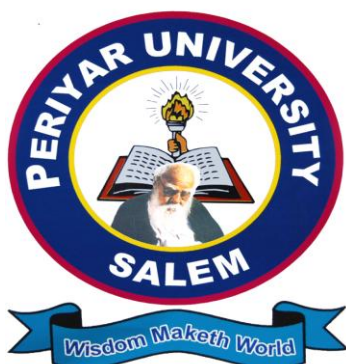


**PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM – 636 011**



**DEGREE OF MASTER OF SCIENCE
CHOICE BASED CREDIT SYSTEM
SYLLABUS FOR M.SC. FOOD & NUTRITION
FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2012 – 2013 ONWARDS**

* IA- Internal Assessment

**EA-External Assessment

SEM	CODE	COURSE	Hrs	Credit	Marks			Examination (Hrs)
					IA*	EA**	TOTAL	
I	12PFNC01	Food Science-I	5	5	25	75	100	3
	12PFNC02	Nutrition Through Life Cycle	5	5	25	75	100	3
	12PFNC03	Macronutrients	5	5	25	75	100	3
	12PFNE01	Elective-1- Food Preservation	5	5	25	75	100	3
	12PFNCP01	Computer Application Practical	5	2	40	60	100	3
	12PFNCP02	Food Analysis Practical	5	-	-	-	-	-
II	12PFNC04	Food Science-II	5	5	25	75	100	3
	12PFNC05	Clinical Nutrition-I	5	5	25	75	100	3
	12PFNC06	Micronutrients	5	5	25	75	100	3
	12PFNCP02	Food analysis practical	4	4	40	60	100	6
	12PFNS01	Extra disciplinary Course (EDC)	4	4	25	75	100	3
	12PFNH01	Human Rights	2	2	-	100	100	3
	12PFNE02	Elective-II- Nutraceutical and Functional foods	5	5	25	75	100	3
III	12PFNC07	Clinical Nutrition-II	5	5	25	75	100	3
	12PFNC08	Food Microbiology	5	5	25	75	100	3
	12PFNC09	Research Methodology & Statistics	5	5	25	75	100	3
	12PFNC10	Community Nutrition	5	5	25	75	100	3
	12PFNE03	Elective-III- Food Processing & Quality Control	5	5	25	75	100	3
	12PFNCP03	Clinical Nutrition Practical	5	-	-	-	-	-
	12PFNCP03	Clinical	5	4	40	60	100	6

IV		Nutrition Practical						
	12PFNE04	Elective-IV- Food Biotechnology	5	5	25	75	100	3
	12PFND01	Dissertation	20	4	---	---	200	-
TOTAL			120	90			2100	

NOTE:

1. Compulsory Internship Programme for 15 days in any one of the following discipline.
 - a) Food Industry
 - b) Hospital
 - c) Health Centers

Totally 20 marks will be awarded for internship which may be a component of Internal Assessment of related practicals.

QUESTION PATTERN

M.SC FOOD & NUTRITION

Theory (External Exam)

Time: 3 Hrs

Max : 75

Part-A (5x5=25) marks

I. Answer all questions: (Internal choice)

Part-B (5x10=50) marks

II. Answer all question (Internal choice)

Internal Assessment (theory)

Marks Distribution

Test :10marks

Assignment : 5 marks

Seminar : 5 marks

Attendance : 5 marks

25 marks

Passing minimum (Internal Assessment) – 50% - 12 marks

Passing minimum (External Assessment) – 50% - 38 marks

50 marks

DISSERTATION: EVALUATION PATTERN

Dissertation 80 marks

2 reviews = 20+20 = 40 marks

Report valuation = 40 marks

Viva voice = 20 marks

100 marks

PRACTICAL MARKS DISTRIBUTION

External : 60 marks

Internal : 40 marks

Practical external marks

Practical : 50 marks

Viva voice : 10 marks

Practical Internal marks

Record : 15 marks

Practical : 25 marks

Passing minimum (Internal Assessment) – 50% - 20 marks

Passing minimum (External Assessment) – 50% - 30 marks

50 marks

SEMESTER-I

FOOS SCIENCE-I

SUB CODE: 12PFNC01

HOURS: L+T+P=C

MARKS: 100

5+0+0=5

UNIT-I

Concept of food and nutrients, physiochemical properties of food, colloidal system in foods-types properties of colloids. Sols, gels- Properties, factors influencing gel formation.

UNIT-II:

Emulsions- Nature, surface activity, types of surface films, common food emulsifies, functions of emulsifying agents.

Foams- Theory of foam formation, stages of foam formation, factors affecting foam formation, and stability of food foams.

UNIT-III:

Cereals and millets- classification, nutritional composition, structure, principles of cookery- gelatinization, retro gradation, and dextrinisation, cereal protein- gluten, factors affecting gluten formation. Effect of cooking on nutritive value, points to be considered while cooking cereals, role of cereals in cookery.

