman N. Potter, Joseph H. Hotchkiss (1996) “Food Science” 5th Edition.CBS Publishers and Distributors, New Delhi.
7. <https://www.fssai.gov.in>

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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3						3				3
CO2	3	3						3				3
CO3	3	2		1	3	1		3				3
CO4	3	2		1	3	1		3				3

3-High, 2- Medium, 1- Low

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

CORE-THEORY

Course Objectives:

- Illustrate the new product categories in food market and their characteristics.
- Elucidate the process of new food product development in food industry.
- 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.

UNIT I: New Food Products

- New food product: Definition, Characteristics, 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 in Food Industry

- Ideation: Idea generation, Sources, 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 Trends- Product life cycle
- Product Commercialization and Marketing: Costing and Pricing, Test Market, Product launching and Entrepreneurship.

UNIT III: New food product development in food ingredient and service industry

- In Food Ingredient Industry: Characteristics, Consumers, Product development and Quality in food ingredient industry.
- In Food Service Industry: Characteristics, Consumers, Product development and Quality in food service industry.
- Ethics and Intellectual property/ Patents in food product development.

UNIT IV: Specialty food products

- Health foods, Medical foods, Therapeutic foods, Herbal foods, Fortified foods.
- Infant foods, Geriatric foods, Sports drink.
- Functional foods, Designer foods and Nutraceuticals.
- Prebiotics, Probiotics and Symbiotics.

REFERENCES

1. Andrew, J.Taylor.(2002). *Food Flavour Technology*, Sheffield Academic Press.
2. Debashri, Ray.(2002). *Nutritional Challenge and Total Quality Management*, 1stedition;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.

Course Outcomes

After studying the course, students will able

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	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3	3	3		3	2	2				
CO2	3	3	3	3								
CO3	3				3							2
CO4	3								2			2

3-High, 2- Medium, 1- Low

FSND 403: NUTRITION FOR HEALTH AND FITNESS
(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

Course Objectives

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

CORE THEORY

UNIT-I

Physical Fitness and its Evaluation

- Definitions- Nutrition, Health, Physical activity and 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

- Nutritional Requirements during Exercise- Carbohydrate, fat, protein and exercise, vitamins, minerals and fluid.
- Nutrition during Post-exercise recovery.
- Special conditions- weight management and obesity.

UNIT-IV

Sports nutrition

- Classification of sports events and 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.
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4. Ira Wolinsky(ed) (1998). Nutrition in Exercise and Sports, 3rd Edition, CRC Press.
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

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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	2										2
CO2	3	2										1
CO3	3		3									1
CO4	3			2	2							2

3-High, 2- Medium, 1- Low

FSND 404 Core Practical - FOOD SAFETY STANDARDS AND QUALITY CONTROL AND PRODUCT DEVELOPMENT

FSND 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

CO 1 Select the appropriate analytical technique when presented with a problem.

CO 2 Demonstrate practical proficiency in a food quality analysis.

FSND 402 PRODUCT DEVELOPMENT

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

FSND 405 A: INSTITUTIONAL FOOD SERVICE MANAGEMENT
(Common to M.Sc. Food Science Nutrition & Dietetics and MS Food Technology Course)

Course Objectives

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

GENERAL 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. Mohinisethi and Surjeet Mohan (1993), “Catering management - An integrated approach”, second edition, Wiley eastem limited, New Delhi.
3. Ramesh V. Bhat and R. NageswaraRao (1996), “Food safety”, Bappco (Ltd). Mysore, Banglore.
4. Ramesh V. Bhat and R. NageswarRao (1992), “Food safety in public catering”, NIN, ICMR, Hyderabad.

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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3			3							3	3
CO2	3			3							3	2
CO3						3			3		3	2
CO4						3			3		3	2

3-High, 2- Medium, 1- Low

FSND 405-B: BAKING TECHNOLOGY
(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

Course Objectives: To enable the students to:

1. Understand the concept and technology of baking.
2. Learn the role of different ingredients in baking process
3. Familiarize with processing techniques of various bakery products
4. Develop skills in organizing and maintenance of a baking industry.

