Home Science

DEPARTMENT OF FOODS AND NUTRITION

M.Sc and Ph.D programmes

List of courses

S. No	Course No.	Title of the Courses	Credits
Major Courses			
1	FN 501	Advanced Food Science	3(2+1)
2	FN 502	Advanced Nutrition	3(3+0)
3	FN 503	Food Analysis	4(1+3)
4	FN 504	Advances in Community Nutrition	3(1+2)
5	FN 505	Food Processing Technology	3(3+0)
6	FN 506	Clinical Nutrition	4(2+2)
7	FN 507	Nutrition During Life Cycle	3(3+0)
8	FN 508	Nutrition and Physical Fitness	3(2+1)
9	FN 509	Advanced Diet Therapy	3(2+1)
10	FN 510	Food Toxicology	2(2+0)
11	FN 511	Advanced Human Physiology	3(2+1)
12	FN 512	Food Service Management	3(1+2)
13	FN 513	Food Product Development	2(1+1)
14	FN 514	Nutrition and Community	2(2+0)
15	FN 515	Special Project	1(0+1)
16	FN 591	Master's Seminar	1(1+0)
17	FN 599	Master's Research	20
18	FN 601	Advances in Carbohydrates , Proteins and Lipids	4(3+1)
19	FN 602	Advances in Vitamins and Hormones	2(2+0)
20	FN 603	Minerals in Human Nutrition	3(2+1)
21	FN 604	Advances in Food Sciences and Technology	3(2+1)
22	FN 605	Advances in Energy Metabolism	2(2+0)
23	FN 606	Nutrition and Agriculture Interface	3(3+0)
24	FN 607	Nutrition in Emergencies	2(2+0)
25	FN 608	Application of Biotechnology in Food Science and Nutrition	2(2+0)
26	FN 609	Global Nutrition Problems	2(2+0)
27	FN 610	Maternal and Child Nutrition	3(2+1)
28	FN 611	Special Project	3(0+3)
29	FN 691	Doctoral Seminar I	1(1+0)
30	FN 692	Doctoral Seminar II	1(1+0)
31	FN 699	Doctoral Research	45

MINOR COURSES

- Department of Biochemistry, Department of Microbiology
- Department of Extension Education,
- Department of Human Development and Family Studies

- Department of Biotechnology, Department of Post Harvest Technology
- Department of Agriculture Economics

S.No.	Course No.	Title of the Courses	Credits
SUPPORTING COURSES			
1.	HSC 500	Research Methods in Home Science	3(2+1)
2.	STAT 500	Statistical Methods	3(2+1)
3.	HSC 600	Research Project Management	3(2+1)
4.	STAT 600	Data Processing	2(1+1)
NON-CREDIT COMPULSORY COURSES			
1.	PGS 501	Library and Information Services	1(0+1)
2.	PGS 502	Technical Writing and Communications Skills	1(0+1)
3.	PGS 503 (e-Course)	Intellectual Property and its Management in Agriculture	1(1+0)
4.	PGS 504	Basic Concepts in Laboratory Techniques	1(0+1)
5.	PGS 505 (e-Course)	Agricultural Research, Research Ethics and Rural Development Programmes	1(1+0)
6.	PGS 506 (e-Course)	Disaster Management	1(1+0)

***M.Sc :*Minor Course – 9 Credits – Any Discipline from the list**

Ph.D: * Minor Course Seminar- Any one discipline from the list

M.SC- HOME SCIENCE COMPULSORY COURSES

S. No	Course No.	Title of the Courses	Credits
M. Sc- HOME SCIENCE COMPULSORY COURSES			
1	FN 501	Advanced Food Science	3(2+1)
2	FN 502	Advanced Nutrition	3(3+0)
3	FN 503	Food Analysis	4(1+3)
4	FN 504	Advances in Community Nutrition	3(1+2)
5	BIOCHEM 502	Intermediary Metabolism	3(3+0)
6	HSC 500	Research Methods in Home Science	3(2+1)
7	FN 591	Master's Seminar	3(2+1)

		Total	**20 (14+7)**

FN 501 ADVANCED FOOD SCIENCE 2+1

Objective

To make the students aware about common food processing techniques and understand the physico-chemical properties of foods.

Theory

UNIT I

Colloidal chemistry as related to foods; evaluation of food by subjective and Objective methods. Carbohydrates in foods sources and characteristics of sugar, starch, cellulose, pectin and gums characteristics in foods; effect of cooking and processing techniques.

UNIT II

Protein in foods: Plant and animal foods; chemical and physical properties related to foods; effect of cooking and processing techniques. Properties, uses, processing techniques, changes during heating and other processing and storage of fats and oils.

UNIT III

Classification, importance, composition of fruits and vegetables and effect of cooking and other processing on their nutritive value.

UNIT IV

Classification and importance of beverages; food pigments; browning reaction. Definition, classification, uses and legal aspects of food additives; classification, nature and uses of leavening units.

Practical

Microscopic structure of different starch granules; evaluation of food by subjective and objective methods ; changes in colour , texture and flavour of foods due to processing; effect of cooking on protein , fat and carbohydrates ; product preparation using leavening agents; project work related to text .

Suggested Readings

Borgstrom G.1968. *Principles of Food Science*. Vols. I, II. Macmillan.

Desrosier NW & Desrosier JN. 1997. *The Technology of Food Preservation.* AVI Publ.

Griswold RM. 1962. *The Experimental Study of Foods*. Houghton Miffin.

Khader V. 1999 *Text Book on Food Storage and Preservation*.

Kalyani. Krishna Swami K. 2000 *Nutrition Research – Current Scenario*. Oxford & IBH.

Lowe B. 1955 *Experimental Cookery*. John Wiley & Sons.

Manay NS & Shadaksharaswamy M. 1997. *Foods, Facts and Principles*. New Age International.

McWilliams M. 1993. *Foods, Experimental Perspectives*. Macmillan.

Meyer LH. 1976 *Food Chemistry*. AVI Publ.

Potter NN & Hotchkiss HJ. 1996. *Food Science*. CBS.