Pulses- Digestibility of pulses, toxic constituents in pulses, effect of cooking, factors affecting cooking quality of pulses, role of pulses in cookery.

UNIT-IV:

Nuts and oil seeds- classification, nutritional composition, structure, digestibility of nuts, toxic constituents, role of nuts and oil seeds in cookery.

UNIT-V:

Fats & oils – Sources, properties, kinds, effect of heating on fat, role of fat in cookery, rancidity of fat and its prevention. Sugars- sources, uses, properties, principles of sugar cookery. Syrup- stages of sugar cookery and crystalline and non-crystalline candies.

NUTRITION THROUGH LIFE CYCLE

SUB CODE: 12PFNC02

HOURS: L+T+P=C

MARKS: 100

5+0+0=5

UNIT I

Concept of different food groups, Recommended Dietary Allowances for Indians, basis for requirement, computation of allowances. Nutrition in pregnancy-stages of gestation, maternal physiological adjustments, weight gain during pregnancy and nature of weight gain, nutritional requirements, storage of nutrients, physiological cost of pregnancy and complications of pregnancy.

UNIT II

Nutrition in lactation- physiological adjustments during lactation, hormonal controls & reflex action, lactation in relation to growth and health of infants, physiology of milk production, problems of breast feeding, nutritional components of colostrum and mature milk, special foods during lactation, nutritional requirements during lactation.

UNIT III

Nutrition in infants – rate of growth, weight as the indicator, feeding premature infants and low birth weight infants, breast Vs bottle feeding, nutritional allowances, supplementary feeding and weaning foods. Nutrition in preschool children – growth and development of preschool children, food habits, nutritional requirements and supplementary foods.

UNIT IV

Nutrition in school age - Early and middle childhood, growth and development, food habits, nutritional needs and feeding – packed lunch. Nutrition during adolescence – physical growth, physiological & psychological problems associated with pubertal changes, nutritional needs, eating disorders- anorexia nervosa and bulimia, adolescent pregnancy and its complications

UNIT V

Nutrition during adulthood – Nutrition and work efficiency and nutritional needs. Nutrition during old age - physiological and psychological changes during old age, nutritional requirements, factors affecting food intake, common nutritional problems in old age.

REFERENCE

1. Swaminathan,M. Advanced text book on Food and Nutrition, , An mol Publication Pvt,Ltd, Second Edition.2004.
2. Venkataiah S.D.,Nutrition Education, Anmol Publication Pvt. Ltd, Revised 2004.
3. Mahtab S.Bamji, Prasad Rao, N.Vinodini Reddy. Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt .Ltd, Second Edition, 2003.
4. Srilakshmi, B. Nutrition Science, New Age International [p] ltd, New Delhi, 2002.
5. Gopal,C.Kamalakrishnaswamy, Nutrition in Major Metabolic Disease, Oxford India Paper backs Publisher First Edition 2000.

6. H.P.S. Sachdev, Anna choudhry., Nutrition in children- Developing country concerns N.I. Publications Pvt. Ltd, New Delhi, 2004.
7. Sumati. R. Mudambi, M.V Rajagopal., Fundamentals of Foods & Nutrition, 4th Edition New age International publishers New Delhi, 2006.
8. Judith E. Brown., Nutrition Now, 2nd edition, West / Wadsworth west / Wadsworth, An International Thomson publishing company, 1998.
9. Melvin H. Willams., Nutrition for health fitness & Sport. 5th edition Mcgraw –Hill, publishing Co., 1999.
10. Gordon M. Wardlaw, Anne M. Smith Contemporary Nutrition, Mc Graw – Hill International Edition -2006.
11. Nutrient Requirement and Recommend Dietary Allowances for Indians by Indian council of Medical research, National Institute of nutrition, Hyderabad, 2004.
12. Dietary Guidelines for Indians, National Institute of Nutrition, Hyderabad, 2004.

MACRO NUTRIENTS

SUB CODE : 12PFNC03

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

Unit I – CHO- Classification, digestion, absorption, metabolism-glycolysis, TCA cycle, glycogenesis, utilization, functions & sources

Unit II- Lipids- Classification, digestion, absorption, transport, functions, storage, sources, metabolism of cholesterol(outline)

Fatty acids- Types, functions, sources, deficiency of EFA, EFA requirements. Phospholipids and their functions.

Unit III- Proteins- Classification, digestion, absorption, general pathway of protein metabolism- denaturation, transamination, deamination, decarboxylation and excretion., Protein utilization in the body, protein sources.

Amino acids- Classification (chemical & nutritional), specific functions of amino acids, Amino acid imbalance.