GENERIC ELECTIVE - THEORY

UNIT-I: Bakery Industry

- Introduction, current status, growth rate, and economic importance of Bakery Industry in India.
- Baking: Principles, baked foods, Baking temperatures, Knowledge and working of various types of oven, baking equipment; Roasting: Principles of roasting, roasting equipment;
- Formulations, processing (mixing, fermentation, rounding, proofing, sheeting, moulding, baking, depanning etc.), equipments, packaging, storage and quality testing of bakery products

UNIT-II: Baking Technology

- Types and grades of wheat flour, Wheat flour proteins and importance of gluten in manufacture of bakery products.
- Role of ingredients in bakery products- sugars, fats, leavening agents, additives and other ingredients.
- Types of Bakery Products and Technology for their Manufacture – dough and batters; Dough rheology.

UNIT-III: Bakery Products

- Hard wheat Products: bread- Ingredients, various types of bread, equipments and types of mixing methods, preparation of bread, Product quality characteristics, faults and corrective measures of bread.
- Soft wheat Products: cookies, crackers, biscuits– Ingredients, types, equipments, method of preparation, Product quality characteristics, faults and corrective measures.
- Ingredient used in Cake Making, types and varieties, equipments, cake making methods, Product quality characteristics, faults and corrective measures of cakes.
- Other bakery products: using very hard wheat. Pizza, pastry and its types.

UNIT- IV: Modified Bakery Products

- Modified bakery products: high fiber, low sugar, low fat, gluten free bakery products.
- Decoration of baked foods – Icing and Fillings, its types and applications in bakery. Role of other ingredients used in icing and fillings.
- Staling and Nutrient Losses in Bakery Products.

REFERENCES

1. Dubey, S.C. (2007). Basic Baking 5th Ed. ChanakyaMudrak Pvt. Ltd.
2. Manay, S. & Shadaksharaswami, M. (2004). Foods: Facts and Principles, New Age Publishers
3. Hebeda, R. (Ed.). (1996). *Baked goods freshness: Technology, evaluation, and inhibition of staling* (Vol. 75). CRC Press.
4. Manley, D. (Ed.). (2011). *Manley's technology of biscuits, crackers and cookies*. Elsevier.
5. Vaclavik, V. A., Christian, E. W., & Campbell, T. (2008). *Essentials of food science* (Vol. 42). New York: Springer.

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

CO1 Acquire knowledge on bakery industry and products.

CO2 Comprehend the technology of processing of bakery products.

CO3 Demonstrate the skills in various types of bakery items.

CO4 Comprehend the technology of processing in handling the bakery.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3		3	3	3		3	3		3	3	3
CO2	3		3		2		3	2	3		3	3		3
CO3	3		3		3	3				1	3		3	3
CO4	2		3			3	3		2		3	3	3	

High-3, Medium-2, Low-1

FSND:405 C: FOOD PACKAGING

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

Generic Elective – THEORY

Course Objective

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

UNIT- I Introduction:

Principles of food packaging, Functions of packaging; Type of packaging materials; Selection of packaging material for different foods. Methods of packaging and packaging equipment. Tests on packaging materials - Mechanical strength (Tension, notch and tearing strengths), Gas and water vapor transmission rates; Interactions between packaging material and foods. Mechanical strength of different packaging materials; Barcodes, Labelling; Food Packaging & Laws.

UNIT-II

Active and Intelligent Packaging Techniques: Active packaging techniques, intelligent packaging techniques, Consumers towards and novel packaging.

Oxygen, ethylene and other scavengers: Oxygen scavenging technology, selecting the right type of oxygen scavenger, Ethylene scavenging technology, Carbon dioxide and other scavengers.

UNIT- III

Packaging-Food Interactions: Factors affecting flavor absorption, the role of the food matrix, the role of differing packaging materials, Flavor modification and sensory quality.

Aseptic Packaging Technology-advances, systems and its food applications, packaging for high pressure processing.

UNIT- IV

Green Plastics for Food Packaging: The problem of plastic packaging waste, the range of biopolymers, developing novel biodegradable materials.

Recycling Packaging Materials: The recyclability of packaging plastics, improving the recyclability of plastics packaging.

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, Blackie: 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 Mridula Saxena.(2002). *Food Packaging*, NLERT – Booklet – New Delhi.
10. Stanley and Sacharow Food Packaging.