Subbulakshmi G & Udipi SA. 2006. *Food Processing and Preservation*.New Age International.

FN 502 ADVANCED NUTRITION 3+0

Objective

To enable the students to understand the current trends in nutrition, functions, deficiencies and toxicity of different nutrients and acquaint about nutritional requirement in special conditions.

Theory

UNIT I

Functions, sources, requirements, digestion and absorption of carbohydrates; definition, composition, classification, functions and role of dietary fibre in various physiological disorders.

UNIT II

Basis of requirement, functions, sources, digestion and absorption of protein; Methods of assessing protein quality .Basis of requirement, functions, sources, digestion, absorption and deficiency disorders of lipids; essential fatty acids and eicosanoids.

UNIT III

Requirements, functions, sources, deficiencies and toxicities of fat and water soluble vitamins.

UNIT IV

Requirement, functions, sources, deficiency, toxicity and factors affecting absorption and utilization of macro and micro minerals .Water balance; acid and base balance.

Suggested Readings

Anderson L, Dibble, Turkki PR, Mitchell HS & Rynbergen HJ. 1982. *Nutrition in Health and Disease*. JB Lippincott.

Bamji MS, Rao NP & Reddy V. 1999. *Text Book of Human Nutrition*. Oxford & IBH.

FAO/WHO/UNU 1985. *Energy and Protein Requirement*. Tech. Report 7824, WHO.

Guthrie HA. 1989. *Introductory Nutrition*. Times Mirror/Mosby College Publ.

ICMR. 1990. *Nutrient Requirement and Recommended Dietary Allowance for Indians*. A Report of Expert Group of the ICMR, NIN, Hyderabad.

James WPT & Schofied EC. 1990. *Human Energy Requirements - A Manual for Planners and Nutritionists*. Oxford University Press.

Jellifee DB. 1966. *The Assessment of the Nutrition Status of the Community*. WHO.

Jolliffe N. 1962. *Clinical Nutrition*. Hoeber Medicalk Division.

Khader V, Sumathi S & Manorama R. 1998. Course Manual of the Short Course on *"Recent Advances in Vitaminology"*, Center for Advanced Studies, Department of Foods and Nutrition, Post Graduate and Research Centre ANGRAU, Hyderabad.

Packer L & Funchs J. 1997. *Vitamin C in Health and Disease*, Marcel Dekker.

Passmore R & Eastwood MA. 1986. *Human Nutrition and Dietetics*. Elbs Churchill.

Pike RL & Brown ML. 1988 *Nutrition - An Integrated Approach*. John Wiley & Sons.

Proceedings of the Nutrition Society of India, NIN, Hyderabad.

Robinson CH & Lawler MR. 1986. *Normal and Therapeutic Nutrition*. Macmillan.

Shills ME, Olson JA, Shike M & Ross AC. 1999 *Modern Nutrition in Health and Disease*. Williams & Wilkins.

Swaminathan MS. 1985. *Advanced Text Book on Food and Nutrition* Vols. I, II. The Bangalore Printing & Publ. Co.

FN 503 FOOD ANALYSIS 1+3

Objective

To acquaint the students with principles, techniques and application of different methods of analysis for various nutrients. .

Theory

UNIT I

Familiarization to terms and calculations used in preparation of various standard solutions. Sample and sampling techniques.

UNIT II

Principles, techniques and applications of colorimetric, spectrophotometer and atomic absorption spectrophotometer.

UNIT III

Principles, techniques and applications of spectrophotometer fluorimetry, flame photometry and electrophoresis.

UNIT IV

Principles techniques and application of chromatography (paper chromatography, TLC,GLC, HPLC). Introduction to animal assay.

Practical

Handling of equipment and instruments; preparation of samples, solutions and buffers; quantitative estimation of proximate principles, minerals and vitamins by use of colorimetry, flame photometry, UV spectrophotometer; chromatography, atomic absorption

spectrophotometer and photofluorometry, analysis of antinutritional factors; estimation of protein and starch digestibility; fractionation of protein; food adulteration.

Suggested Readings

AOAC 1995. *Association of Official Analytical Chemists*. Washington, DC.

Gruenwedels DW & Whitakor JR 1984. *Food Analysis: Principles and Techniques.* Vols. I-VIII. Marcel Dekker.

Joslyn MA. 1970. *Methods in Food Analysis: Physical, Chemical and Instrumental Methods of Analysis.* Academic Press.

Pomeranz Y & Molean CE. 1977. *Food Analysis Theory and Practice*. AVI Publ.

Sawhney SK & Singh R. 2000. *Introductory Practical Biochemistry*. Narosa.

FN 504 ADVANCES IN COMMUNITY NUTRITION 1+2

Objective

To enable the students to understand the nutritional problems of the community and gain skills in planning, executing and evaluating nutrition projects of the community.

Theory

UNIT I

Assessment of the nutritional status at individual, household and institutional level: direct and indirect methods.

UNIT II

Ecological, socio-cultural, economic and demographic correlations of malnutrition; prevalence, etiology, biochemical and metabolic changes in vitamin A deficiency, PEM, iron deficiency anemia, IDD.

UNIT III

Major nutritional problems of the state, nation and world. Nutrition intervention- Definition, importance, methods of nutrition intervention and their impact evaluation.

UNIT IV

National nutritional programmes and policies; nutritional surveillance. National programmes and policies regarding food production and distribution.

Practical

Market survey for food availability and their cost; development of low cost nutritious recipes suitable for various vulnerable groups; visit to the ongoing public health nutrition programme and report writing; Techniques of assessment of nutritional status.

Project Work:- Studying existing diet and nutrition practices, planning and conducting survey, analyzing data and writing report; development, implementation and evaluation of community nutrition and health programmes.

Suggested Readings

Gopaldas T & Seshadari S. 1987. *Nutrition Monitoring and Assessment.* Oxford University Press.

Jeannette B Endres. 1990 *Community Nutrition Challenges and Opportunities*. Merrill.

Jelliffe DB. 1966. *The Assessment of the Nutritional Status of the Community*. WHO.

Jolliffee N.1962. *Clinical Nutrition*. Hoeber Medical Division.

