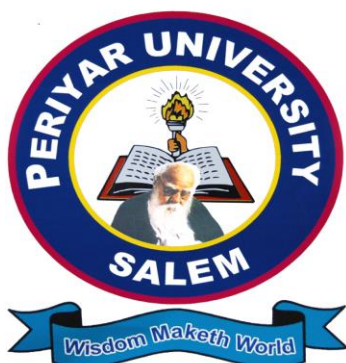


**PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM – 636 011**



DEGREE OF MASTER OF SCIENCE

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR M.Sc. NUTRITION & DIETETICS

**FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2021 – 2022 ONWARDS**

M.Sc. NUTRITION & DIETETICS

REGULATIONS AND SYLLABUS

(With effect from the academic year 2021-2022 onwards)

Preamble

The post graduate program in Nutrition and Dietetics has been designed to provide students a vast scope ranging from alleviation of malnutrition, preventive, promotive and therapeutic care in hospitals, in food industries as well as food service managers in various establishments. The specialists in Nutrition and Dietetics play a vital role in promoting the quality of life of individuals and communities, which contributes significantly to the economic and overall development of the nation.

Program objectives

1. To impart knowledge and develop capacities of the students through state of the art higher education in the area of Nutrition and Dietetics
2. To provide practical, field level experience in hospitals and food service establishments
3. To provide professionally competent manpower for academic and research institutions; hospitals and food industries; nutrition and health programs; food safety and quality control; consultancy and entrepreneurship

Eligibility for admission

An under graduate degree in Food and Nutrition/ Nutrition and Dietetics/ Food science and Nutrition/ Clinical nutrition and Dietetics/ Nutrition, Food service management and Dietetics/ Home Science.

Duration of the program

Two academic years consisting of 4 semesters

Program specific outcome

The student will know, understand, apply, analyze, evaluate and able to build relationship between food, nutrition, diet and healthy life and shine as trained professionals in areas such as Public nutrition, Dietetics and Clinical Nutrition, Food science and Food Quality Control.

M.Sc. Nutrition and Dietetics (2021-22 Onwards)
Curriculum Framework

Semester	Course Code	Course Title	Hours/Week	Credit	University Examination			Exam Hours
					I	E	T	
I	Core 01	Nutrition Through Life Cycle	5	4	25	75	100	3
	Core 02	Human Nutrition I	4	4	25	75	100	3
	Core 03	Nutritional Biochemistry	5	4	25	75	100	3
	Core 04	Diet in Disease I	4	4	25	75	100	3
	Core 05	Nutrition Management Practical	4	2	40	60	100	3
	Core 06	Diet in Disease I Practical	4	2	40	60	100	3
	Elective 01	Food Science	4	4	25	75	100	3
		Total	30	24	205	495	700	
II	Core 07	Human Nutrition II	4	4	25	75	100	3
	Core 08	Physiological Aspects of Nutrition	4	4	25	75	100	3
	Core 09	Diet in Disease II	4	4	25	75	100	3
	Core 10	Diet in Disease II Practical	4	2	40	60	100	3
	Core 11	Nutritional Biochemistry Practical	4	2	40	60	100	3
	Core 12	Food Analysis Practical	4	2	40	60	100	3
	EDC	Nutritional Management (for other Department Students)	4	2	25	75	100	3
	HR	Human Rights	2	2(extr a)	25	75	100	3
	Online course	SWAYAM/MOOC	-	4(extr a)	-	100	100	3
		Total	30	26	245	655	900	
III	Core 13	Community and Public Health Nutrition	4	4	25	75	100	3
	Core 14	Nutrition in Exercise and Sports	4	4	25	75	100	3
	Core 15	Institutional Food Management	4	4	25	75	100	3
	Core 16	Research Methodology and Statistics	4	4	25	75	100	3
	Core 17	Assessment of Nutritional Status in the Community (Practical)	5	2	40	60	100	3
	Core 18	Assessment of Food Management in the Organization (Practical)	5	2	40	60	100	3
	Core 19	Hospital Internship (Viva Voce)	-	4	40	60	100	3
	Elective 02	Food Processing and Preservation	4	4	25	75	100	3
		Total	30	28	245	555	800	
IV	Core 20	Diet Counselling	4	4	25	75	100	3
	Core 21	Nutraceuticals and Functional Foods	4	4	25	75	100	3
	Core 22	Dissertation and Viva Voce	18	6	40	60	100	3
	Elective 03	Food Safety and Standards	4	4	25	75	100	3
			Total	30	18	115	285	400

Examinations

Examinations are conducted in semester pattern. The examination for the Semester I & III will be held in November/December and that for the Semester II and IV will be in the month of April/May. Candidates failing in any subject (both theory and practical) will be permitted to appear for such failed subjects in the same syllabus structure at subsequent examinations within next 5 years.

Scheme for Evaluation

Theory Examination

Scheme for **internal marks** (25 marks)

Assignment - 5 marks

Seminar with PPT presentation - 5 marks

Tests - 10 marks (Average of best 2 out of 3 tests)

Attendance - 5 marks

Scheme for **external marks** (75 marks)

Part A

Answer all the questions (Objective type) (15x1=15 marks)

Part B

Answer any 2 questions (Analytical question) (2x5=10 marks)

Part C

Answer all the questions (descriptive type internal choice questions) (5x10=50 marks)

Equal weightage will be given to all the units in all parts of the question paper.

Practical examination

Scheme for **internal marks** (40 marks)

Good laboratory practices - 10 marks

Performance evaluation based on observation note and record - 15 marks

Internal tests (Average of best 2 out of 3 tests) - 10 marks

Attendance - 5 marks

Scheme for **external marks** (60 marks)

Record - 10 marks

Practical - 50 marks

Dissertation

Internal evaluation (40 marks)

Innovative idea - 10 marks

Performance evaluation - 10 marks

Report preparation - 20 marks

External evaluation (60 marks)

Report and presentation - 40 marks

Viva voce - 20 marks

Passing minimum

A candidate who secures not less than 50% in the internal mark as well as not less than 50% in the external mark in the duly conducted examinations in the above mentioned pattern for the respective courses shall be declared to have passed the examination conducted for those particular courses. For practical examinations, submission of record notebook is a must.

Grading

Grade of marks	Grade points	Letter grade	Description
90-100	9.0 - 10.0	O	Outstanding
80-89	8.0 - 8.9	D+	Excellent
75-79	7.5 - 7.9	D	Distinction
70-74	7.0 - 7.4	A+	Very Good
60-69	6.0 - 6.9	A	Good
50-59	5.0 - 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

Ranking

Candidates who pass all the examinations prescribed for the program in the first appearance and within the minimum stipulated time from the year of admission only are eligible for University Ranking.

Commencement of this regulation

These regulations may take effect from the academic year 2021-2022 for the students admitted from the academic year 2021-2022 and thereafter until further notice.

SEMESTER I

Core course 01: NUTRITION THROUGH LIFE CYCLE

SUB CODE:

Hours: 5

Marks: 100

Credit: 4

Objectives

This paper will enable the students to

1. Understand the Computation of allowances.
2. Understand the importance of nutrition during life span.

Outcome

1. Understand and apply nutritional assessment techniques
2. Understand growth and development and nutritional requirement during pregnancy and lactation to promote healthy living in the community
3. Know about growth and development and nutritional requirement of school going children and adolescents
4. Acquire the knowledge on growth and development and nutritional requirement during infancy and preschool age
5. Know the nutritional needs of adults and elderly

UNIT-I

Nutrition during Pregnancy: Prenatal growth and development, Nutritional requirements, RDA, Weight gain during pregnancy, Relationship between maternal and foetal nutrition, Teenage pregnancy and diet, General gastro intestinal problems, complications of pregnancy.

UNIT-II

Nutrition during Lactation: Physiological process of lactation, Nutritional requirements, RDA, Breast feeding- Colostrum and mature milk. Advantages of breast feeding- Nutritional benefit,

hormones and growth, immunological benefits, psychological and economic, environmental benefits, infant and child morbidity. Barriers to breast feeding, Low milk production.