Course Outcomes

After the completion of the course, the students will be 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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	2					3			3		2
CO2	3						2			2		2
CO3	3			3			2			2		2
CO4	3			2			2			2		2

3-High, 2-Medium, 1-Low

FSND 406 (A): CHILD WELFARE PROGRAMME

OPEN ELECTIVE – THEORY

Course Objectives

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

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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	2										2
CO2	3	2										2
CO3	2	2		3		2	3					2
CO4	2	2		3		2	2			3		2

3-High, 2- Medium, 1- Low

FSND 406(B): DISASTER MANAGEMENT

OPEN ELECTIVE – THEORY

Course objectives

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

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.
2. Hodgkinson PE & Stewart M. 1991. *Coping with Catastrophe: A Handbook of Disaster Management*.
3. Routledge. Sharma VK. 2001. *Disaster Management*. National Centre for Disaster Management, India.

COURSE OUTCOMES

After studying the course, Students will be able to

- CO 1 Gain in-depth knowledge about natural disasters; manmade disasters; chemical hazards : disaster management.
- CO 2 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

Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
CO1	3	3								2	2	3
CO2	3	3						2		2		3

3-High, 2- Medium, 1- Low

Table. 1.1.1. Details of Courses Addressing Local, National, Regional and Global Developmental Needs (2020-21)

I. Local Needs:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Clinical Nutrition and Dietetics I & II	103 & 203	2020
	230	Essential of Food and Community Nutrition	107	2020
	230	Food Microbiology and Safety	202	2020
	230	Food Processing and Preservation Technology	301	2020
	230	Nutrition Assessment Techniques	306b	2020
	230	Food Safety Standards and Quality Control	401	2020
	230	Food Product Development and Marketing	402	2020
	230	Nutrition for Health and Fitness	403	2020

II. National Initiatives/Needs

National Green Energy Initiatives:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

National Biotechnology Initiatives:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Geographical Integration System (GIS) Initiatives:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

National Digital Initiatives:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Environment & Sustainability:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Essential of Food and Community Nutrition	104A	2020
	230	Advanced Human Nutrition	302	2020

Initiatives on water Resources:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Agricultural Sustainability:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Health Promotions:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Essential of Food and Community Nutrition	104A	2020
	230	Nutrition for Health and Fitness	403	2020

Initiatives on Nano vision:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
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Name				

Initiatives on Translational Mission:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Sarva Siksha Abhiyan:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction

Initiatives on Rural Development:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Rural Work Experience	304	2020

III. Regional Needs:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Clinical Nutrition and Dietetics I & II	103 & 203	2020
	230	Essential of Food and Community Nutrition	107	2020
	230	Food Microbiology and Safety	202	2020
	230	Food Processing and Preservation Technology	301	2020
	230	Nutrition Assessment Techniques	306b	2020
	230	Food Safety Standards and Quality Control	401	2020
	230	Food Product Development and Marketing	402	2020
	230	Nutrition for Health and Fitness	403	2020

III. Global Needs:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction
M Sc Food Science Nutrition and Dietetics	230	Clinical Nutrition and Dietetics I & II	103 & 203	2020
	230	Essential of Food and Community Nutrition	107	2020
	230	Food Microbiology and Safety	202	2020
	230	Food Processing and Preservation Technology	301	2020
	230	Nutrition Assessment Techniques	306b	2020
	230	Food Safety Standards and Quality Control	401	2020
	230	Food Product Development and Marketing	402	2020
	230	Nutrition for Health and Fitness	403	2020



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Table. 1.3.1. Courses which address Professional Ethics, Gender, Human values, Environment and sustainability into the curriculum.

A. Professional Ethics:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction	Description of the course addressing Professional Ethics
M Sc Food Science Nutrition and Dietetics		Human Values and Professional Ethics-I	FSND 107	2020	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.

M Sc Food Science Nutrition and Dietetics		Human Values and Professional Ethics-II	FSND	2020	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. 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.
M Sc Food Science Nutrition and Dietetics		Food Product Development	FSND 402	2020	Ethics and Intellectual property/ Patents in food product development.