McLaren DS.1977. *Nutrition in the Community*. John Wiley & Sons. *Nutrition Foundation of India Bulletin*. New Delhi.

Nutrition News. NIN, Hyderabad .

Park JE & Park K. 2000. *Text Book of Preventive and Social Medicine*. Banarsidas Bhanot Publ.

Rao BSN, Deosthale YG & Pant KC.1998 (Revised and updated). *Nutritive Value of Indian Foods* by Gopalan C, Ramashastri BV & Balasubramanium SC. NIN, Hyderabad.

Shukla PK. 1982. *Nutritional Problems of India*. Prentice Hall of India.

FN 505 FOOD PROCESSING TECHNOLOGY 3+0

Objective

To know processing technology of various food stuffs, physical and chemical principles in food processing and ways of quality control, waste disposal and sanitation in food industries.

Theory

UNIT I

Principles underlying food processing operations including thermal, radiation, refrigeration, freezing and dehydration. Effect of processing on physicochemical characteristics.

UNIT II

Processing technology for preservation and production of variety food products, losses during storage, handling and processing of cereals and legumes, oilseeds, fruits and vegetables.

UNIT III

Processing technology for milk and milk products, egg, meat, poultry and fish, convenience foods, processed foods. Technologies underlying in mutual supplementation, enrichment and fortification, fermentation, malting, germination. Food additives commonly used in food industries for color, flavor, and as preservatives.

UNIT IV

Quality control in food industry: raw material , finished products. Waste management and sanitation in food industries. Packaging of foods. Storage and marketing of processed foods.

Suggested Readings

Desrosier NW & Desrosier JN. 1977. *The Technology of Food Preservation*. AVI Publ.

Frank AP. 1987. *Modern Processing, Packaging and Distribution System for Foods*. AVI Van nonstand Reinhold Co.

Frazier WC. 1988. *Food Microbiology*. Tata McGraw Hill. McWilliams M. 1993. *Foods - Experimental Perspectives*. Macmillan. Potty VH & Mulky MJ. 1993. *Food Processing*. Oxford & IBH.

Srilakshmi B. 2001. *Food Science*. New Age International.

Swaminathan MS. 1993. *Food Science and Experimental Foods*. Ganesh & Co.

FN 506 CLINICAL NUTRITION 2+2

Objective

To familiarize students about estimation of RDA, deficiency of nutrients, estimation of different nutrients and metabolites in normal and diseased conditions.

Theory

UNIT I

Methods for estimating requirements and recommended allowances of energy, protein, minerals and vitamins for different age groups and physiological states.

UNIT II

Nutrient interrelationship; historical background, epidemiology, preventive and therapeutic measures of protein energy malnutrition.

UNIT III

Interrelationship, etiology and preventive measures of vitamin and mineral deficiencies toxicities.

UNIT IV

Principles and interpretation of clinical laboratory methods with particular emphasis on their interpretation relative to nutritional status and disease; interaction between nutrients, infections and drugs.

Practical

Biochemical analysis of blood under normal and diseased conditions for glucose, calcium, iron, creatinine, urea, uric acid, creatinine, albumin, globulin, cholesterol, phosphate, glutamate oxaloacetate transaminase, glutamate pyruvate transaminase; phospholipids; analysis of urine for specific metabolites under normal and diseased conditions.

Suggested Readings

Anderson L, Dibble MV, Turkki PR, Mitchel HS & Rynbergen H. 1982. *Nutrition in Health and Disease*. JB Lippincott Co.

ICMR 1998. *Recommended Dietary Allowance for Indians*. ICMR.

Khanna K, Gupta S, Seth R & Puri S. 1997. *Text Book of Nutrition and Dietetics*. Phoenix Publ.

Oser H. 1969. *Physiological Chemistry*. Tata McGraw Hill.

Raghuramalu N, Nair KM & Kali Sundram S. 1983. *A Manual of Laboratory Techniques*. NIN Hyderabad.

Srilakshmi B. 2002. *Nutrition Science*. New Age International.
Swaminathan M.1988. *Principles of Nutrition and Dietetics*. BAPPCO.

FN 507 NUTRITON DURING LIFE CYCLE 3+0

Objective

To enable the students to know physiological changes and nutritional requirements during various stages of life cycle.

Theory

UNIT I

Adulthood: sex, occupation, income. Pregnancy: physiological changes in pregnancy, weight gain during pregnancy, food and nutrient requirements, storage of nutrients during pregnancy and impact of good nutrition on the outcome of pregnancy, complications of pregnancy and their nutritional management. Lactation: Physiology of lactation, impact of nutrition on efficiency and milk production, food and nutrient requirements during lactation.

UNIT II

Infancy: role of nutrition on physical and mental development, rate of growth - weight as an indicator, assessment of growth, nutrient requirement during infancy, feeding of infants – value of breast feeding, breast milk composition, breast feeding Vs artificial feeding, types of milk and their use in infant feeding, methods of formula preparation, weaning and supplementary foods, weaning practices in the community, special nutritional concern in infant feeding, feeding the premature and low birth weight infants. Nutritional disorders and common ailments in infancy, feeding the sick child, immunization schedule and growth charts.

UNIT III

Preschool age: growth and development – Physical and mental, prevalence of malnutrition in preschool years and food habits, nutritional requirements during preschool year and supplementary foods. School age: growth and development, nutritional requirements of school age children, specific problems in feeding school children.

UNIT IV

Adolescence: physical and physiological changes, nutritional requirements of adolescents, Food preferences and nutritional problems. Elderly: physical and physiological changes, nutritional requirement, problems of old age, nutrients influencing aging process.

Suggested Readings

Anderson L, Dibble MV, Turkki PR, Mitchell HS & Rynbergen HJ. 1982. *Nutrition in Health and Disease*. JB Lippincott Co.

Beal VA. 1980. *Nutrition in the Life Span*. John Wiley & Sons.

Falkner F & Tanner JM. 1978. *Human Growth.* Vols. I-III. Plenum Press.

FAO/WHO/UNU. 1985. *Energy and Protein Requirement*. Tech. Report 724. WHO.