Unit IV- Energy- Energy value of foods, unit of measurements, measurements of energy value, Components of human energy expenditure- resting metabolic rate: measurement of metabolic rate – direct and indirect calorimetry, factors affecting the metabolic rate, physical activity, thermic effect of food.

Unit V

Dietary fiber- Definition, classification (soluble, insoluble), digestion, functions, sources, interrelationship between CHO, protein and fat. Alcohol- sources, absorption and metabolism.

FOOD PRESERVATION

SUB CODE : 12PFNE01

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

UNIT I

Basic principles of food preservation, prevention of food spoilage, principles of sanitation to be observed in food preservation, Methods of food preservation.

UNIT II

Addition of salt – pickling and curing of meat and fish, canning – steps, containers and equipment for canning. Sugar concentrates, Jams, Jellies and squashes.

UNIT III

Refrigeration and freezing – methods, advantages and disadvantages. Drying and dehydration – methods , factors influencing, advantages and disadvantages.

UNIT IV

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

UNIT V

Chemical additives – classification, criteria for selection of chemical additives- mode of action, types of preservative, irradiation and microwave heating of foods, principal effects of irradiation, advantages, disadvantages, method of packing- list of common packaging materials and their usage with examples.

REFERENCE

1. Potter, H. N, Food Science, AVI Pub, Co., Westport, 1978.
2. Srilakshmi, B, Food Science, 3rd Edition, New Age International Pub, New Delhi, 2003.
3. Shakuntala Manay and Shadaksharaswamy, Foods, Facts and Principles, Wiley Eastern Co., New Delhi, 1995.
4. Charley,H, Food Science ,(2nd edition), John Wiley & sons, New York, 1982.
5. Lall, G., Siddhappa, G.V and Tandon, J. L, preservation of fruits and vegetables, Indian council of agricultural research, New Delhi, 1967.

Practical /Related Experiences

1. A visit to Food Processing and Preservation industry (one week)and report preparation

COMPUTER APPLICATIONS PRACTICAL

SUB CODE : 12PFNCP01

HOURS : L+T+P=C

MARKS : 100

0+0+5=5

1. Working with files and folders
2. Working with control panel options
3. MS Word- Starting word, creating, editing and saving a word document, previewing and printing a document, creating table and working with graphics, Tabulating nutrient content of foods and editing the table.
4. MS Excel - Starting excel, working with spread sheet, working with formula, functions, graphs and charts. Calculating the measures of central tendency, measures of dispersions and dietary calculation using excel
5. MS power point - creating slides, slide show presentation, transition and effects, inserting pictures and slides, import and export using excel and other templates, creating a powerpoint presentation with animations on nutrition related topics
6. Creating Email ID, sending and receiving Emails.

. REFERENCE

1. Sanjoy Saxena, 2002, MS office 2000, for everyone, Vijay Nicole imprints, Chennai
2. Ajai, S. Gaur and Sanjaya S. Gaur, 2006. Statistical methods for practice and Research, Sage Publications, New Delhi
2. SPSS package tutorial

FOOD ANALYSIS PRACTICALS

SUB CODE : 12PFNCP02

HOURS : L+T+P=C

MARKS : 100

0+0+4=4

I. Quantitative Analysis

1. Protein by Lowry's method
2. Nitrogen by kjeldhal method
3. Iodine Number of oil
4. Saponification number of oil
5. Acid Number of oil
6. Ash content
7. Iron
8. Phosphorus
9. Calcium
10. Vitamin -C
11. Thiamine
12. Riboflavin
13. Sodium
14. Potassium
15. Vitamin A / β carotene

Demonstration

1. Energy value by bomb calorimeter
2. Moisture by hot air oven method
3. Fat by soxhlet method

REFERENCE

1. Raghuramulu, N., Nair, K.M. and Kalyanasundaram, A. (1983), A Manual of laboratory Techniques, National Institute of Nutrition, Silver prints, Hyderabad.
2. Oser, B.L.(1954), Hawke's physiological chemistry, XIV edition, Tata MC Graw Hill Publishing company ltd, Mumbai.
3. Jayaram. J.(1996), Laboratory manual in Biochemistry, New Age International Ltd, publishers, New Delhi, fifth reprint .
4. Sadasivam, S and Manickam, A (1991), Biochemical methods, New Age International Pvt. Ltd, publishers, New Delhi, 2nd edition .

SEMESTER- II

FOOD SCIENCE-II

SUB CODE : 12PFNC04

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

UNIT-I: Vegetables and fruits- composition, classification, pigments, enzymes, tannins, pectin, acids and flavors- changes during cooking, points to be considered while cooking and serving of fruits and vegetables- effect of cooking on pigments, browning reaction, ripening of fruits.

UNIT- II:

Egg- Structure, composition, coagulation of egg protein, factors affecting coagulation of egg protein, egg quality, Role of egg in cookery.