B. Gender:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction	Description of the course addressing Gender issues
M Sc Food Science Nutrition and Dietetics		Community Nutrition	FSND 104A	2020	Nutrition Through Life Span – Infancy, Early and late childhood, Adolescence, Adulthood and Ageing – Nutritional requirements and Recommended Dietary Allowances (RDA)– Justification for special needs during periods of growth and development,

					pregnancy and lactation – significance of breast feeding.
M Sc Food Science Nutrition and Dietetics		Nutrition during life span	FSND 104B	2020	Nutritional requirements for adult man and woman. Nutritional concerns, RDA, nutritional guidelines and work efficiency. Physiological changes in aging, effects of aging on nutritional health.

C. Human Values:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction	Description of the course addressing Human Values
M Sc Food Science Nutrition and Dietetics		Human Values and Professional Ethics-I	FSND 107	2020	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.

D. Environment & Sustainability:

Programme Name	Programme Code	Course Name	Course Code	Year of Introduction	Description of the course addressing Professional Ethics



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Table. 1.3.2. Number of value added courses for imparting transferable and life skills offered due to the last five years (10).

Table.1.3.3. Average Percentage of students enrolled in the courses under 1.3.2 above (10).

I / II / III / IV / V years:

Name of the Programme	Name of the value added course offered (With	Course Code	Year of offering	Number of times offered	Duration of the Course	Number of students enrolled in the year	Number of students completed the course
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	30 or more contact hours)			during the year			in the year
M Sc Food Science Nutrition and Dietetics	Food Microbiology and Safety	FSND 203-A	2020	Once	II - semester		
	Research Methodology	FSND 204-A	2020	Once	II - semester		
	Statistics and Computer Applications	FSND 204-B	2020	Once	II - semester		
	Food Safety Standards and Quality Control	FSND 401	2020	Once	IV - semester		
	Food Product Development and Marketing	FSND 402	2020	Once	IV - semester		

1.1.3. Employability / Entrepreneurship / Skill Development – Mapping (2020-21)

S. No.	Name of the Programme	Course Code	Title of the Course	Years of Introduction	Employability	Entrepreneurship	Skill
1	M Sc Food Science Nutrition and Dietetics	FSND-101	Food Chemistry and Analysis	2020	√		
2	M Sc Food Science Nutrition and Dietetics	FSND - 102	Food Science and Experimental Foods	2020			√
3	M Sc Food Science Nutrition and Dietetics	FSND - 103	Clinical Nutrition and Dietetics-I	2020	√	√	
4	M Sc Food Science Nutrition and Dietetics	FSND - 104	Food Chemistry and Analysis Practical	2020	√		√
5	M Sc Food Science Nutrition and Dietetics	FSND - 105	Food Science and Experimental Foods Practical	2020			√
6.	M Sc Food	FSND -	Clinical Nutrition	2020	√	√	

	Science Nutrition and Dietetics	106	and Dietetics-I Practical				
7.	M Sc Food Science Nutrition and Dietetics	FSND - 107	Essential of Food and Community Nutrition	2020	√		
8.	M Sc Food Science Nutrition and Dietetics	FSND - 108	Human Values and Professional Ethics-I	2020			√
9.	M Sc Food Science Nutrition and Dietetics	FSND - 201	Nutritional Bio chemistry	2020			√
10	M Sc Food Science Nutrition and Dietetics	FSND - 202	Food Microbiology and Safety	2020	√		
11	M Sc Food Science Nutrition and Dietetics	FSND - 203	Clinical Nutrition and Dietetics-II	2020	√	√	
12	M Sc Food Science Nutrition and Dietetics	FSND - 204	Nutritional Bio chemistry Practical	2020			√
13	M Sc Food Science Nutrition and Dietetics	FSND - 205	Food Microbiology and Safety Practical	2020	√		√
14	M Sc Food Science Nutrition and Dietetics	FSND - 206	Clinical Nutrition and Dietetics-II Practical	2020	√	√	
15	M Sc Food Science Nutrition and Dietetics	FSND - 207	Research Methodology	2020			√
16	M Sc Food Science Nutrition and Dietetics	FSND - 208	Human Values and Professional Ethics-II	2020			√
17	M Sc Food Science Nutrition and Dietetics	FSND - 301	Food Processing and Preservation Technology	2020			√
18	M Sc Food Science Nutrition and Dietetics	FSND - 302	Advanced Human Nutrition	2020			√
19	M Sc Food Science Nutrition and Dietetics	FSND - 303	Rural Work Experience	2020			√
20	M Sc Food Science Nutrition and Dietetics	FSND - 304	Internship	2020	√		
21	M Sc Food Science Nutrition and Dietetics	FSND - 305	(a) Nutrition Research Techniques (b) Geriatric Nutrition	2020			√