Ghosh S. 1988. *The Feeding and Care of Infant and Young Children*. Voluntary Health Association of India, New Delhi.

Guthrie HA. 1989. *Introductory Nutrition*. Times Mirror/Mosby College Publ.

ICMR. 1990. *Nutrient Requirement and Recommended Dietary Allowance for Indians*. A Report of Expert Group of the ICMR, NIN, Hyderabad.

Khetarpaul N, Katyal Sudha K & Grover I. 2001 *Infant Health and Nutrition*. Agro Tech. Publ. Academy.

Krause MV & Mahan LK. 1990. *Food, Nutrition and Diet Therapy*. WB Saunders.

Robinson CH & Lawler MR. 1986. *Normal and Therapeutic Nutrition*, McMillan.

Williams SR, Worthington RS, Sneholinka ED, Pipes P, Ress JM & Mahal KL. 1988. *Introduction Nutrition throughout the Life Cycle*. Times Mirroe/Mosby College Publ.

FN 508 NUTRITION AND PHYSICAL FITNESS 2+1

Objective

To enable the students to know the recent techniques of body composition and energy metabolism for the assessment of nutritional status.

Theory

UNIT I

Overview of nutritional management vis-a-vis physical fitness, body composition and physical fitness.

UNIT II

Methods of measuring body composition: direct and indirect. Body composition in different physiological conditions and factors affecting it.

UNIT III

Energy metabolism and physical fitness: concept, importance, influencing factors.

UNIT IV

Techniques to measure energy expenditure and energy intake. Techniques to assess physical fitness. Aging theories, physiology, mechanism and role of nutrients in arresting aging process.

Practical

Project relevant to text: selection of topic, planning of project, development and standardization of tool, collection of data, analysis

of data, report writing.

Suggested Readings

Falkner F & Tanner JM. 1978. *Human Growth - Principles and Prenatal Growth.* Vol. I. Bailliere Tindall.

Falkner F & Tarnner JM. 1980. *Human Growth Methodology*. *Ecological, Genetic, and Nutritional Effects on Growth.* Vol. III. Plenum Press.

Passmore R & Eastwood MA. 1986. *Human Nutrition and Dietetics*. ELBS Churchill Livngstone.

Pike RL & Brown ML. 1988. *Nutrition - An Integrated Approach*. John Wiley & Sons.

FN 509 ADVANCED DIET THERAPY 2+1

Objective

To familiarize the students with newer concepts in dietary management of various disorders and diseases.

Theory

UNIT I

Role of dietician in a health care team in hospital and community. Newer concepts in dietary management of various nutritional disorders and disease conditions: fevers, infections.

UNIT II

Dietary management during burns, allergy, gastrointestinal and liver diseases.

UNIT III

Dietary management of cardiovascular diseases, renal disorders and obesity.

UNIT IV

Dietary management of diabetes, cancer and HIV. Nutrition in critical care.

Practical

Formulation of food exchanges. Therapeutic modifications of diet in terms of nutrients, consistency and composition for various disorders and diseases. Preparation of SOAP notes and case studies. Visits to hospitals.

Suggested Readings

Robinson, Lawler, Chenoweth & Garwick, 1987. *Normal & Therapeutic Nutrition.* 17th Ed. Macmillan Publishing Co.

Shills ME & Young VR. *Modern Nutrition in Health & Disease* 7th Ed. Lea & Febiger.

Stanfield PS, Hui YH & American Dietetics Association 1992. *Nutrition & Diet Therapy*. 2nd Ed. Jones & Bartlett Publ.

FN 510 FOOD TOXICOLOGY 2+0

Objective

To enable the students to understand the toxic substances present in the foods and processing techniques for removal of toxins from foods.

Theory

UNIT I

Introduction and significance of food toxicology. Food poisoning: types, causative factors, preventive symptoms, natural food toxins, antinutritional factors, other food toxins, harmful effects, methods of removal.

UNIT II

Microbial toxins and food intoxications. Source of contamination Effect on health, preventive measures, methods of inactivation/destruction.

UNIT III

Chemical toxins: Pesticides, insecticides metallic and others, residual effects, preventive measures, methods of removal.

UNIT IV

Food packaging material, potential contaminants from food packaging material. Food laws and standards: FPO, ISI, Ag Mark, Codex Alimentarius, ISO, mark for vegetarian and non vegetarian foods, ecofriendly products and others in operation.

Suggested Readings

Ayres JC. 1968. *The Safety of Foods.* AVI Publ.

Hayes WJ. 1975. *Toxicology of Pesticide.* The Willams & Wilkins Co. Jacob T. 1976. *Food Adulteration.* Sib Wasani Macmillan Co.

Swaminathan MS. 1985. *Advanced Text Book on Food and Nutrition.* Vol-II. The Bangalore Printing & Publ. Co.

FN 511 ADVANCED HUMAN PHYSIOLOGY 2+1

Objective

To enable the students to understand the anatomy and functions of human body and techniques/methods of blood and urine analysis.

Theory

UNIT I

Reticulo- endothelial system: functions, classification. Lymphatic system: functions, circulation. Circulatory System: blood - composition blood cells

- development and function of blood cells, blood clotting, blood grouping and hemoglobin, Heart: anatomy, cardiac cycle, blood pressure and factors affecting blood pressure.

UNIT II

Respiratory system: anatomy, physiology and mechanism of respiration, regulation of respiration. Digestive system: anatomy of gastrointestinal tract and accessory organs. Digestion and absorption of food, regulation of appetite.

UNIT III

Excretory system: anatomy and functions of kidney, formation, composition and excretion of urine. Endocrine glands, mode of action of hormones.

UNIT IV

Reproductive system: structure and functions of male and female reproductive organs. Nervous system: anatomy and functions, Musculo skeletal system:anatomy and functions.

Practical

Estimation of hemoglobin. Identification of blood groups. Preparation of blood slide, identification and counting of blood cells. Haematocrit and sedimentation rate. Measurement of blood pressure. Examination of abnormal constituents of urine Estimation of glucose and cholesterol in blood.