UNIT-III

Nutrition during Infancy: Infant growth and Physiological development, Nutritional requirements for growth, RDA, Artificial feeding. Low birth weight and Preterm baby- Nutritional requirements, feeding the preterm baby, feeding problems. Weaning- Need for weaning, types of supplementary foods, problems in weaning. Nutrition in Preschool children: Growth and development, nutritional requirements, RDA, feeding dental problems and decay. Nutrition related problems of preschool children – Protein energy malnutrition- Types, symptoms, nutritional requirements and treatment.

Unit –IV

Nutrition in School children: Nutritional requirements, RDA, Feeding problems, Packed lunches, Supplementary foods. **Nutrition in Adolescents:** Growth and development, Nutritional requirements, RDA, Nutritional problems- Obesity, eating disorders, predisposition to osteoporosis, anaemia, under nutrition, pre-menstrual syndrome, mal nutrition due to early marriage.

Unit –V

Nutrition in Adults: Growth and development, Nutritional requirements, RDA. **Nutrition in Old age:** General physiological changes, Theories on the causes of aging, Nutritional requirements, Nutrition related problems of old age, Degenerative diseases. Alzheimer's disease- Cause, physical effects and nutrition consideration. Guidelines for promoting healthful eating in old age, Exercise in old age.

References

1. Gordon. M. Wardlaw et.al; Contemporary Nutrition, 2nd edition, Publishing by Mosby, 2004.
2. Srilakshmi. B; Dietetics, 7th edition, New Age International (P) Limited Publishers, 2014.
3. William's; Nix; Basic Nutrition and Diet therapy, 14th edition, Publishing by Mosby, 2013.
4. Mahtab S.Bamji, Prasad Rao, N.Vinodini Reddy; Textbook of Human Nutrition, Second Edition Oxford and IBH Publishing Co. Pvt .Ltd, 2003.
5. Nutrient Requirement and Recommend Dietary Allowances for Indians by Indian council of Medical research, National Institute of nutrition, Hyderabad.

6. Judith E. Brown., Nutrition New, 2nd edition, West / Wadsworth west / Wadsworth, An International Thomson publishing company, 1998.

Web Resources

- <https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-differentages>.
- <https://www.nutrition.org.uk/nutritionscience/life.html>
- <http://www.open.edu/openlearncreate/mod/oucontent/view.php>

Core course 02: HUMAN NUTRITION - I

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives

1. To understand the structure and functions of macronutrients in human body.
2. To understand the effects of deficiency and excess of macronutrients in human body

Outcome

1. Understand the role of energy in various physiological conditions of the body.
2. Know the nutritional significance and health benefits of macronutrients.
3. Explore the role of dietary fibre, amino acids and fatty acids in human nutrition and disease.
4. Acquire skills to evaluate protein quality
5. Comprehend on the water balance and assessment of hydration status

UNIT I

Carbohydrates – Introduction, Classification - Basis of degree of polymerization, based on digestive fate of carbohydrates. Functions, Food sources, Requirements. Digestion, absorption and metabolic utilization of carbohydrates, Regulation of blood glucose concentration. Glycemic index -Factors affecting GI of foods.

Dietary fibre -Introduction, Types, Properties, RDA and Components of dietary fibre. Role of fibre in human nutrition.

UNIT II

Lipid-Introduction, Classification, Function, Food sources, Requirements, RDA, digestion, absorption, transport and storage. Lipids and gene expression. Dietary fat and coronary heart disease. Fatty acid- Types, Functions, Requirements, food sources and deficiency.

Omega fatty acids – Classification, role in good health, daily values, food sources, fortification of omega fatty acids.

UNIT III

Proteins- Introduction, Classification, Functions, Requirements and RDA, Food sources, Digestion, absorption and metabolic utilization of protein, Quality of proteins.

Amino acid - Types, functions, food sources, requirements, deficiency. Therapeutic applications of specific amino acids. Peptides of physiological significance. Proteins, amino acids and gene expression.

UNIT IV

Energy – Introduction, Units, determination of energy value of food, physiological fuel value, Benedict's Oxy-calorimeter, relation between oxygen required and calorimeter value. Basal Metabolic rate – Introduction, measurement of basal metabolism determination of basal metabolic rate by calculation energy requirement, during work, Thermic effect of food, Total energy requirement – Meaning, Measuring total energy requirement. Factors affecting physical activity, basal metabolic rate and thermic effect of food, Dietary source, RDA.

UNIT IV

Water and electrolytes – Introduction, water, electrolytes and body composition, body water distribution, body electrolyte content: Distribution and exchangeable fractions, Intracellular water and the body cell mass concept, regulation of body water compartments, metabolic links: glucose, water and sodium. Body water compartments in chronic starvation, Impact to acute pathological conditions on the ICW, Body water in acute illness, water and electrolyte metabolism during refeeding, Implications of water and sodium metabolism in nutrition therapy for specific clinical condition.

References

1. Michael. J. Gibney etal; Clinical Nutrition, Blackwell Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics III edition, McGraw Hill Education (India) private limited

3. Srilakshmi.B; Nutrition Science, 15th edition, New Age International (P) Limited, Publishers, 2016.
4. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I 2nd edition. The Bangalore Printing and Publishing Co., LTD, Reprint 2015.
5. Sunetra Roday; Food Science and Nutrition, 2nd edition, Oxfore University Prerss, 2013
6. Carol Byrd – Bredbenner; Wardlaw's perspecctives in Nutrition, 9th edition MCGraw – Hill International Edition 2013

Web Resources

- <http://www.nutritionfoundationindia.res.in>
- nhp.gov.in/healthyliving/healthydiet
- <http://www.nin.res.in>

Core course 03: NUTRITIONAL BIOCHEMISTRY

SUB CODE:

Hours: 5

Marks: 100

Credit: 4

Objectives

1. To develop students' knowledge, understanding and skills in nutritional biochemistry
2. To understand the role of metabolism in human nutrition

Outcome

1. The students understand the principles of biochemistry and apply the knowledge to human nutrition.
2. Describe the biochemical and physiological functions of the nutrients and their integrated role.
3. Evaluate the therapeutic role of key nutrients in maintaining health.

UNIT 1

Water & electrolytes: Fluid compartments, distribution, water Intake & output, water balance, Composition of electrolytes in fluid compartments, buffer system, acid base balance-blood &

kidney, imbalance disorders-dehydration & oedema. Enzymes – Classification and Role of Enzymes.

UNIT 2

Carbohydrate metabolism: Classification, Review of digestion and absorption. oxidation of glucose – glycolysis, oxidative decarboxylation, citric acid cycle. Pentose phosphate pathway. Glycogen- Glycogenesis, Glycogenolysis. Gluconeogenesis. Inborn errors of metabolism. Glycogen storage diseases.

UNIT 3

Protein metabolism: Classification of protein, Review of digestion and absorption. Deamination, transamination, trans-deamination, decarboxylation, deamidation, Urea cycle, inborn errors of amino acid metabolism.

UNIT 4

Nucleic acid metabolism: Classification, Biological oxidation, Electron transport chain, nucleic acid metabolism, structure of DNA & RNA, genetic code, DNA replication, bio synthesis of protein.

UNIT 5

Lipid metabolism: Classification, Oxidation of fatty acid- α , β , & ω . Bio synthesis of fatty acid & TGL, Cholesterol synthesis & synthesis of bile acids & bile pigments, ketosis, ketone bodies, acidosis & fatty liver.

References

1. Deb. A.C., Fundamental of Biochemistry, New Centruy Book Agency (P) Ltd, Reprint 2004.
2. Ambika Shanmugam, Fundamentals of biochemistry for Medical students, Karthik Pprinters, 7thedition, 1992.
3. U.Sathyanarayana and U.Chakrabani, Biochemistry, Third Edition, Uppala- Author Publishers, 2007.
4. Mahtab. S.Bamji, Kamala Krishnaswamy and G.N.V Brahmam, Text Book of Human Nutrition, Oxford and IBH Publishing Company, Third Edition.2009

Web Resources

- www.virutal library biochemistry
- <http:// themedicalbiochemistrypage.org>

Core course 04: DIET IN DISEASE - I

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives

1. To understand the etiology, physiological, metabolic anomalies, nutritional management of acute and chronic disorders / diseases
2. To understand the effect of various disorders / diseases on nutritional status, nutritional and dietary requirements

Outcome

1. Know the importance and principles of dietetics as a distinct therapy for diseases
2. Gain knowledge on the types and role of dietitians
3. Understand the different therapeutic diets
4. Learn the dietary management for gastrointestinal, liver and gall bladder diseases.
5. Relate dietary management for eating disorders, fever and food allergy

UNIT-I

Principles of clinical nutrition – Introduction, the spectrum of nutritional problems and management pathways. Perspectives on the future. Diet therapy and types of therapeutic diets, Role of dietitian and Indian Dietetic Association. Special Feeding Method: Intravenous feeding, tube feeding, gastrostomy, jejunostomy – Meaning, objectives, Technique, Nutrients and Diet.