UNIT- III:

Meat- Structure, composition, postmortem changes, cuts of meat, tenderness of meat, changes during cooking, factors affecting cooking quality and changes during cooking of meat.

Poultry- and fish- Classification, composition, structure, selection of poultry and fish.

UNIT- IV:

Milk- types, composition, physical and chemical properties, milk cookery, effect of heat, acids and enzymes, Phenolic compounds and salts, role of milk in cookery, points to be considered in using milk and milk products in cookery.

UNIT- V:

Spices and condiments-types, uses and abuses, volatile flavor compounds in spices. Beverages – Classification and points to be considered while making beverages.

REFERENCE:

1. Sri Lakshmi, B, Food Science, New Age International (P) Ltd., New Delhi, 3rd edition, 2003
2. Potter, N.W, Food Science, AVI Publidshing, Co, Cunneticut, 1960.
3. Shakuntalamanay, N & Shadakcheraswamy, M , Foods, facts and principles, Wiley Easterd Ltd. 2004.
4. Margus Karel Daryl B. Lund, Physical principles of food preservation, 2nd edition printed in the United States of America.
5. M.N. Ahmed, Food science and nutrition, 1st edition Anmol Publications Pvt, Ltd, New Delhi, 2005.

CLINICAL NUTRITION I

SUB CODE : 12PFNC05

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

Unit I

Therapeutic diets- Objectives, principles & types of hospital diets; diet planning, use of exchange list in nutrient calculation.

Dietitian: types, qualities, qualification, role of dietitian , diet counseling,& patient education.

IDA- Objectives & functions.

Unit II

Nutritional care for

- (a) Fever & infection (b) deficiency disorders: PCM, anemia, Vit A deficiency, (c) Dental caries & periodontitis, (d) Allergy & burns

Unit III

Nutritional care for GI tract diseases_ Esophagitis, hiatus hernia, indigestion, hypochlorhydria, gastritis, peptic ulcer, duodenal ulcer, flatulence, constipation, diarrhea, steatorrhea, diverticulitis, ulcerative colitis, & mal absorption syndrome: etiology, symptoms & dietary mgt

Unit IV

Nutritional care for diseases of liver, gall bladder & pancreas- etiology, symptoms, & dietary mgt for viral hepatitis, jaundice, hepatic coma, fatty liver, cholecystitis, cholelithiasis & pancreatitis.

Unit V

Nutritional care for cardio vascular diseases- etiology, symptoms & dietary mgt for hypertension, atherosclerosis, coronary heart disease, congestive heart failure, hyper lipoproteinemia, hyper cholestrolemia. Role of dietary fat, fibre & anti oxidants in the development, prevention & treatment.

MICRO NUTRIENTS

SUB CODE : 12PFNC06

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

Unit I

Macro minerals

Calcium- Distribution, function, absorption, factors affecting absorption, calcium balance, requirement, sources, deficiency & toxicity

Phosphorus- Distribution, functions, absorption, requirement, sources & deficiency

Magnesium- Distribution, function, absorption, requirement, source & deficiency

Unit II

Micro minerals

Iron, Zinc, Copper, cobalt, selenium. chromium- Function, absorption, transport, requirement, sources, deficiency & toxicity

Unit III

Fat soluble vitamins A,D,E &K – Functions, absorption, requirement, sources, deficiency & toxicity

Unit IV

Water soluble vitamins- Thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12, ascorbic acid, pantothenic acid & biotin- Functions, absorption, requirement, sources & deficiency

Unit V

Water & electrolyte balance: Functions of water in body, distribution of body water, water components water balance: intake& output;

Electrolytes in water balance: Electrolyte composition of body fluids, electrolyte balance within fluid compartments, electrolyte control of body hydration.

EXTRA DISCIPLINARY PAPER (EDC)

BAKERY

SUB CODE : 12PFNS01

HOURS : L+T+P=C

MARKS : 100

4+0+0=4

UNIT - I

Baking Principles, role of ingredients in baking, Major ingredients – wheat flour – Types of wheat, Principles of flour milling, flour and dough qualities, gluten and test for gluten.

UNIT – II

Other ingredients and their function in baking. Sugar – sources, types, functions of sugar and role in baking. Shortening agents – Nature of fat, types, functions and characteristics, shortening value and plasticity, Leavening agents – Definition, physical, chemical and biological leavening agents, role of leavening agents in baking. Eggs – egg foams and their role in bakery.

UNIT – III

Baking process – basic concepts, batch/continuous dough mixing, dividing, moulding, panning, proofing, baking, Qualitative changes during different unit operations.

UNIT – IV

Major and minor equipments used in bakery, plan for a bakery unit – Maintenance of sanitation and hygiene in bakery Unit.

UNIT – V

Methods of preparing variety of baked products – bread and bread rolls, biscuit, cake, cookies, pastries, variety of icings, soufflé and meringue.