Suggested Readings

Best CH & Taylor NB. 1989. *The Human Body. ASI Publ. House.* (Source: National Book Depot, Bombay).

Chatterjee CC. 1992. *Human Physiology.* Vols. I , II. Medical Allied Agency.

Guyton AC. 1991. *Text Book of Medical Physiology.* WB Saunders.

Mukherjee KL. 1994. *Medical Laboratory Technology.* Vol I. Tata McGraw Hill.

Wilson KJW & Ross JS.1987. *Ross and Wilson Anatomy and Physiology in Health and Illness.* 6th Ed. Churchill Livingstone.

FN 512 FOOD SERVICE MANAGEMENT 1+2

Objective

To enable the students to understand the process of planning, organizing and controlling the management of food and other resources in institutions.

Theory

UNIT I

Types of food services. Organization: Definition, types. Management: tools of management.

UNIT II

Personnel management. Books, records and record keeping. Cost control in food services. Menu planning.

UNIT III

Meal services management: types of services. Quantity food production: Principles involved in development of recipes in large scale cooking, Standardization of recipes, Utilization of left over foods.

UNIT IV

Planning of layout and equipment for foods services. Sanitation and hygiene in handling foods.Personnel hygiene and its importance.

Practical

Standardization of recipes: planning and preparation , modification in basic recipe, preparation of standard recipe. Use of left over foods. Visit to different types of food service institutions and study the following: Organization, physical plan and layout, food service equipment, sanitation and hygiene. Practical experience in organization and management of a college cafeteria/ hotels.

Suggested Readings

Fuller J. 1966. *Chefs Manual and a Kitchen Management.* B.T. Badtsford Ltd.

Kazarian EA. 1975. *Food Service Facilities - Planning,* AVI Publ.

Kotschevar LH. 1961. *Food Service, Layout and Equipment Planning.*John Wiley & Sons.

Sethi M & Malhan S. 1997. *Catering Management - An Integral Approach*. New Age Internationl.

Treat N & Richards 1997. *Quantity Cookery*. Little Brown & Co.

West BB, Wood L, Harger VF & Shugart GS. 1977. *Food Service in Institutions,* John Wiley & Sons.

FN 513 FOOD PRODUCT DEVELOPMENT 1+1

Objective

To enable the students to understand the concept of product development, their sensory evaluation and quality control.

Theory

UNIT I

Basic principles of food product development. Sensory properties of food and their role in product development. Formulation and evaluation of recipes at laboratory level. Bulk food preparation for food institutions and enterprises: servings, nutritive value and costing.

UNIT II

Evaluation of food- Objective and subjective methods, selection and training of judges, development of score cards and analysis of data.

UNIT III

Consumer evaluation-developmentof schedule and data analysis. Packaging material, types for different products. Food labeling.

UNIT IV

Food safety issues in product development, food quality regulations and standards, quality control and HACCP. Product formulation and development for general and therapeutic use.

Practical

Sensory evaluation, methods, training of judges, score card preparation. Selection and modification of food product to be

developed. Formulation and standardization of products. Objective and subjective evaluation of the products. Evaluation of consumer acceptability. Packaging and sale of products. Preparation of video film for media.

Suggested Readings

Altschul Aaron M. 1993. *Low Calorie Foods.* Marcel Dekker

Goldberg I. 1994. *Functional Foods: Designer Foods, Pharma Foods, Neutraceuticals.* Springer.

Matz SA. 2004. *Formulating & Processing Dietetic Foods.* CHIPS Publ.

FN 514 NUTRITION AND IMMUNITY 2+0

Objective

To make the students understand the importance of various nutrients in maintaining and improving the immunity of individuals.

Theory

UNIT I

Immunity: definition and history. Classification, immunological responses, cell types involved. Mechanism of phagocytosis and antigen-antibody reactions. Regulation of immunity. Mucosal defence system- effect of nutrients.

UNIT II

Effect of malnutrition on immunity. Carbohydrates and immune system. Fat and immune system- factors affecting acquired immunity. Protein and immune functions- effect of arginine, glutamine and sulphur amino acids. Glutathione and immune system.

UNIT III

Role of vitamins in immune functions-effect of deficiency. Role of minerals-effect of deficiency and excess on immune cell functions.

UNIT IV

Probiotics and antioxidants – their effect on immune function. Immunity against infection – role of immunization.

Suggested Readings

David A, Darlington G & Bendich A. 2004. *Diet and Human Immune Function.* Humana Press.

Huffer T, Kanapa T & Stevenson GW. 1986. *Introduction to Human Immunology*. Jones & Bartlett.

Wise DJ & Carter GR. 2004. *Immunolgy - A Comprehensive Review*. Iowa State University Press, Blackwell Science Co.

FN 601 ADVANCES IN CARBOHYDRATES, PROTEINS AND LIPIDS 3+1

Objective

To acquaint the students with recent developments in the role of carbohydrates, proteins and lipids in normal and diseased conditions.

Theory

UNIT I

Carbohydrates, proteins and lipids-their digestion, absorption, metabolism. Inborn errors of metabolism.

UNIT II

Metabolic disorders-diabetes, dental caries, obesity, atherosclerosis, hyperlipidemias and hypertension.Glucose homeostasis determined by insulin/glycogen ratio; carbohydrates free diet and its metabolic consequences; glycolic index; dietary fiber- its definition, composition, classification, functions and role in various physiological disorders.

UNIT III

Classification of protein, new discoveries in protein and their functions such as protein in Immune system, as lubricants, biological buffers and carriers, evaluation of protein quality: in vitro and in vivo methods, animal and human bioassays: amino acid pool, protein turnover in man with special reference to body size, age and various nutrition and pathological conditions, regulation of proteins, requirements; novel food sources of protein.Effect of insulin, corticosteroids, thyroids, androgen and growth hormone on protein metabolism, inheritable disorders of amino acid metabolism of protein; effect of dietary protein on cardiovascular disease and cholesterol metabolism, adaptation of body to low intake of energy and protein.