			(c)Nutrition in Emergencies and Disaster				
22	M Sc Food Science Nutrition and Dietetics	FSND - 306	(a) Fundamentals of Food, Nutrition and Health (b)Nutritional Assessment	2020			√
23	M Sc Food Science Nutrition and Dietetics	FSND - 401	Food Safety Standards and Quality Control	2020	√		
24	M Sc Food Science Nutrition and Dietetics	FSND - 402	Food Product Development and Marketing	2020	√		
25	M Sc Food Science Nutrition and Dietetics	FSND - 403	Nutrition for Health and Fitness/Dissertation	2020	√	√	
26	M Sc Food Science Nutrition and Dietetics	FSND - 404	Food Safety Standards and Product Development Practical	2020	√		√
27	M Sc Food Science Nutrition and Dietetics	FSND - 405	(a) Institutional Food Service Management (b)Baking Technology (c)Food Packaging	2020	√	√	√
28	M Sc Food Science Nutrition and Dietetics	FSND - 406	(a) Child Welfare Programmes (b)Disaster Management	2020			√

1.1.3. Average Percentage of Courses having focus on Employability / Entrepreneurship / Skill development during the last five years (10)

1.2.1. Percentage of New Courses introduced of the Total number of courses across all programmes offered during the last five years (30)

S. No.	Course Code	Title of the Course	Years of Introduction	Activities/Content with direct bearing on Employability/Entrepreneurship /Skill development
1	FSND 101	Food Chemistry and Analysis	2020	<p>Knowledge on chemical composition physical, chemical, and functional properties of Water, carbohydrate, Protein and Fats.</p> <p>Understand the principles and working applications of different analytical techniques associated with food.</p> <p>skills in qualitative and quantitative estimation of nutrients in different foods.</p> <p>This course gives on hands on experience which will help student to become food analyst at local, regional, national and global levels.</p>
2	FSND 102	Food Science and Experimental Foods	2020	<p>This course will give knowledge on Plant and Animal foods composition, and processing techniques on nutritive quality of foods.</p> <p>Understand the principles of cookery of different foods and methods of evaluation.</p> <p>This course is prerequisite for skill development in Food Product development.</p>

				Standardization and experimentation on different foods leading to physical, chemical and sensory changes can be understood leading to become food research analyst in industries at local, regional, national levels.
3	FSND 103	Clinical Nutrition and Dietetics-I	2020	The concepts of nutrition and its relation to health and describe the role and responsibilities of Dietitian in Hospital will be dealt. Knowledge related to Therapeutic modification of diets and Plan and prepare diet for different diseases conditions. This will help the students to get employability in hospitals and also start their own diet and nutrition clinics.
4	FSND 104	Food Chemistry and Analysis Practical	2020	Developing skills in quantitative and qualitative analysis of Nutrients in foods. This course will help the students to develop skills as food analyst for employability.
5	FSND 105	Food Science and Experimental Foods Practical	2020	Standardization of foods using different processing techniques is included along with skills in processing, preparation and evaluation of bakery products. This helps in employability and entrepreneurial opportunities for the students
6	FSND 106	Clinical Nutrition and Dietetics-I Practical	2020	This course gives hands on experience in Therapeutic modifications of diet for different diseases by planning, preparing and evaluating.
7	FSND 107	Essential of Food and Community Nutrition	2020	Nutrients in food, their functions and consequences of deficiency is included in this course. Developing skills for planning diets for nutritional disorders like PEM, Iron, Vitamin A and Iodine and the knowledge of techniques to assess the nutritional status of different age groups. Acquire knowledge on government programs to prevent nutritional disorders according to regional and national needs. Community assessment skills in terms of anthropometry, dietary, clinical and biochemical for various disorders and planning programs for important days is given along with Applications of Computational skills in the Nutritional allowances during life span.
8	FSND 108	Human Values and Professional Ethics-I	2020	The students understand the importance of good character, conduct and values embedded in various religions. Demonstrate knowledge of ethical values in non-class room activities, internships and field work.
9	FSND-201	Nutritional Bio chemistry	2020	This course deals with the metabolism of nutrients such as carbohydrates, proteins, lipids, minerals and vitamins in human physiology acquire knowledge on factors affecting digestion, absorption of nutrients. Create awareness on enzymes and its role in nutrient metabolism and gain knowledge on role of vitamins and minerals as coenzymes in metabolism.
10	FSND-202	Food Microbiology and Safety	2020	Knowledge acquirement about important genera of microorganisms associated with food. This course makes the student to acquaint with the various factors associated with growth, food spoilage and food-borne diseases of different microorganisms and food contaminants and their sources. Gain knowledge on the characteristics of food borne