REFERENCES

1. Matz, S.A, Technology for the materials of baking, Elsevier Science publishers, England, 1989.
2. Helen Charley, Food Science, New York, John Wiley & Sons, 1982.
3. Debey's bakery, wheat associates of India, 1979
4. Varghese, Theory of cookery, new age international, New Delhi, 2001.

Practical /Related Experiences

1. Visit to well establish bakery unit. (One week) and report preparation

NUTRACEUTICALS AND FUNCTIONAL FOODS

SUB CODE : 12PFNE02

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

UNIT – I

Functional Foods and Nutraceuticals - Introduction - Defining the concept – Cereals and pulses as functional food Teleology of Nutraceuticals – Primary and secondary metabolites in plants. General Teleology – a) Carotenoids b) Conjugated linolenic acid c) Flavonoids d) Sulphur containing Amino Acid Derivatives e) Omega 3 fatty acids f) PUFA g) Terpenoids

UNIT – II

Therapeutic role of nutraceuticals

Classifying Nutraceuticals

- a) Food Source – Plant: Soya, olive oil, tea, grape wine, garlic, dietary fibre and other fruits and its Mechanism of Action – on Anticancer, Blood Lipid Profile, Anti oxidation.

UNIT – III

- a) Animal source as nutraceuticals: Milk and products, meat, fish. Microbial: probiotics. Mechanism of Action in various disease conditions related to human health.
- b) Chemical Nature – Isoprenoid derivatives, phenolic substances, Fatty acids and structural lipids, Carbohydrates and derivatives, Amino acid base substances, Microbes, Minerals.

UNIT -IV

Dietary Supplements – role of nutraceuticals in the management of – Inborn errors of metabolism, obesity, neurological disorder, diabetes mellitus, hypertension, vitamin A Deficiency and PEM.

UNIT –V

Infant foods and formulas, supplement, herbal and functional food, beverages and Role of nutraceuticals in Sports nutrition. Nutrigenomics – Relationship between nutritional supplementation and gene expression and disease prevention.

REFERENCE

- 1.Mary, K. Schmidl and Theodore, P. Labuza , Essentials of Functional Foods, Culinary and hospitality industry publication services, 2000.
- 2.Mazza, G , Functional Foods- Biochemical and processing aspects, Culinary and hospitality industry publication services, 1998.
- 3.Israel Goldberg , Functional foods, Pharma foods, Nutraceuticals, Culinary and hospitality industry publication services, 2001.
- 4.Robert easy Wildman , Handbook of Nutraceuticals and Functional Foods, Culinary and hospitality industry publication services, 2001.

5. David, H. Watson , Performance, Functional Foods, Culinary and hospitality industry publication services, 2003.
6. Chatwick, R et al. , Functional Foods, Springer, 2003.
7. Jeffery Horst, Methods of Analysis for Functional Foods and Nutraceuticals, CRS Press, 2002.
8. Paresh, C. Dutta , Phytosterols as Functional Food Components and Nutraceuticals, Marcel Dekker Inc, New York, 2004.

Practical / Related Experiences

A visit to siddha Pharmaceutical Company.

SEMESTER-III

CLINICAL NUTRITION II

SUB CODE : 12PFNC07

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

Unit I

Nutritional care for metabolic disorders- Diabetes mellitus: Classification, symptoms, metabolic changes, complications, dietary mgt, glycemic index of foods, types of insulin, nutritive & non nutritive sweeteners.

Unit II

Nutritional care for phenyl ketonuria, tyrosemia, histidinemia, maple syrup urine disease, galactosemia, lactose intolerance, Addison's disease, hypothyroidism, hyperthyroidism, tetany, hypocalcemia & gout.

Unit III

Nutritional care for renal disorders: etiology, symptoms & dietary mgt for glomerular nephritis, nephrosis, renal failure, nephrosclerosis, nephrolithiasis, dialysis & transplantation.

Unit IV

Nutritional care for weight mgt: Obesity & under weight- types of obesity, etiological factors, grades of obesity; dietary modification for obesity & under weight.

Respiratory & musculo skeletal systems: Arthritis(rheumatoid& osteo) , asthma, muscular dystrophy.

Unit V

Cancer- causes, pathogenesis, classification, metabolic & nutritional alterations in malignancy, nutritional therapy, eating problems.

HIV- epidemiology, transmission, clinical manifestation, dietary mgt, prevention & control.
syllabus for papers food analysis, food micro, RM & stat, FP, Community nutrition, Fqc, Nutra & final foods, Food biotech , clinical nutrition pracs may be copied from Periyar University syllabus. Necessary modifications may be done where ever required.