UNIT-II

Nutritional therapy during energy Imbalance: Over nutrition and under nutrition - Introduction, etiology, clinical assessment, treatment approaches – general principles, lifestyle changes and nutritional management.

Eating disorders: Anorexia nervosa, bulimia nervosa, binge eating disorder – History, etiology, clinical features, epidemiology and nutritional management.

UNIT-III

Adverse reaction to foods; Introduction, food intolerance, food allergy, types of food allergy, patterns of food allergic responses, diagnostic criteria for food allergy, specific food allergies, multiple food allergy, scientific background: The basic mechanisms of immune response to dietary antigen.

Infection and fevers – Defence mechanisms in the body, Role of Nutrition in Infections, effects of infection on body mechanisms, effects of infection on nutrition, definition of fever, nutritional modification in infection and fever.

Unit –IV

Metabolic disorder: Diabetes Mellitus – Introduction, types, pathophysiology of insulin resistance, symptoms, biochemical tests, complications, hypoglycemic drugs, dietary management, patient education, the diabetic association of India.

Unit –V

Gastro intestinal tract disorders: Dyspepsia, peptic ulcer, diarrhoea, constipation, inflammatory bowel disease – definition, epidemiology, pathogenesis, clinical features and diagnosis, dietary management.

Diseases of Liver - Hepatitis, (A, B, and C), Cirrhosis - Causes, symptoms, dietary management and Prevention.

References

1. Michael. J. Gibney etal; Clinical Nutrition Blackwell Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.
3. Srilakshmi . B; Nutrition Science, 15th edition, New Age International (p) Limited, publishers, 2016.
4. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I and 11 2nd Edition, The Bangalore printing and publishing co., LTD, Reprint 2015.
5. Sunetra Roday; Food Science and Nutrition, 2nd edition, Oxford University press, 2013.
6. Carol Byrd – Bredbenner; Wardlaw's perspectives in Nutrition, 9th edition McGraw – Hill International Edition, 2013.

Web Resources

- www.anme.com.mx/libros/PrinciplesofNutrition.pdf

- <https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf>
- krishikosh.egranth.ac.in

Core course 05: NUTRITION MANAGEMENT PRACTICAL

SUB CODE:

Hours: 4

Marks: 100

Credit: 2

Objectives

1. To impart learning on menu planning strategy, nutrient intake analysis and analysis on sufficiency of food intake.

Outcome

1. Construct a balanced meal
2. Comprehend and relate the physiological changes and nutritional requirements in pregnancy and lactation meal planning.
3. Suggest infant supplementary feeds and plan meal for preschool children.
4. Understand nutrient needs and demonstrate food choices for school going children and adolescents
5. Develop suitable menus for geriatric population and nutritional deficiencies

Exercises

1. Weights and Measures
2. Food Exchange list
3. Menu plan for pregnancy
4. Menu plan for lactation
5. Menu plan for infants
6. Menu plan for preschool children
7. Menu plan for school children
8. Menu plan for adolescent boys and girls

9. Menu plan for an adult
10. Menu plan for Nutritional Deficiencies
 - a. Protein Calorie Malnutrition
 - b. Anaemia
 - c. Iodine Deficiency
 - d. Flourosis
 - e. Vitamin A Deficiency
 - f. Scurvy
 - g. Angular Stomatitis
 - h. Calcium Deficiency

The above mentioned exercises will provide learning on planning a menu, collection of basic information of a person, portion size, amount of nutrients required, food plan, meal distribution, menu plan, nutrient calculation and matching with requirement, preparation and display of a meal.

References

1. Amy E. Galena, Msh Rd. 2013. Eat to Your Good Health: Exchange Lists and Meal Planning for Eating Disorders. USA
2. Peggy S. Stanfield, Peggy Stanfield, Y. H. Hui. 2010. Nutrition and Diet Therapy: Self-Instructional Approaches. 5th edition. Jones and Bartlett publishers. Canada.
3. B Srilakshmi. 2014. Dietetics. New Age International publishers.
- 4.

Core course 06: DIET IN DISEASE - I PRACTICAL

SUB CODE:

Hours: 4

Marks: 100

Credit: 2

Objectives

1. To impart learning on dietary management for various diseases.

Outcome

1. Learn to prepare hospital diets
2. Plan diets based on dietary principles
3. Set up diet trays and calculate nutrients
4. Plan and prepare appropriate diets for therapeutic conditions
5. Apply knowledge in counseling for disease conditions

Exercises

- I. Standardization of common food preparations.
- II. Planning, preparation and calculation of nutritive value for the following diets (SOAP Format)
 1. Normal diet.
 2. Liquid diet
 3. Soft diet
 4. Enteral formulas
 5. High fibre and low caloric diet
 6. Diet for Energy imbalance
 7. Diet for Diabetes Mellitus
 8. Diet for Gastrointestinal diseases
 9. Diet for Liver diseases
 10. Diet for Infections and fevers.

References

1. Amy E. Galena, Msh Rd. 2013. Eat to Your Good Health: Exchange Lists and Meal Planning for Eating Disorders. USA
2. Peggy S. Stanfield, Peggy Stanfield, Y. H. Hui. 2010. Nutrition and Diet Therapy: Self-Instructional Approaches. 5th edition. Jones and Bartlett publishers. Canada.
3. B Srilakshmi. 2014. Dietetics. New Age International publishers.

Elective course 01: FOOD SCIENCE

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives

Study of this paper will enable the students to

1. Understand the composition and nutritive value of cereals, pulses, milk and milk products, vegetables, fruits, fats, oils, nuts and spices.
2. Understand the changes that are taking place in cereals, pulses and milk during cooking.

Outcome

1. Distinguish and relate the characteristics and properties of foods
2. Comprehend the knowledge gained on characteristics and properties of foods during cooking
3. Apply the properties of food in various food processing and preparations
4. Analyze the factors affecting cooking quality of foods
5. Develop appropriate food preparation and processing methods to ensure quality standards.

UNIT –I

Definition of Food Science, Food, **Colloids** – Types and Properties; Sols – Properties; Gels – Properties and factors influencing gel formation; Emulsion – Types, formation, properties and stability of emulsions; Foams – formation, Stability and anti-foaming agents.

Cereals: General structure, composition, Nutritive value of rice, wheat, maize, oats and jowar. Cereal cookery: Cereal protein- Gluten formation and factors affecting; Cereal starch, effect of moist heat – Gelatinisation, factors affecting gelatinisation Changes in cooked starches- Gel formation, Retrogradation and syneresis; Effect of dry heat- Dextrinisation; Effect of cooking on nutritive value.

Milletts: Composition, Nutritive value and uses of pearl millet, finger millet, proso millet.

UNIT-II

Pulses: Composition and nutritive value, Digestibility of pulses and factors affecting the digestibility of pulse proteins, Toxic constituents in pulses and their elimination; commonly used pulses. Pulse cookery: Effect of cooking, Factors affecting cooking quality.

Milk and Milk products: Composition of milk, Nutritive value of milk and milk products, Physical and chemical properties of milk, Types of milk available in the market.

UNIT-III

Meat: Classes of meat, structure, composition and nutritive value; post-mortem changes in meat, ageing, tenderising, curing; cuts and grades of meat. Meat cookery: Factors affecting cooking quality, changes in meat on cooking, tenderness and juiciness of meat.

Fish: Classification, composition and nutritive value, selection. Fish cookery: Principles and methods.

Poultry: Classification, composition and nutritive value, processing and cooking.