				diseases, infections and intoxications and their identification and make the students to fit in as food microbiologist at national level.
11	FSND-203	Clinical Nutrition and Dietetics-II	2020	The concepts of dietary principles for various diseases and comprehend knowledge in Dietary modifications for the management of diseases is included in the course. Application of principals in preparation and service of diets to the patients and assess the case studies and construct the diet charts will be explained. This course will be helpful in creating employability and entrepreneurship at local and national levels.
12	FSND-204	Nutritional Bio chemistry Practical	2020	Developing skill and hands on experience in analysis of biochemical parameters in blood and serum will be carried out in this course.
13	FSND-205	Food Microbiology and Safety Practical	2020	Standard methods and procedures for the microbiological analysis of food will be dealt in this course to have skill development and employability in food industries at local, regional and national level.
14	FSND-206	Clinical Nutrition and Dietetics-II Practical	2020	Application of principals in preparation and service of diets to the patients and assess the case studies and construct the diet charts will be explained. This course will be helpful in creating employability and entrepreneurship.
15	FSND-207	Research Methodology	2020	The concept of doing research and terms like 'variables', 'hypotheses, and 'research 'and different types of research like experimental, survey, applied, action research etc., and differentiate advantages and disadvantages each type of research are dealt in this course. This course helps student to critically gain knowledge to select a sample by using different sampling methods like probability and non-probability sampling. Develop a research proposal in the appropriate scientific style to help students for skill development for higher learning. This course makes the student to understand about the scope of statistics in research, concepts of inferential statistics like t-test, chi-square, Correlation and Variance. Basics in computer and its application in statistics and development of skill in computing statistics by using statistical software will be imparted.
16	FSND-208	Human Values and Professional Ethics-II	2020	Understand the importance of value education and ethics in medical, business, environmental and social fields. The students apply the knowledge while joining in any profession and will contribute to society as socially responsible citizens.
17	FSND 301	Food Processing and Preservation Technology	2020	The course illustrates the principles and scope of food processing and preservation along with various techniques/methods. Knowledge acquirement on advanced emerging technologies and their applications in food processing and preservation is imparted to the students. This course creates opportunities in local, regional, national levels.
18	FSND 302	Advances in Human Nutrition	2020	The course appraises the advance concepts of nutrition of Brain, Immunity and Sports along with the concepts of