UNIT IV

Estimation of body fat; lipoproteins and hyper lipoproteinemia; hypolipidemic action of PUFA omega-3 fatty acids and oxidation products of cholesterol; lipids and cancer; fish oils in health and disease; oxidation products of cholesterol.Disturbance in lipid metabolism; role of reversal diet in cardiovascular disorders; high blood cholesterol – causes, prevention and treatment; hypolipidemic action of rice bran, oat, barley and legumes.

Practical

Assessment of protien quality; project work related to metabolic disorders of proximate principles; blood analysis in relation to NCD and estimation of amylase and protease inhibitors in foods.

Suggested Readings

Akoh CC & Min DB. 1998. *Food Lipids - Chemistry, Nutrition and Biotechnology.* Marcel Dekker.

Berdenier CD. 1976. *Carbohydrate Metabolism - Regulation and Physiological Role.* John Wiley.

Bodwell CE. 1979. *Evaluation of Protein for Human.* AVI Publ.

Dickens F. *Carbohydrate Metabolism and its Disorder.* Vol. II. Academic Press.

FAO. 1998. *Carbohydrates in Human Nutrition.* FAO.

FAO/WHO.1985. *Energy and Protein Requirements.* Technical Report Series 724.

Friedmen M.1975. *Protein Nutritional Quality of Foods and Feeds.* Part II. Marcel Dekker.

Lehninger Al. 1971. *Bioenergetics.* W.A. Benjamin.

Munro HN & Attoson JB. (Eds.). *Mammaliam Protein Metabolism.* Vols. I-IV. Academic Press.

Waterlow JC, Garlick PJ & Millerand DJ. 1978. *Protein Turnover in Mammalian Tissues and in the Whole Body.* North Holland Publ. Co.

FN 602 ADVANCES IN VITAMINS AND HORMONES 2+0

Objective

To acquaint the students with role and function, metabolism and recent developments in vitamins and hormones.

Theory

UNIT I

General definition and history of vitamins and hormones; cause of vitamin deficiencies in India. Chronology, chemistry, distribution, functions, absorption, transport, metabolism, deficiency manifestations,

UNIT II

Nutritional requirements, methods of assay. Interaction with other nutrients, antagonists and analogues of vitamins,

UNIT III

Hypervitaminosis of water and fat soluble vitamins; vitamin fortification and supplementation; endocrine and exocrine secretion of hormones- organs of secretion, metabolism, mechanism of action, regulation and sites of action, biological effects and interaction.

UNIT IV

Assessments of vitamin status of population; antioxidants and their relationship with aging, cancer and other metabolic disorders.

Suggested Readings

Basu TK & Dickerson JWT. 1996. *Vitamins in Human Health and Disease.* CABI.

Combs GF. 1992. *The Vitamins, Fundamental Aspects in Nutrition and Health.* Academic Press.

Kutsky RJ. 1981. *Handbook of Vitamins and Minerals and Hormones.* NRC.

Machlin LJ. 1991. *Handbook of Vitamins.* Marcel Dekker.

FN 603 MINERALS IN HUMAN NUTRITION 2+1

Objective

To acquaint the students with role and functions, metabolism and recent developments in minerals.

Theory

UNIT I

General definition and history of minerals; causes of macro and micro mineral deficiencies in India. Chronology, chemistry, distribution, functions, absorption, transport, metabolism, deficiency manifestations.

UNIT II

Nutritional requirements, methods of assay of all the minerals. Interactions of minerals with other nutrients, antagonists and analogues of minerals.

UNIT III

Assessment of mineral status of population, mineral fortification and supplementation; major mineral pollutants- their harmful effect to health; mutagenicity, carcinogenicity, teratogencity, heavy metal toxicity. Use of mineral isotopes/ tracers in nutritional studies.

UNIT IV

Metalonzymes; antioxidants and their relationship with aging, cancer and other metabolic disorders. Heavy metal toxicity; trace minerals, their chronology, chemistry, distribution, functions, absorption, metabolism, requirements, deficiency manifestation and interaction.

Practical

Assessment of antioxidants in foods; Project to combat micro nutrient deficiencies- Vulnerable sections, Groups with special needs.

Suggested Readings

Basu TK & Dickerson JWT. 1996. *Vitamins in Human Health and Disease*

CABI.

Boyd LO' Dell & Sunde RA. 1997. *Handbook of Nutritionally Essential Mineral Elements.* CRC Press.

Causing 2005. *Annual Review of Nutrition.* Vol. 25.

Comb GF. 1992. *The Vitamins, Fundamental Aspects in Nutritional and Health.* Academic Press.

Kutsky RJ. 1981. *Handbook of Vitamins of Minerals and Hormones*
NRC. Machlin LJ.1991 *Handbook of Vitamins.* Marcel Dekker.

Monier Willam GW. 2008. *Trace Elements in Foods.* Agribios.

Taylor SL. 2007 *Advances in Food and Nutrition Research.* Vols. 1-52.

Research Books & Pvt. Ltd.

FN 604 ADVANCES IN FOOD SCIENCE AND TECHNOLOGY 2+1

Objective

To acquaint the students with latest advances in nutrition and food science and food challenges in next millennium.

Theory

UNIT I

Recent advances in the field of carbohydrates, lipids, proteins, vitamins and minerals in relation to human nutrition.

UNIT II

Nutrogenomics, incorporating genetics into dietary guidance. Recent advances in the field of food analysis and food fortification.

UNIT III

Foods of future; special nutrients. Food processing and product development; regulating food processing and preservation through TQM and HACCP.

UNIT IV

GM foods and their health implications; functional foods and organic foods, impact of WTO in food regulation.

Practical

Product development and shelf life of nutritionally fortified foods using advanced technologies, field study of food processing and preservation in relation to TQM and HACCP in an industry.

Suggested Readings

Manay NS & Shadaksharaswamy 1997. *Food Facts and Principles.* New Age Publ.

Potter N & Hotchkiss JH. 1996. *Food Scienc .* 5th Ed. AVI Book

Van. Potty VH & Mulky MJ. 1993. *Food Processing.* Oxford & IBH.

Srilakshmi B. 2002. *Nutrition Science.* New Age Publ..