Egg: Structure, composition and nutritive value, quality of egg – factors determining and evaluation. Egg cookery: Effect of cooking on nutritive value, effect of heat on egg protein, factors affecting coagulation of egg proteins, effect of other ingredients on egg proteins.

UNIT-IV

Vegetables: Classification, composition and nutritive value, pigments, organic acids, enzymes, flavour compounds, bitter compounds, selection of vegetables. Vegetables cookery: Changes during cooking, loss of nutrients during cooking, effect of cooking on pigments.

Fruits: Classification, composition and nutritive value, pigments, cellulose and pectic substances, changes during cooking, flavour constituents, polyphenols, bitterness, post-harvest changes and ripening. Browning: Types and prevention.

UNIT-V

Nuts and Oilseeds: Classification, composition and nutritive value, toxins present in nuts, role in cookery. Fats and oils: Nutritional importance of fats and oils, functions of oils and fats in foods, flavour changes – Rancidity – types and prevention, reversion.

Sugar: Sources, properties, types, forms, liquid sweeteners, reactions of sugar Crystallisation: Factors affecting, role of sugar in cookery, stages of sugar cookery, crystalline and non-crystalline candies.

Spices: Classification, general functions, commonly used spices and herbs, role of spices in cookery. **Aromatics** – Composition and uses.

Beverages: Classification and points to be considered while preparing beverages.

References:

1. Srilakshmi. B; Food Science, 6th edition New Age International (p) Limited Publishers 2015.

2. Shakunthala manay N; Shadakshara swamy. M; Foods Facts and Principles, Third edition, New Age International (p) Limited Publishers, 2014.
3. Lillian Hoagland meyer, Food chemistry, CBS Publishers and distributors, 2004.
4. Arindam Ramaswamy, Elements of Food Science, Oxford book company, 2010.
5. Norman N. Potter, Joseph H. Hotchkiss, and food science, fifth edition, CBS publishers and distributors, 1996.
6. B. Sivasankar, Food Processing and Preservation, PHI Learning Private Limited, 2011.

Web Resources

- <https://guides.libraries.psu.edu/foodscience>
- <https://www.nal.usda.gov/fnic/food-science-and-technology>
- <https://foodinfo.ifis.org>

SEMESTER - II

Core course 07: HUMAN NUTRITION - II

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives:

1. To understand the basis of RDA for micronutrients
2. To understand the effects of deficiency and excess of micro nutrients in human body.

Outcome

1. Gain in depth knowledge on the physiological and metabolic role of Vitamins.
2. Outline the role of vitamins in health and disease.
3. Assess the physiological action of vitamins and minerals.
4. Acquire in depth knowledge of macro and micro minerals and their role in human health and diseases.

5. Enable to understand the inter relationship between vitamins, minerals and immunity

UNIT-I

Fat soluble Vitamins: Introduction, functions, digestion, absorption, transport, storage, bioavailability, requirements, food sources, deficiency and toxicity. Interactions with other nutrients.

UNIT-II

Water soluble Vitamins : Thiamin, Riboflavin, Niacin, Pyridoxine, Folic acid, Vitamin-B12, Biotin, Pantothenic acid, Vitamin-C- Introduction, functions, absorption, transport, storage, bioavailability, requirements, food sources, deficiency and toxicity. Interactions with other nutrients.

UNIT-III

Major minerals: Calcium, Phosphorus and Magnesium - Introduction, functions, absorption, transport, storage, bioavailability, requirements, food sources, deficiency and toxicity. Interactions with other nutrients.

Electrolytes: Sodium, Potassium and Chloride- Sources, functions, deficiency and toxicity.

UNIT-IV

Trace Minerals: Iron, Copper, Fluoride, Selenium, Manganese, Zinc, Iodine-Introduction, functions, absorption, transport, storage, bioavailability, requirements, food sources, deficiency and toxicity. Interactions with other nutrients.

UNIT-V

Interaction of Nutrition, Immunity and Infection: Host defence mechanisms and nutrients essential in the development of immune system. Effect of infections on the nutritional status of an individual.

Nutrition for space, mines and underwater.

Role of free radicals and antioxidants in health and disease.

REFERENCE:

1. Michael. J. Gibney et al; Clinical Nutrition Black well Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.
3. Srilakshmi . B; Nutrition Science, 15th edition, New Age International (p)

Limited, publishers, 2016.

4. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I and II 2nd Edition, The Bangalore printing and publishing co., LTD, Reprint 2015.
5. Sunetra Roday; Food Science and Nutrition, 2nd edition, Oxford University press, 2013.
6. Carol Byrd – Bredbenner; Wardlaw's perspectives in Nutrition, 9th edition McGraw – Hill International Edition, 2013
7. Bamji, M.S., Krishnaswamy K. Brahmam G.N.V. (Eds.) (2017). Textbook of Human Nutrition. 4th Edition. New Delhi : Oxford and IBH Publishing Co. Pvt. Ltd.
8. Chadha R., Mathur P. (Eds.) (2015). Nutrition: A Lifecycle Approach. New Delhi: OrientBlackswan
9. FAO/WHO. (2004). Vitamin and Mineral Requirements in Human Nutrition. Report of a Joint Expert Consultation.
10. FSSAI (2016). Food Safety and Standards (Food or Health Supplements, Nutraceuticals, 11.Foods for Special Dietary Uses, Foods for Special Medical Purpose, Functional Foods and Novel Food) Regulations. <http://www.fssai.gov.in/home/fss-legislation/fssregulations>.
12. Simopoulos A.P., Ordovas J.M. (Eds.) (2004). Nutrigenetics and Nutrigenomics. USA:Karger.

Web references

<http://www.nutritionfoundationindia.res.in>

nhp.gov.in/healthyliving/healthydiet

<http://www.nin.res.in>

Core Paper 08: PHYSIOLOGICAL ASPECTS OF NUTRITION

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives:

Study of this paper will enable the students to

1. Advance their understanding of some of the relevant issues and topics of human physiology.
2. Understand the integrated functions of all systems and the grounding of nutritional science in Physiology.

Outcome

1. Understand the basic tenets of human physiology
2. Comprehend the role and secretion of digestive juices and hormones
3. Enumerate the process of gaseous exchange and urine formation
4. Understand the structure and functions of nerves and cardio vascular system
5. Apply knowledge gained in physiology to nutrition and health

UNIT-I

Digestive system: Structure and functions of gastrointestinal tract and gastrointestinal secretions. Role of enzymes in digestion and role of prebiotics and probiotics in the maintenance of health of digestive system. Regulation of food intake –hunger, appetite and satiety.

Liver: Structure and functions of liver.

UNIT-II

Respiratory system: Structure of lungs and gaseous exchange (transport of oxygen and carbon-di-oxide).

Nervous system: Structure and functions of brain (briefly) and spinal cord; structure and functions of neuron; conduction of nerve impulse, role of neuro transmitters; blood brain barriers, CSF, hypothalamus and its role in various body functions.

Musculo skeletal system: Structure and functions of bone; physiology of muscle contraction.

UNIT-III

Cardio vascular system: Blood composition and functions, structure and function of heart and blood vessels, regulation of cardiac output and blood pressure, heart failure and hypertension.

Excretory system: Structure and functions of kidney, structure of nephron, physiology of urine formation, micturition.

UNIT-IV

Endocrine system: Structure, function, role of hormones, regulation of hormone secretion and disorders – pituitary, thyroid, adrenal, pancreas and parathyroid glands. Functions and deficiency of insulin.

UNIT-V

Reproductive system: Ovaries- Structure of ovaries, functions of oestrogens and progesterone. Function of Uterus, Hormonal control of menstrual cycle, physiological changes in pregnancy, parturition, lactation and menopause.

Testes: Structure of Testes, functions of testosterone, deficiency of testosterone.

REFERENCE:

1. Ganongs. W.F; Review of medical physiology, 1985.
2. Campbell. E.J et al; Clinical and applied physiology,1984.
3. Guyton AC and Hall JB; Textbook of medical physiology, 1996.
4. Guyton AC; Functions of human body, 1985.
5. Wilson KJW and Waugh A; Ross and Wilson. Anatomy and Physiology in health and illness, 8th edition, 2003.
6. Judith E. Brown., Nutrition New, 2nd edition, West / Wadsworth west / Wadsworth, An International Thomson publishing company, 1998.