FOOD MICROBIOLOGY

SUB CODE : 12PFNC08

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

UNIT I

Introduction – Development of microbiology, classification of microorganisms, morphology – Bacteria, yeast, mold and algae. Primary sources of micro-organism in food, microbial growth intrinsic and extrinsic parameters of food affecting the microbial growth.

UNIT II

Principles and types of food spoilage, Control of micro organisms – Sterilization, physical agents – lights, desiccation, electricity and heat. Chemical agents, removal of microorganism by filtration.

UNIT III

Water – sources, bacteriology of water supplies, Bacteriological examination, Purification of water, water borne diseases and prevention. Food borne diseases-food infection and intoxication.

UNIT IV

Microbiology of cereal and cereal products- organisms associated with grains. Classification and control of molds in bread. Microbiology of fruits and vegetables – contamination and control of microorganisms in fruits and vegetables.

UNIT V

Microbiology of milk and milk products- kinds of microorganisms in milk, sources of contamination, pathogens in milk, control of microbes in dairy products, fermented milk, butter and cheese. Microbiology of fleshy foods – egg, poultry, fish and meat products- sources and contamination, spoilage and its control.

REFERENCE

1. Pelczar, M.I and Reid, R.D, Microbiology, MC Graw Hill Book Company, New York, 5th edition, 1993.
2. Atlas M.Ronalds , Principles of microbiology, 1st edition, Mosby – year book Inc, Missouri, U.S.A, 1995.
3. Frazier, W.C, Food Microbiology, MC Graw Hill Inc 4th edition, 1988.
4. Banwart , Basic food Microbiology, 2nd edition CBS Publisher, 1989.
Bensaon, H.J, Microbiological applications, C. Brown publishers, U.S.A, 1990.

Practical / Related Experiences.

1. A visit to defence food laboratory.
2. A visit to BIS

RESEARCH METHODOLOGY AND STATISTICS

SUB CODE : 12PFNC09

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

UNIT I

Meaning of Research, Role of Statistics & research in Home Science discipline, objectives of research, Types of Research and their application, selection and formulation of Research problem, Hypothesis, Designing a research – different types, census and sample method, theoretical Basis of sampling, Sampling methods – Random sampling methods and Non-Random sampling methods, size of sample, sampling and Non-sampling errors.

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.

REFERENCE

1. Kothari, C.R , Research Methodology, 2002.
2. Gupta, S.P, Statistical Methods, Sultana Chand and Sons, 31st revised edition, 2002.
3. Devadas, R.P ,A Handbook on Methodology of Research, Sri Ramakrishna Vidhyalaya, Coimbatore, 1989.
4. Ramakrishnan, P , Biostatistics, Saras publication, 2001.
5. Donald, H.M.C. Burney , Research Methods, fifth edition, Thomson and Wadsworth Publications, 2002.
6. Shanthi,P., Sophia and Bharathi , Computer oriented statistical methods/ probability and Statistics, charulatha publications, second edition, 2000.
7. Pillai,R.S.N and Bagavathi,V , Statistics, Chand and company limited, 2001 .

Practical / Related Experiences

1. Identifying the research problems under each type.
2. Formulation of questionnaires and schedules.
3. Consolidating data and forming tables.
4. Drawing graphs and diagrams appropriately.
5. To understand and select a suitable saying methods for a given situation.
6. Working out numerical sums for all statistical analysis and interpret.

COMMUNITY NUTRITION

SUB CODE : 12PFNC10

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

UNIT I

Relation of Nutrition to National development in terms of socio- economic, industrial and agricultural development. Food security- Definition, Food security at house hold level, Factors affecting food security system, National and international approaches to improve food security.

UNIT II

Assessment of Nutritional status - Dietary survey, Biochemical methods, Growth monitoring methods, Body composition studies, Tests of intelligence related to nutrition. Epidemiology of communicable diseases - Factors responsible for the spread of communicable diseases, Mode of transmission- Chicken pox, Typhoid fever, Malaria, Leprosy, Filariasis.

UNIT III

Malnutrition - Etiological factors leading to Malnutrition, consequences of malnutrition, Synergism between malnutrition and infection, measures to overcome malnutrition. Infant Mortality Rate(IMR), Neonatal Mortality Rate (NMR), Maternal Mortality Rate(MMR) and prevalence of common nutritional problems – Protein Energy Malnutrition(PEM), Vitamin A Deficiency diseases, Anemia, Iodine deficiency disorders and flurosis,

UNIT IV

Nutrition Intervention Programmes in India .Objectives and operation of Chief Minister Noon Meal Programme(CMNMP) and Integrated Child Development Service(ICDS). Primary Health Center (PHC) – concept, organization, current status in India and delivery of service. National organization– ICMR, NIN, NNMB, CFTRI, DFRL, and ICAR, NIPCCD. International Organization– FAO, WHO, UNICEF. Voluntary services – CART, CWS, CRS and AFPRO

UNIT V

Nutrition Education- Types and Methods of education. Principles of planning, executing and evaluating nutrition education programmes, problems of nutrition education.