Swaminathan MS. 1993. *Food Science and Experimental Foods.* Ganesh & Co.

FN 605 ADVANCES IN ENERGY METABOLISM 2+0

Objective

To familiarize the students with new developments in the area of energy metabolism and its relation to human health.

Theory

UNIT I

Scope and application of bioenergetics for human nutrition; energy types, energy store in man, its components and measurements.

UNIT II

Methods of estimation of energy requirement; factors affecting

energy requirements and expenditure.

UNIT III

Thermogenesis; interrelationship between metabolic regulation. Mechanism of hunger and its energy cost of macromolecules.

UNIT IV

Weight control and obesity-role of adipose tissues. Effect of hormones on energy metabolism.

Suggested Readings

Lehninger AL & Benjamin WA. 1971 *Bioenergetic.* Meulo Park. Causing 2005. *Annual Review of Nutrition.* Vol. 25.

Taylor SL.2007. *Advances in Food and Nutrition Research.* Vol- 1-52. Research Books.

FN 606 NUTRITION AND AGRICULTURE INTERFACE 3+0

Objective

To acquaint the students with food production and consumption trends, food balance sheet and interrelationship between nutrition and agriculture development.

Theory

UNIT I

Food situation in India and in the world, food production and consumption trends; food balance sheets. Role of nutrition in agricultural planning and national development.

UNIT II

Linkages between agricultural practices; food production, food distribution and nutritional status; food crop failure and malnutrition; poverty and vicious cycle of low food production ; consumption indicators, nutritional status indicators and their role in agricultural planning.

UNIT III

Agricultural development and its effect on food availability; effect of food production and economic policies on food availability; impact of physical resources, farming systems, cropping system, inputs and manipulation, agricultural marketing system, post harvest processing of foods on food and nutrition situation; food distribution systems .

UNIT IV

Food and nutrition security at national and household level; nutrition policy implementation; nutritional impact of agricultural programmes, food price control and consumer subsidy; contribution of national and international organization for agricultural development.

Suggested Readings

Bhatia MS. 1991. *Agricultural Statistics at a Glance.* Ministry of Agriculture, Govt. of India, New Delhi.

Census 1981, 1991, 2001.

India 2001. A Reference Annual. Publication Division, Ministry of Information about Broad casting, Govt. of India.

UNICEF 1999. *The State of World's Children.* Oxford University Press.

FN 607 NUTRITION IN EMERGENCIES 2+0

Objective

To acquaint the students with latest advances in management of food and nutrition in emergent situations.

Theory

UNIT I

Starvation in emergencies arising out of drought, floods, earth quakes, locust, war, wrong policies and poverty; historical perspectives.

UNIT II

Effect of inanition, short, medium and long term emergencies on food and nutrients intake, precautions against food shortage. Food needs at national level during normal emergencies,

UNIT III

Major nutritional deficiency diseases in emergencies; mobilization of local resources; general fund distribution; mass and supplementary feeding; therapeutic feeding; social funds.

UNIT IV

Control of communicable diseases; public health and hygiene problems during emergencies.

Suggested Readings

Messer E, Mark J, Cohen C & Jashinta D. 1998. *Food from Peace: Breaking the Links between Conflicts and Hunger.* IFPRI, Washington.

Spark A. 2007. *Nutrition in Public Health: Principles, Policies and Practice.* CRC Press.

The Management of Nutrition in Major Emergencies. 2000, WHO.

FN 608 APPLICATION OF BIOTECHNOLOGY IN FOODS AND NUTRITION 2+0

Objective

To acquaint the students with recent advances in role and application of biotechnology in Foods and Nutrition.

Theory

UNIT I

History, processes and products of biotechnology; application of biotechnology in production of nutritious foods.

UNIT II

Role of biotechnology in enzymology and product development, fermentation process, fruit juice extraction, genetic improvement of food grade microorganisms.

UNIT III

Nutritional significance of food products developed by biotechnological techniques.

UNIT IV

Scientific, technological and resource constraints on biotechnology; important factors affecting development in biotechnology.

Suggested Readings

Nestle M. 2003. *Safe Food: Bacteria, Biotechnology and Bioterrorism.* University of California Press.

Rogers PL & Fleet GH. 1989. *Biotechnology and Food Industry*. University of Minnesota.

FN 609 GLOBAL NUTRITIONAL PROBLEMS 2+0

Objective

To enable the students to know the global nutritional problems and intervention programmes.

Theory

UNIT I

Food consumption pattern of developed and developing countries. UNIT II

An overview of world nutrition situation and assessment of problems of developing countries in light of prevalence, etiology, Indicators and preventive measures.

UNIT III

An overview of world nutrition situation and assessment problems of developed countries in light of Prevalence, etiology, indicators and preventive measures.

UNIT IV

Nutrition and health programmes to alleviate malnutrition; role of national and international organizations.

Suggested Readings

Anderson L, Dibble MV, Turkki PR, Mitchell HE & Pynbergen HJ. 1982. *Nutrition in Health and Disease.* JB Lippincottt Co.

Jelliffee BD. 1966. *The Assessment of the Nutritional Status of the Community.* WHO.

Jolliffee N. 1962. *Clinical Nutrition.* Hoeber Medical Division. Mclaren DS. 1983. *Nutrition in the Community.* John Wiley & Sons.

Park JE & Park K. 2000. *Text Book of Preventive and Social Medicine.* Barnasidas Bhanot Publ.

SCN News, United Nations. *System Forum on Nutrition.* WHO. Shukla PK. 1982. *Nutritional Problems of India.* Prentice Hall of India.

FN 610 MATERNAL AND CHILD NUTRITION 2+1

Objective

To enable the students to understand the role of nutrition during pregnancy, lactation and infancy.

Theory

UNIT I

Current scenario of maternal and child nutrition; Nutritional aspect of embryogenesis; Factors affecting outcome of pregnancy; Physiological changes in body composition and mental development in relation to prenatal and postnatal nutrition .