Web Resources:

- <http://physiology.forumshealth.com/>
- <https://www.pdfdrive.com/physiology-books.html>

Core Paper 09: DIET IN DISEASE - II

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives:

1. To enable the students to remain updated on recent advances in diet therapy for various diseases.
2. To gain knowledge to recommend nutritional care for prevention treatment of various diseases.

Outcome

1. Understand the etiology and pathophysiology of metabolic and degenerative diseases.
2. Gain knowledge on the role of diet therapy during the various diseases
3. Apply the knowledge in planning diets for the disease conditions
4. Counsel on the dietary management
5. Equip to become a dietitian

UNIT-I

Diet for kidney diseases: Etiology, symptoms, diagnosis and dietary management: Glomerulonephritis, Nephrotic Syndrome, Acute and chronic renal failure and Urinary calculi.

Dialysis: Hemodialysis and Peritoneal dialysis- Advantages, disadvantages and Dietary management.

Kidney Transplant: Diagnosis and dietary management.

UNIT-II

Diet for pulmonary diseases: Etiology, symptoms, diagnosis and dietary management of Chronic Obstructive Pulmonary disease, asthma, pneumonia, and tuberculosis.

Rheumatoid Arthritis: Types, etiology, symptoms and dietary management

Osteoarthritis: Types, etiology, symptoms and dietary management

Gout: Etiology, symptoms and dietary management.

UNIT-III

Dietary management for cardio-vascular diseases: Atherosclerosis, coronary heart disease, hypotension, hypertension, stroke, cardiac arrest- Risk factors, definition, epidemiology, pathogenesis, clinical features, diagnosis and dietary management.

UNIT-IV

Cancer: Types, mechanism, etiology, metabolic changes and dietary management during cancer treatment (drugs, chemotherapy and radio therapy).

AIDS: Causes, symptoms, metabolic changes, diagnosis, treatment and dietary management

Nutrition for children with special needs: Ketogenic diet – Epilepsy. Neutropenic diet – Marrow transplant and Nutrition for Autism.

UNIT-V

Surgery and Critical Care: Metabolic & clinical aberrations, diagnosis, complications, treatment, dietary management of Surgery, Burns, Sepsis, Trauma and Critical care.

Nutrient – Drug interactions.

REFERENCE:

1. Ganongs. W.F; Review of medical physiology, 1985.
2. Campbell. E.J et al; Clinical and applied physiology, 1984.
3. Guyton AC and Hall JB; Textbook of medical physiology, 1996.
4. Guyton AC; Functions of human body, 1985.
5. Wilson KJW and Waugh A; Ross and Wilson. Anatomy and Physiology in health and illness, 8th edition, 2003.
6. Judith E. Brown., Nutrition New, 2nd edition, West / Wadsworth west / Wadsworth, An International Thomson publishing company, 1998.
7. Clinical Dietetics and Nutrition – F P Anita and Philip Abraham.
8. Food, Nutrition and Diet Therapy – Kathleen Mahan & Krause, Sylvia Escott Stump.
9. Normal and Therapeutic Nutrition – Robinson & Lawler, 17th edition, Mac Millan Publishers.
10. Clinical Nutrition – Ed Michael J Gibney, Marinos Elia, Olle Ljungqvist and Julie Dowsett.
11. Nutrition in Clinical Practice – David L. Katz, Lippincott, Williams & Wilkins.
12. Text Book of Human Nutrition – Mahtab S Bamji, N Prahlad Rao, Vinodini Reddy, 2nd edition, Oxford & IBH Publishing Co. Pvt. Ltd.
13. Modern Nutrition in Health & Disease – Eds – Maurice E. Shils, James A.

Web Resources:

- www.anme.com.mx/libros/PrinciplesofNutrition.pdf
- <https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf>
- krishikosh.egranth.ac.in

Core Paper 10: DIET IN DISEASE – II (Practical)**SUB CODE:****Hours: 4****Marks: 100****Credit: 2****Objectives**

To enable students to develop skill in nutritional diagnosis, planning and providing suitable therapeutic diets for various diseases

Outcome

1. Develop skills in planning therapeutic diets
2. Analyze the disease condition and plan appropriate menus
3. Calculate nutrient content of diet plans
4. Prepare the various types of diets
5. Learn techniques in diet tray arrangement and assess patient compliance

Planning & preparation of diets for the following conditions: (Using SOAP format)

1. Nephritis
2. Nephrosis
3. Renal Failure
4. Renal calculi
5. Dialysis
6. Pulmonary diseases –TB

7. Asthma
8. Rheumatoid Arthritis
9. Hypo/Hyper tension
10. Atherosclerosis
11. Burns
12. Cancer
13. AIDS

REFERENCE :

1. Vimala(2012) Advanced diet therapy, New age international.
2. Escott-Stump, S. (2002) Nutrition and Diagnosis Related Care. 5th ed. Williams.

Core Paper 11: NUTRITIONAL BIOCHEMISTRY PRACTICAL

SUB CODE:

Hours: 4

Marks: 100

Credit: 2

Objective

To enable students to understand the role of nutrients in the body.

Outcome

1. Acquire skills to analyse various blood parameters using different methods.
2. Ability to relate the theoretical knowledge with the biomarkers for CVD & diabetes
3. Ability to relate the theoretical knowledge with the biomarkers for liver & kidney functions
4. Apply the techniques to estimate the urine for various parameters.
5. Understand and examine the urine by qualitative methods

I. Analysis of Blood / Serum

1. Blood glucose
2. Serum iron
3. Serum cholesterol
4. Serum protein
5. Blood Haemoglobin

II. Analysis of urine

1. Creatinine
2. Urea
3. Total nitrogen
4. Calcium
5. Phosphorus

III. Qualitative Analysis

A. Qualitative analysis of sugars

1. Reactions of Monosaccharide (Glucose, fructose, galactose, mannose and ribose)
2. Reactions of disaccharides (Maltose and lactose)
3. Reactions of polysaccharides (Starch and dextrin)
4. Analysis of unknown sugar

B. Qualitative analysis of amino acids

1. Reactions of individual amino acids (Tyrosine, tryptophan, arginine, histidine, cystine and methionine)
2. Analysis of unknown amino acids

REFERENCE :

1. Raghuramulu N., Madhavan Nair K., Kalyanasundaram S.(2003). *A Manual of Laboratory Techniques*. Hyderabad: National Institute of Nutrition.

Core Paper 12: FOOD ANALYSIS PRACTICAL

SUB CODE:

Hours: 4

Marks: 100

Credit: 2

Objective

This course will enable students to determine nutrient content in food materials.

Outcome

1. Understand the need for analysis and instrumentation
2. Identify an appropriate technique for analysing specific substances

3. Learn the principles of different instruments used for analysis
4. Have an insight into the advanced techniques in food and nutrient analysis

I. Quantitative Analysis

1. Protein by Lowry's method
2. Nitrogen by Kjeldahl method
3. Iodine Number of oil
4. Saponification/ Acid number of oil
5. Fat by Soxhlet method
6. Ash content
7. Iron
8. Phosphorus
9. Calcium
10. Vitamin –C
11. Crude fibre
12. Moisture by hot air oven method
13. Energy value by Bomb calorimeter (Demo)

REFERENCE :

1. Raghuramulu N., Madhavan Nair K., Kalyanasundaram S.(2003). *A Manual of Laboratory Techniques*. Hyderabad: National Institute of Nutrition.

SEMESTER-III

Core paper 13: COMMUNITY AND PUBLIC HEALTH NUTRITION

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives

Study of this paper will enable the students to

1. Remain updated on recent advances in policies and program.

2. Develop an understanding about various programs and agencies involved for the improvement of nutritional status of the community.

Outcome

1. Gain knowledge on nutritional programmes and policies to overcome malnutrition
2. Understand the role of national, international and voluntary nutritional organizations to combat malnutrition
3. Able to organize community nutrition education programme with the application of computers.
4. Apply immunological intervention programmes to overcome epidemic of communicable diseases.
5. Application of the principles of massive supplementary feeding and food safety during unforeseen disasters

UNIT – I

Nutrition and national development: National Nutrition Policy – aims and objectives; Demographic Profile: Population trends in India, density of population, age structure, sex ratio, family size, literacy and education, life expectancy. Nutrition and Infection: Vicious cycle of malnutrition and infection, effect of malnutrition on immunity.