REFERENCE

1. Wal Ruchi Mishra,S, Encyclopedia of Health Nutrition and family welfare, published by Sarup and sons, New Delhi 2000.
2. Srilakshmi, B. Nutrition Science, New Age International [p] ltd, New Delhi, 2002.
3. Swaminathan, M.Handbook of Food and Nutrition, the Bangalore Printing and Publishing Co.Ltd, Fifth Edition, 2003.

4. Padmini Gupta, Ruchi thakkar, Nutritional Disorders and Community Health, Pointer Ltd Publishers, Jaipur.
5. Venkataiah S.D. Nutrition Education, Anmol Publication Pvt, Ltd Reserved 2004.
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9. R. C. Mishra , Health and Nutrition Education, A. P.H. Publishing Corporation, New Delhi, 2005.

Practical / Related Experience

1. Planning, conducting and evaluating nutrition education programmes in a selected community.
2. Critical appraisal of existing interventions and programmes in the voluntary sector and government and suggestions to improve the same vis – a – vis target groups in society and specific needs

FOOD PROCESSING AND QUALITY CONTROL

SUB CODE : 12PFNE03

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

UNIT – I

Physical principles in food processing, – thermal processing, refrigeration, freezing, dehydration, ionizing radiation. Chemical principles in food processing – preservation/ processing by sugar, salt, curing, smoking, acid and chemical. Chemical changes in food that affect texture, flavor, colour , nutritive value and safety during handling , storage and processing.

UNIT II

Cereal Technology: Rice- Parboiling, milling, by products of rice milling; Wheat- milling, by products of wheat milling fermentation; Manufacture of breakfast cereals, extruded products, puffed and flaked cereals. Pulse /legume Technology – milling, fermentation and germination. Sugar technology – Manufacturing of sugar from sugarcane, sugar cubes and powdered sugar.

UNIT –III

Oil Seeds – milling, extraction of oil and it's processing, inter – esterification and production of MCT meal concentrates and isolates, specialty fats from non-traditional oilseeds, use of fat replaces in processed food. Milk Technology - Separation, standardization, pasteurization, homogenization, sterilization, evaporation, drying, condensation, membrane fractionation, milk products -butter, ghee, cream, paneer, yoghurt and cheese.

UNIT-IV

Egg Technology – manufacturing of egg powder. Fleshy food Technology – canning, freezing, salting, smoking, dehydration of meat, poultry and fish, fish oil extraction. Fruits and vegetables –dehydration, juices, concentrates. Spices Technology - Extraction of essential oils and colors.

UNIT – V

Food Quality assurance – Quality assurance programme –Quality plan, documentation of records, product and specifications process control and HACCP, corrective action, and total quality process. Quality parameters- physical, chemical, functional, microbial; Rapid diagnostic methods of food quality – instruments and kits, Food standards – GMP, codex alimentations, ISO – 9000 serious, Food laws - PFA, FPO, AGMARK, MPO, BIS, Food safety and standards act,2006.

REFERENCE

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Published, Published in Great Britain by Chapman & Hall London, 1994.

1. Rick Parkar, Introduction to Food Science, Library of Congress Cataloging-in-Publication Data, First Edition, 2002.
2. Lillian Hoagland Meyar, Food Chemistry, CBS Publishers & Distributors, New Delhi, Reprint, 2004.
3. Suman Bhatti & Uma Varma, Fruit & Vegetable Processing Organizations and Institutions, CBS Publishers and Distributors, New Delhi, Reprint 2003.
4. Thoms Richardson and Johan W. Finley, Chemical Changes in Food during Processing, CBS Publishers and Distributors, New Delhi, 2003.
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8. Pomeranz, Y. and Meloan, C. E (1996): Food Analysis: Theory and Practice, CBS Publishers and Distributor, New Delhi.
9. Askar, A. and Treptow, H. (1993): Quality Assurance in Tropical Fruit Processing, Springer – Vertag, Bertin.
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11. Marth, E.H. (1978): Standard Methods for the Examination of Dairy Products 14th ed or edition. Interdisciplinary Books and Periodicals, Washington, D.C.
12. Ranganna, S. (1986): Handbook of Analysis and Quality Control for Fruit and Vegetable Products, 2nd edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
13. Hagstad, H.V. and Hubbert, W.T. (1986): Food Quality Control, Foods of Animal Origin, Iowa State University press, AMES.

Practical / Related Experience

1. Visit to food processing Industries- Rice, wheat, pulse, millets, fleshy foods, Egg milk, and milk product and fruit and vegetable processing Industry.