				<p>dietary management in endemic nutrition problems.</p> <p>This course create knowledge on the dietary management during emergencies and the process and relation of immunity and nutrition.</p>
19	FSND - 303	Rural Work Experience	2020	<p>This course will help students to gain skill and have hands on experience in assessing a community in relation to nutrition, human development and extension activities.</p>
20	FSND-304	Internship	2020	<p>Internship as dietitian in government and corporate hospitals give practitioner skills and hands on experience for entry-level dietitians who are able to assume leadership roles to improve and maintain the nutritional care of diverse individuals, families and communities within national and global populations.</p>
21	FSND-305	(a) Nutrition Research Techniques (b)Geriatric Nutrition (c)Nutrition in Emergencies and Disaster	2020	<p>(a). Understanding the methods of nutritional status assessment like Anthropometry, Biochemical, Clinical and Dietary will be dealt in this course.</p> <p>Application of knowledge on assessment techniques of protein quality in diets and Plan nutrition research using animal models is given in this course along with designing in nutrition research using Human models.</p> <p>(b). Understanding the physiological changes and theories of ageing and gaining knowledge on importance and consequences of diet in elderly is included in this course.</p> <p>Creating awareness on degenerative diseases, life style genesis and its management through diet and acquainting with the government programs and policies for elderly is included.</p> <p>(c). This course helps to assess the emergency situations related to food and Nutrition in natural and manmade disasters and nutrition surveillance and treatment in emergencies.</p>
22	FSND-306	(a) Fundamentals of Food, Nutrition and Health (b)Nutritional Assessment	2020	<p>(a).The course will help students to gain knowledge on foods, food groups, balanced diet for different age groups and understand the importance of macro and micronutrients in daily diet.</p> <p>Comprehending knowledge on deficiency symptoms of different nutrients and developing skills and hands on experience to assess nutritional problems in community is included in the course.</p> <p>(b). Understanding the methods of nutritional status assessment like Anthropometry, Biochemical, Clinical and Dietary will be dealt in this course.</p> <p>Application of knowledge on assessment techniques of protein quality in diets and Plan nutrition research using animal models is given in this course along with designing in nutrition research using Human models.</p>
23	FSND 401	Food Safety Standards and Quality Control	2020	<p>This course includes the current food safety standards rules and regulations and gain knowledge on desirable and undesirable constituents and contaminants in foods.</p> <p>This course helps students to critical analysis on subjective and objective methods of quality of food and develop skills for quality analysis and assurance of food at national level.</p>
24	FSND 402	Food Product Development and Marketing	2020	<p>This course illustrates the new product categories in food market and their characteristics and elucidate the process of new food product development in food industry.</p> <p>Exemplifying various specialty food products and their applications and acquiring the skill to design and</p>

				development of new food product and analyzing the quality of the product is imparted.
25	FSND-403	Nutrition for Health and Fitness/Dissertation	2020	<p>The course defines the concepts of Health, Nutrition, physical activity, physical fitness and methods of evaluation.</p> <p>Energy metabolism pathways during physical activity and describing the role of macronutrients in physical performance, weight management and obesity has been included.</p> <p>This course also explains the nutritional needs in different sports and the role of national agencies, thereby creating employability in Nutrition fitness centers at local, regional and national levels.</p>
26	FSND-404	Food Safety Standards and Product Development Practical's	2020	<p>This course helps students to critically analyse subjective and objective methods of quality of food and develop skills for quality analysis and assurance of food.</p> <p>Skill to design and development of new food product and analyzing the quality of the product is imparted thereby employability in national organizations like FSSAI.</p>
27	FSND-405	(a) Institutional Food Service Management (b) Baking Technology (c) Food Packaging	2020	<p>(a). The course will gain knowledge on the different types and management of food services and exposure to the dietary department in a hospital setting. Knowledge on finance, personnel management, duties and responsibilities of dietitians will be learnt.</p> <p>Gaining skills to act in a variety of capacities in clinical, administrative, and community settings and quantitative food production and planning diet plans for different diseases by placing in hospitals is practiced.</p> <p>(c). This course provide knowledge on packaging and packaging materials an overview of the scientific and technical aspects of food packaging.</p> <p>Enabling the students to understand the regulations of packaging and packaging material testing and applying skills of new innovations in food packaging to improve product stability and/or to extend the product shelf-life was included.</p>
28	FSND-406	(a) Child Welfare Programmes (b) Disaster Management	2020	<p>(a). The course helps the students to know the terms growth, development and stages of development across life span and understand the characteristics of children at different stages of childhood</p> <p>Explaining the different developments like physical, cognitive, language and social development during childhood and applying knowledge to understand normal development and developmental delays during childhood is studied.</p> <p>(b). The course helps to know about natural disasters: manmade disasters; chemical hazards; National and International strategies to mitigate disaster management and to understand natural disasters (like floods, drought, cyclone, earthquakes, global warming etc); Nuclear disasters; Biological disasters.</p> <p>Explaining the efforts made by the NGOs, Community based organizations and local administration in disaster management will be dealt in the course.</p>