UNIT – II

Nutrition education: Scope of nutrition education, steps in planning, conducting and evaluating nutrition and health education programmes; methods of imparting nutrition education; monitoring and evaluation of effectiveness of nutrition and health education programmes.

UNIT – III

National and International Organisations: Engaged in food and nutrition activities – ICMR, NIN, NNMB, ICAR, CFTRI, FAO, WHO, UNICEF, UNESCO.

UNIT – IV

Community health care centre (CHC) - Objectives and service delivery in CHCs.

Non-communicable disease control programme-Diabetes, cardiovascular disease and cancer- Objects, program component strategies and management structure.

UNIT- V

National vector borne disease control: Malaria, Japanese encephalitis, Dengue and Chikungunya- An overview of programme.

National Aids control programme – Goal, objectives, package of services, organization structure and management system.

National programme on occupational diseases- Occupational injuries and illness in India, National occupational safety and health systems and programmes.

REFERENCE:

1. Park K., Preventive and social medicine, Bamarasidas Bahnot Publishers, Jabalpur.
2. Jellilfe D. B., Infant nutrition in tropics and subtropics, WHO, 1965.
3. Bamji M. S., Prahalad Raov, Reddy V, Text book on human nutrition, Oxford and IBM publishing co. Pvt. Ltd.
4. Proceeding of Nutrition Society of India, NIN.
5. Technical reports of ICMR .
6. P.K. Shukla, Nutritional problems of India, Prentice Hall, India.
7. Sabarwal B., Applied Nutrition and Health education, common wealth publishers, New Delhi.

Web Resources

- <https://www.nutrition.gov>
- <http://www.ninindia.org/community.htm>
- <https://www.nhp.gov.in/healthyliving/healthy-diet>
- www.government national policies.

Core paper 14: NUTRITION IN EXERCISE AND SPORTS

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives

Study of this paper will enable the students to

1. Understand the characteristics, physiology, body composition and nutritional needs for health and sports.

2. Imbibe knowledge of sports specific nutrition guidelines.

Outcome

1. Understand concept of fitness training
2. Foster fitness skills
3. Prevent and manage lifestyle related disorders
4. Utilize exercise in stress and health management
5. Gain the technical ability to run fitness centers
6. Understand the nutritional needs of athletes and plan diet for them

UNIT – I

Overview of nutrition for fitness and sports - Exercise for health promotion of Exercise guidelines Human energy requirements for exercise. Major human energy systems - Components of energy expenditure, Fatigue during exercise.

Carbohydrates and exercise - Role of CHO in energy systems during exercise, Dietary CHO recommendations and strategies for exercise performance

UNIT – II

Fats and exercise - Role of lipids in energy systems during exercise , Dietary fat recommendations and strategies for exercise performance.

Protein and exercise- Role of protein in energy systems during exercise o Dietary protein recommendations and strategies for exercise performance.

Energy, Fluid, electrolytes, temperature regulation and exercise

UNIT – III

Nutrition for child, adolescent and master athletes- -Process of growth and development during childhood and adolescence, Factors influencing with special emphasis of exercise -Physiology of ageing and factors influencing; -Nutritional problems of younger and master athletes -Nutritional guidelines and Nutritional Requirements for younger and older athletes. Nutritional concerns of travelling and vegan athletes; Athletes performing under altered climatic conditions-High altitude, Mountaineers, High and low climatic temperature etc.

UNIT – IV

Nutritional Management of clinical conditions among sports – Diabetes Mellitus - Etiology, Pathophysiology, metabolic alterations, Complications, Assessment and Management.

-Hypertension and Heart disease -Prevalence, Pathophysiology, Role of Macro & Micronutrients.

UNIT- V

Planning and preparation of diets for team sports -Cricket, Hockey, Football, Kabbadi and Basketball.

REFERENCE:

1. Slater, G., & Phillips, S. M. (2011). Nutrition guidelines for strength sports: sprinting, weightlifting, throwing events, and bodybuilding. *Journal of sports sciences*, 29(sup1), S67- S77.
2. Helms, E. R., Aragon, A. A., & Fitschen, P. J. (2014). Evidence-based recommendations for natural bodybuilding contest preparation: nutrition and supplementation. *Journal of the International Society of Sports Nutrition*, 11(1), 20.
3. Maughan, R. J., & Burke, L. M. (2012). Practical nutritional recommendations for the athlete. In *Sports Nutrition: More Than Just Calories-Triggers for Adaptation* (Vol. 69, pp. 131-150). Karger Publishers .
4. Jeukendrup, A., & Gleeson, M. (2010). *Sport nutrition: an introduction to energy production and performance* (No. Ed. 2). Human Kinetics.

Web Resources

- <http://www.aco.org.nz/pdf/nutrition-for-sports>
- https://www.researchgate.net/publication/258630492_Sports_Nutrition_Book_2013
- <http://themedicalbiochemistrypage.org>

Core paper 15: INSTITUTIONAL FOOD MANAGEMENT

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives

Study of this paper will enable the students to

1. Gain knowledge on requirements and management of various food service establishments.
2. Learn to purchase, receive and store different food

Outcome

1. Comprehend and apply theory and principles of management in achievement of objectives.
2. Establish a food service unit.
3. Manage human resources and solve problems with remedial measures.
4. Analyze and implement quality control in food service institution.
5. Promote the product in the market.

UNIT – I

Food service organisation- Development of food service institution, objectives and classification.

Food service management- Principles and functions

UNIT – II

Spaces: Planning and Organisation-Kitchen spaces, storage spaces and services areas.

Equipment- Catering equipment, selection equipment, equipment design, purchasing equipment and care and maintenance of equipment.

UNIT – III

Food Management-Food purchasing, Menu planning, Food production and cleaning and waste management.

UNIT – IV

Financial management – Costing and budgeting, pricing and accounting.

Personnel management- Concepts, staff employment and employment benefits

UNIT- V

Hospital food service – Objectives and Classification.

Industrial food service- Objectives and Classification.

REFERENCE:

1. Sethi M and Mahan S (Revised 2nd edition, 2007)). Catering Management, An Integrated Approach. New Age International (P) Ltd

2.Andrews S (2009) Food and beverage service : Training Manual 2nd edition. New Delhi
Tata McGraw Hill.

3.Bessie Brooks West and Levelle Wood MS (1988). Food Service in Institutions (6th ed.).
John MacMillan Publishing Co., New York

4.Harris N (1984) Meal management (6th ed.). New York : Mac Mill

Web Resources

- <https://theicn.org/management-and/inventory-tracking-and-managment-guide.pdf>
- <https://www.scribd.com/document/119449120/History-of-Food-Service-Industry>
- cte.sfasu.edu › Hospitality and Tourism › Practicum in Culinary Arts

Core course 16: RESEARCH METHODOLOGY AND STATISTICS

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives

Study of this paper will enable the students to

1. Understand the methods of researches that can be applied in the field of food and nutrition.
2. Understand the application of statistical calculations in the interpretation of results of research problems.

Outcome

1. Design the tools for collection, identification and interpretation of data with the use of tables and pictorial representations.
2. Assess the numerical data for providing statistical evidences to support the research results.
3. Enable to become a qualified researcher

UNIT I

Research methodology: An introduction- Meaning, Objectives, Motivation, Types and Significance of research, Research methods versus methodology, Research and scientific method, Research process. Defining the research problem- Selecting, Necessity, Technique and An Illustration in defining the problem. Research design- Meaning, Need, Features, Important concepts and different research designs. Sampling design- Census, Sample survey, Steps, Characteristics and Types of sampling design.

UNIT II

Methods of collecting primary data- Questionnaire, preparation of schedules, Interview method, case- study method, Experimentation method, Data Collection – Primary and secondary data, Sources of secondary data, precautions while using secondary data. Editing and coding the data, Organization of data- Classification – meaning and objectives, types of classification, formation of discrete and continuous frequency distribution, Tabulation – Role, parts of a table, general rules of tabulation, Types of tables.