CLINICAL NUTRITION PRACTICALS

SUB CODE : 12PFNCP03

HOURS : L+T+P=C

MARKS : 100

0+0+4=4

Analysis of Blood / Serum

2. Blood glucose
3. Serum iron
4. Serum cholesterol
5. Serum protein
6. Serum vitamin – A
7. Blood Haemoglobin

Analysis of urine

1. Creatinine
2. Urea
3. Total nitrogen
4. Calcium
5. Phosphorus
6. Vitamin – C

Qualitative Analysis

1. Qualitative analysis of sugars

Reactions of Monosaccharide

- Reactions of Glucose
- Reactions of Fructose
- Reactions of Galactose
- Reactions of mannose
- Reactions of Ribose

Reactions of disaccharides

- Reactions of maltose
- Reactions of lactose

Reactions of polysaccharides

- Reactions of starch
- Reactions of dextrin

General Procedure for unknown sugars

- Analysis of unknown sugar –A

1. Qualitative analysis of amino acids

Reactions of individual amino acids

- Reactions of tyrosine
- Reactions tryptophan

- Reactions of arginine
- Reactions of histidine
- Reactions of cystine
- Reactions of methionine

General procedure for unknown amino acids

- Analysis of unknown amino acids

REFERENCE

1. Reghuramulu, N., Naire, K.M & Kalyanasundaram, S.A., Manual of Laboratory Techniques, National Institute of Nutrition, ICMR, Silver Prints, Hyderabad, 1983.
2. Varley, H., Gowenlak, A.H and Hell, M., Practical Clinical Biochemistry, William Itinmaon Medical Books, London, 1980.
3. Jayaraman, J., Laboratory manual in Biochemistry, New Age International Ltd, Publishers, New Delhi, Fifth Reprint, 1996.
4. Sadasivam, S and Manickam , A , Biochemical methods, New Age International P.Ltd. Publishers, New Delhi, Second edition, 1996.

SEMESTER-IV

FOOD BIOTECHNOLOGY

SUB CODE : 12PFNE04

HOURS : L+T+P=C

MARKS : 100

5+0+0=5

UNIT – I

Introduction to Biotechnology, Industrial biotechnology, Introduction to industrial micro organisms, metabolism and regulation of metabolism, production of primary and secondary metabolites, Isolation and screening of micro organisms, stain improvement and biotransformation.

UNIT II

Gene cloning – steps and technique involved in gene cloning. Genetically modified foods- Definition, examples of GM foods and its production, advantages and disadvantages, ethical and legal concerns – safety aspects of foods produced by biotechnology and genetic engineering.

UNIT III

Food Fermentation- Batch and continuous process, Fermentor design, solid substrates fermentation, instrumentation and control, criteria used in media formulation, downstream processing, Alcoholic beverages, cheese making, bread making, fermented soya based foods, meat fermentations and vinegar.

UNIT IV

Enzyme technology in food industry -Industrial enzymes (with respect to food processing industry), immobilization of enzymes, immobilized plant cells for production of food flavors and colours, immobilized enzymes in food processing, development of novel sweeteners, Production of food additives and supplements

UNIT V

Microbial biomass production- baker's yeast, single cell protein and mushroom, Food industrial wastes- Typs, sources and characteristics of industrial wastes, waste disposal – physical, chemical and biological treatment, management of waste by products from sugar, fruits and vegetable, meat, fish, oil and fat, dairy and cereal industry; utilization of food industry wastes; Recovery of useful materials from effluents by different systems.

REFERENCE

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2. Frazier and West Hoff , Food Microbiology, Tata McGraw Hill publishing company Ltd, New Delhi, 1995.
3. Dubey, R.C , Text book biotechnology S.Chand and Co Ltd,New Delhi, 2001.
Gupta, P.K, Elements of biotechnology, Rostogi and Co, Meerut, 1996.
4. Gary Walsh and Denis R. Headen, Protein Biotechnology John Willey & Sons England.
Dubey, R.C and Maheswari, D.K, A Text book of Microbiology, S.Chand and Co, Ltd, New Delhi (2003).
5. Stanbur, P.F and Allan, W. (1984): Principles of fermentation technology, Pergamon Press oxford
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8. Lawrence K.W. and Wang, MUS (1992), Handbook of Industrial waste treatment, Marcel Dekker, Inc. New York
9. WHO (1990): Strategies for assessing the safety of foods by biotechnology, Report of joint FAO/WHO consultation -Geneva

Practical related experience

1. Isolation, purification and maintenance of yeast and bacterial cultures
2. Aerobic and anaerobic fermentation
3. Production of various fermented food products
4. Production of metabolites and enzyme

PROJECT

SUB CODE : 12PFND01

HOURS :

MARKS : 200

The dissertation should include research in food processing and clinical nutrition presented in a comprehensive manner with recommendations for solutions based on scientifically worked our date. It should contain less than 200 pages.