UNIT III

Representation of data – Diagrammatic and graphical representation , Significance of diagrams and graphs, General rules for constructing diagrams, Types of diagrams, graphs of Time series, graphs of frequency distribution. Interpretation and Report writing- Meaning of interpretation technique, precautions, Format of research report, types, steps and stages, mechanism and style, precautions and essential for good report, footnotes and bibliographical citations.

UNIT IV

Measures of central Tendency – Mean, Median, Mode, their relative advantages and disadvantages, Measures of dispersion- Mean deviation, standard deviation, quartile deviation. Co-efficient of variation, percentile and percentile ranks. Association of attributes, contingency tables, correlation, coefficient of correlation and its interpretation, rank – correlation, regression equations and predictions. Scales of measurement and the appropriate statistical techniques.

UNIT V

Probability - Rules of probability and its applications. Distribution - Normal, binomial, their properties, importance of these distributions in statistical studies. Tests of significance, large and small samples, “t” and F test, tests for independence using chi-square test. Analysis of variance- One – way and two way classification.

REFERENCES

1. Kothari, C.R; Research Methodology, 2nd edition, New Age International Publishers,2004.
2. Gupta, S.P; Statistical Methods, 31st revised edition, Sultana Chand and Sons, 2002.
3. Devadas, R.P; A Handbook on Methodology of Research, Sri Ramakrishna Vidhyalaya, Coimbatore, 1989.
4. Donald, H.M.C. Burney; Research Methods, fifth edition, Thomson and Wadsworth Publications, 2002.
5. Pillai,R.S.N and Bagavathi,V , Statistics, Chand and company limited, 2001 .

Web Resources:

- <https://explorable.com/research-methodology>
- <https://www.mbaknol.com/research-methodology/the-basic-types-of-research>

Core course 17: ASSESSMENT OF NUTRITIONAL STATUS OF THE COMMUNITY (PRACTICAL)

SUB CODE:

Hours: 5

Marks: 100

Credit: 2

Objectives

1. To empower the learners on assessing their nutritional status, planning balanced meal and conservation of nutrients
2. To give an insight into the various low cost ingredients available in market and develop low cost nutritious recipes for vulnerable segments of the community

Outcome

1. Understand the common health problems of the community
2. Acquire skills to overcome nutritional deficiency diseases
3. Understand the reasons for mal nutrition and under nutrition
4. Develop the skills in educating healthy dietary practices for pregnancy and lactation

Course outline

Module: 1

- A. Assessment of nutritional status: General information, Anthropometry, Identification of clinical signs of common nutritional disorders, Dietary assessment – FFQ and 24 hour diet recall
- B. Planning of low cost nutritious recipes for infants, preschoolers, pregnant/nursing mothers for nutrition education
- C. Teaching aids for nutrition education.
- D. Development of low cost nutritious recipe, Standardization of Recipe, Calculation of cost and Nutritive Value

Core course 17: ASSESSMENT OF FOOD MANAGEMENT IN THE ORGANIZATION (PRACTICAL)

SUB CODE:

Hours: 5

Marks: 100

Credit: 2

Objectives

1. To develop skill in organizing and establishing food service institution.
2. To gain knowledge in menu planning, preparation of recipes in large scale and serving and also in food costing.
3. To enable students get practical experience in evaluating the management of human, material and financial resources.

Outcome

1. Know the different cuisines

2. Know how to select and use equipment in food preparation
3. Gain skill in pre preparation methods
4. Learn the various types of cooking methods
5. Acquire skills in table setting

Course outline

Module :1

Food Production

- A. Selection of recipes suitable for various types of institutional food service management.
- B. Five value added recipes (Standardisation of recipes).
- C. Cost and profit analysis.

Module :2

Field study on any one of the following aspects

- A. Food purchasing, receiving, storage, preparation, service and washing area in institutional food service organization.
- B. Planning, interior designing, equipment design, costing, profit calculation, sanitation and hygiene practices and staff strength and salary in institutional food service organization.

Core course 19 : HOSPITAL INTERNSHIP

SUB CODE:

Hours:

Marks: 100

Credit: 4

AIM:

Internship is a phase of training wherein a graduate is expected to conduct actual practice of diet management and health care and acquire skills under supervision of a Practicing dietician so that he/she may become capable of functioning independently.

OBJECTIVES:

At the end of the Internship Training, the student shall be able to:

1. Manage Diet prescription independently for clinically common disease conditions encountered to higher level.

Outcome

1. Gain skill in planning therapeutic diets
2. Ability to be a health professional
3. Apply the knowledge for diet counseling
4. Competent to manage catering outlet

Period of Internship:

One month internship in a multispecialty hospital with dietary department.

Case Studies:

Five to ten case studies of different disease conditions have to be taken up during the internship.

Report to be submitted in the hospital and institution.

INTERNSHIP REPORT: EVALUATION PATTERN

Report on internship will be evaluated as stated below.

External marks	- 60
Internal marks	- 40

Total marks	- 100

Internal mark components

Marks awarded by the training institution- 20 marks

Marks awarded by the guide - 20 marks

External mark components

Report preparation - 20 marks

Report presentation - 20 marks

Viva voce - 20 marks

Elective paper 02: FOOD PROCESSING AND PRESERVATION

SUB CODE:

Hours: 4

Marks: 100

Credit: 4

Objectives

Study of this paper will enable the students to

1. Understand and apply the food processing and preservation techniques.
2. Develop an understanding about the latest developments in techniques.

Outcome

The students possess knowledge about various food processing methods and preservation techniques used in the food industry and apply the same in the relevant area.

1. Know the principles of preservation behind the methods of preservation.
2. Understand the stages of sugar cookery, quality of pectin and acidity in the development of preserved fruit products.
3. Acquire skills to formulate fruits based preserved products with value addition for nutritional benefits.
4. Explore the principle of preservation in vegetables based products with nutritive value.
5. Prepare cereals and pulses based preserved products focusing the principle of preservation.

UNIT I

Scope of food processing in India with National and International perspectives, Food deterioration and control, Principles of food processing and preservation. Cereal technology: Rice- Milling, parboiling: Methods, advantages and disadvantages, byproducts of rice milling and their utilization. Wheat: Milling process, byproducts of wheat milling. Millets: Milling of major and minor millets. Manufacturing of breakfast cereals: Extruded products, puffing, flaking.

Pulse technology: Milling of soya bean and Bengal gram and their byproducts, germination, fermentation, parching, popping, processed soya products.

Nuts and oil seeds processing: Milling, techniques in extraction of oil, byproducts- Meal concentrates, isolate. Speciality fats, hydrogenation, production of MCT. Fat replaces and their uses.

UNIT II

Dairy technology: Milk processing: Separation, standardization, pasteurization, homogenization, sterilization, evaporation, drying, membrane fractionation. Manufacturing of cheese, butter, khoa, yoghurt, srikhand, ice cream, condensed milk and dry milk. Milk substitutes- Lactone, infant formula. Byproducts: Skimmed milk, lassi, butter milk, whey, ghee residue.

Fruits and vegetable technology: Dehydration, juice concentrate, canning of fruits and vegetables. Potato processing and its products (wafers and French fries). Fleshy food technology: Processing of fish for smoking, canning and freezing. Curing of meat, Poultry processing, Pasteurization of egg, manufacture of egg powder and frozen egg products.

UNIT III

Preservation by use of High temperatures- Factors affecting heat resistance, heat resistance of microorganism and their spores, determination of heat resistance, thermal-death-time curves, 12D concept, heat penetration, determination of thermal processes, heat treatments employed in processing foods.

Preservation by use of low temperatures- Low-temperature methods- Refrigeration, cool storage and freezing. Low- temperature-Microbial activity, characteristics, factors affecting the quality of foods and packaging requirements for foods.

UNIT IV

Preservation by drying and dehydration- Methods, advantages and disadvantages. Factors in the control of drying, treatments of food before drying, procedures after drying, microbiology of dried foods.

Food irradiation- Introduction, electromagnetic energy, ionizing radiation, kinds of ionizing radiation and their applicability on food processing, mode of action, potentialities for radiation processing of foods, effects of food irradiation, safety of irradiated foods.

UNIT V

Fermentation of foods - advantages and disadvantages, types, factors controlling fermentation, commonly fermented foods- sauerkraut, wine, vinegar, beer, temph, soya sauce.

Food additives- Introduction, classification of food additives – Preservatives, antioxidants, emulsifiers, stabilizers and thickeners, sequestering and buffering agents, bleaching and maturing agents, food colours, flavouring agents and flavor boosters, nutrient supplements, non-nutritive and special dietary sweeteners, anti-caking agents, foaming and anti-foaming agents, leavening agents, firming agents, humectants and texturisers and clarifying agents: Nature, characteristics and use of additives in foods.

REFERENCE:

- 1.Srilakshmi. B; Food Science, 6th edition, New Age International (P) Limited Publishers, 2015.
- 2.Shakunthala Manay. N; Shadakshara Swamy.M; Foods Facts and Principles, 3rd edition, New Age International (P) Limited Publishers, 2014.
- 3.Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.
- 4.Subbulakshmi. G and Shobha. A.U; Food processing and preservation, New Age International (P) Limited Publishers, 2014.
- 5.Norman. N Potter, Joseph H. Hotchkiss, Food Science, 5th edition, CBS Publishers and Distributors, 1996.
- 6.Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011.

Web resources

<http://www.foodsafe.ca>

http://www.bclaws.ca/civix/document/id/complete/statreg/08028_01

SEMESTER - IV

Core Paper- 20 DIET COUNSELLING

SUB CODE:

Hours: 5

Marks: 100

Credit: 4

Objectives

To enable students to

1. Know the importance of counselling skills.
2. Knowledge about dietary concepts of different diseases.

Outcome

1. Know the importance and principles of dietetics in the management of diseases
2. Gain knowledge on the role of dietitian in disease management
3. Understand the etiology, management and prevention
4. Relate dietary management and lifestyle counselling.

UNIT-I

Counselling: Introduction, definition and Importance. Types of counselling, advantage and disadvantage. Principle of counselling, the process of counselling, qualities of an effective counselling.

UNIT-II

Counselling skills for dietician: Introduction, dietician using counselling skills, qualities of a dietician, developing a counselling approach, different approaches to counselling.

Diet counselling steps: Assessment components, planning components, Implementation components and evaluation components.

UNIT-III

Role of counselling in hospital, Role of counselling in community, Organizing health camps -hospital level and community level, Diet counselling for pregnancy, lactation and child care , Patient follow up / home visits.

UNIT-IV

Diet counselling for adolescent, adults and old age. Diet counselling for obese people, Infectious diseases, and AIDS

UNIT-V

Diet counselling for Diabetics, CVD, Gastrointestinal diseases, liver diseases and cancer.

REFERENCES:

1. Gibson, R.L., Mitchell, M.H.(2005). Introduction to counselling and guidance (6th Ed).
2. Judey gable, (2005). Counselling skills for dietitians, 2nd edition, black publishing.
3. WHO, (2014). NACS, A programme guide.
4. WHO, (2018). NACS, module 3 counselling guide.

Core Paper: 21 NUTRACEUTICALS AND FUNCTIONAL FOODS

SUB CODE:

Hours: 5

Marks: 100

Credit: 4

Objectives:

To enable students to:

1. Know the importance of Nutraceuticals and Functional Foods
2. Impart knowledge on the health benefits

Outcome

1. Understand the developments in the field of nutraceuticals and nutrigenomics.
2. Comprehend the components of functional foods and foods containing nutraceuticals
3. Know the importance of probiotics and prebiotics in human health
4. Understanding the effects of nutrients in molecular level process in the body and the effect of phytochemicals in disease conditions.

UNIT-I

Nutraceuticals : Definition, history, classification, market trends, sources. Demand drivers for health supplements and nutraceuticals in India. Development of nutraceuticals incorporated food products- Tailoring diets for special needs, critical steps , stability and bio availability of bio actives substances in food matrices.

UNIT-II

Functional foods: Definition, history and types. Health benefits of functional foods and future promises in Indian diet. Future research and develop of functional foods- Qualified studies, modern technologies and appropriate consumer communication. Safety and Regulatory aspects of functional foods.

UNIT-III

Probiotics and Prebiotics: Definition, types, source and Health benefits. Recent advances in probiotics and prebiotics. FAO/WHO Standards/ guidelines on probiotics and prebiotics .

UNIT-IV

Carotenoids: beta carotene, lycopene and lutein – sources and uses.

Terpenes: terpenoids, saponin, tocotrienols– sources and uses.

Allyl-s-compounds and phenolic compounds– sources and uses.

UNIT-V

Curcumin for prevention and treatment of chronic diseases- Introduction, mechanism of action of curcumin, role of curcumin in cancer, CVDs, neurological diseases, pulmonary diseases, diabetes, rheumatic diseases and infection diseases.

REFERENCES:

1. Dilip ghosh et al(2006). Clinical aspects of functional foods and nutraceuticals, CRC Press.
2. Mahtab S Bamj, N Prahlad Rao, Vinodini Reddy(2005). Text book of Human Nutrition –, Second• Edition, Oxford and IBH Publishing Co.Pvt.Ltd.
3. Wilman(2007). Hand book of Nutraceuticals and functional foods, second editin.CRC press.
4. Gibson GR and Williams CM(2000). Functional Foods - Concept to Product.

Core course-22 DISSERTATION AND VIVA VOCE

SUB CODE:

Hours: 18

Marks: 100

Credit: 6

An independent research project work undertaken by student under the guidance of a member of the teaching faculty of the concerned department. It can either be a survey or laboratory oriented research. The research should be submitted at the end of semester IV in the form of a thesis.

EVALUATION PATTERN

Internal examination: 40 marks

40 marks are based on day-to-day work of the concern student in terms of project designing, Practical performance in the laboratory, interpretation of the results obtained, regularity and any other criteria relevant to the study. Presentation of the work in front of the faculty of the department at least once during this project work is mandatory.

External examination: 60 marks

Internal evaluation (40 marks)

Innovative idea - 10 marks

Performance evaluation - 10 marks

Report preparation - 20 marks

External evaluation (60 marks)

Report and presentation - 40 marks

Viva voce - 20 marks

Elective paper-03: FOOD SAFETY AND STANDARDS

SUB CODE:

Hours: 5

Marks: 100

Credit: 4

Objectives:

To enable students to:

1. Know the importance of food safety and hygiene.
2. Knowledge about food standards.

Outcome

1. Learn about the applications of safety management in food industry.
2. Define different food laws and regulations for quality management in food industry.
3. Master the standards followed for food safety

UNIT-I

Safe food: Introduction, definition and manufacture of hygienic food. Type of hazards. Factors affecting food safety and Importance of safe foods.

UNIT-II

Relationship of microorganisms to sanitation: Introduction, microorganisms common to food, effects of microorganism on food borne illness- aeromonas hydrophila, bacillus

cereus, botulism, campylo bacteriosis, clostridium perfringens, Escherichia coli, listeriosis, salmonellosis, staphylococcal, trichinosis and mycotoxins.

UNIT-III

Food safety: Indicators of food microbial quality and safety - Coliforms, enterococci, bifidobacteria, coliphages/enterviruses, predictive microbiology/microbial modelling.

Personal hygiene and sanitary food handling in food service establishments.

Sanitizing methods: Thermal, radiation, high hydrostatic pressure, vacuum and chemical sanitizing.

UNIT-IV

Risk assessment and management during food preparation – HACCP- prerequisite programmes, definitions, HACCP principles and flow diagrams, application and limitations of HACCP.

Risk assessment and management during food preparation- Food safety objective (FSO), Microbiological criteria, definitions, sampling plans.

UNIT-V

Microbiological criteria for various food products – Sea foods, milk products, spices, fruits and vegetables.

Food laws and standards: FAO, Codex alimentarius, ISO, Indian food laws and standards, prevention of food adulteration(PFA)act, fruit products order(FPO), meat products order(MPO, cold storage order(CSO), BIS and Agmark.

REFERENCES:

1. Raveendra reddy et al(2018). Food safety and microbial standards, Archarya NG Ranga agricultural university.
2. Lawlwy, et al(2004). The food safety hazard guidebook, RSC publishing.
3. Marriott, Norman G(2005). Principles of food sanitation, AVI, Newyark.

4. Forsythe, SJ (2000). Microbiology of safe food, Blackwell science, oxford.