UNIT II

Effect of nutritional status of mother on quantity and quality of breast milk; recent guidelines in infant feeding and complementary feeding. Feeding of premature babies; HIV and breast feeding; drug abuse and breast feeding.

UNIT III

Nutritional problems and requirements of preschool and school going children; growth and development of children; growth monitoring using growth charts.

UNIT IV

Strategies to improve maternal and child health in India ; role of BPNI in promotion of breast feeding in India; importance of world breast feeding week.

Practical

Preparation of a database on prevailing supplementary and weaning practices- planning, collecting data, analyzing data, writing report; preparation of low cost complementary foods. Analysis of weaning/complementary foods for its nutrient content.

Suggested Readings

Bamji MS, Rao NP & Reddy V.1999. *Text Book of Human Nutrition*. Oxford & IBH.

Falkner F & Tanner JM. 1978. *Human Growth - Postnatal Growth and Neurobiology.* Vol. II. Plenum Press.

Falkner F & Tanner JM. 1986. *Human Growth - A Comprehensive Treatise.* Development Biology Press.

Falkner F & Tanner JM. 1986. *Human Growth – Methodology, Ecological*, *Genetic and Nutritional Effects on Growth.* Vol. III. Plenum Press.

Francis DEM. 1986. *Nutrition in the Life Span.* John Wiley & Sons. NNMB Reports

Sachdeva HPS & Choudhary P. 1994. *Nutrition in Children*. Cambridge Press.

Williams SR, Worthington RS, Sneholinka ED, Pipes P, Ress JM & Mahal KL. 1988. *Nurition Throughout the Life Cycle*. Times Mirror/Mosby College Publ.

Ziegler EE & Filer LJ. 1996. *Present Knowledge in Nutrition.* International Life Science Institute, Washington, D.C.

FOODS AND NUTRITION
List of Journals

- **Plant Foods for Human Nutrition**
  - Kluwer Academic Publisher, P.O. Box 322, 3300, AH Dordrecht, The Netherland
- **Journal of Food Science and Technology**
  - Association of Food Scientists, CFTRI, Mysore 570013 (India) afsti@soncharnet.in
- **Nutrition and Food Science**
  - www.emeraldinsight.com/authors
- **Food Chemistry**
  - Professor Gordon Birch, School of Food Biosciences, University of Reading, Whiteknights, Po Box 226, Reading RG6 6AP, UK
- **Journal of Human Nutrition and Dietetics**
  - Dr. Joan Gandy, Centre for Health Studies, Buckinghamshire Chilterns University College Gorelands Lane, Bucks, HP84AD, UK
- **International Journal of Food Science and Technology**
  - wttp:/mc.manuscriptcentral.com.ijfst
- **Journal of Indian Dietetic Association**
  - Editor-in-chief, Department of Biochemistry & Nutrition, All India Institute of Hygiene and Public Health, 110 C.R. Avenue, Kolkata – 700 073
- **International Journal of Food Science and Technology**
  - Blackwell Publishing Ltd. 9600 Garsington Road, Oxford, Ox42D.
- **Indian Food Packer**
  - K.P. Sareen, Executive Editor, All India Food Processors Association, 206, Aurobindo Place, Havzkhas, New Delhi
- **Trends in Food Science and Technology**
  - Elsevier Ltd., The Boulevard, Langfodlane, Kidlington, Oxford OXs 1GB, UK
- **European Journal of Clinical Nutrition**
  - JC Seidell, Free University, Amsterdam, The Netherlands.
- **Association of Food Scientists and Technologists** (India) Mysore
  - E-mail: aftsi@sancharnet.in.www.aftsi.org.
- **Journal of the Science of Food and Agriculture**
  - www.interscience.welley.com/jsfa

e-Resources

- www.eatright.org/
- www.fda.gov/search.html
- www.nutrition.about.com
- www.lifelines.com/ntnlnk.html

- www.fda.gov
- www.nal/usda.gov/fnic/dga
- www.nal.usda.gov/fnic/fpyr/pyramid.html
- www.diabetes.org
- www.5aday.com
- www.ificinfo.health.org/infoFN.htm
- www.fascb.org/asns/intro.html
- www.osteo.org
- www.ironoverload.org
- www.bookman.com.au.vitamins
- www.thriveonline.com/eats/vitamins/guide.index.html
- www.altmedicine.com/
- www.ncahf.org
- www.nal.usda.gov/fnic/foodcomp
- www.niddk.nih.gov/health/nutrit/nutrit.htm
- www.fda.gov/cder
- www.acsm.org
- www.cdc.gov/nccdphp
- www.nih.gov/od/oar
- www.americanheart.org
- www.nhlbi.nih.gov/index/htm
- www.cancer.org
- www.aice.org
- www.eatright.org/nfs42.html
- www.foodsafety.org
- www.safefood.org
- www.fao.org
- www.who.org/nut
- www.wfp.org
- www.worldbank.org

Suggested Broad Topics for Master's and Doctoral Research

- Diet and nutrition surveys of vulnerable sections of specific district
- Nutritional improvement and utilization of pearl millet and soybean in Indian dietaries
- Weaning/supplementary mixture for infants and pre school children
- Value added products from cereals and pulses
- Development and nutritional evaluation of β-carotene and iron rich products from amaranth, fenugreek, spinach and unconventional vegetables
- Development of foods for diabetes and old persons
- Development of fiber rich food products
- Development and nutritional evaluation of probiotic foods for controlling diarrhea
- Development and nutritional evaluation of value added products supplemented with crude palm oil and the vegetable oils
- Development and nutritional evaluation of value added products using medicinal plants and to test their efficacy against blood sugar and cholesterol level in animals and human beings

- Nutritional evaluation of under-utilized foods of India and incorporation in traditional diets to improve their nutritional quality
- Dietary survey of patients suffering from various diseases like, heart disease, liver disease, kidney disorder etc.
- Nutritional evaluation of new crop varieties and preparation of value added products

COMPULSORY NON-CREDIT COURSES

(Compulsory for Master's programme in all disciplines; Optional for Ph.D. scholars)

CODE	COURSE TITLE	CREDITS
PGS 501	LIBRARY AND INFORMATION SERVICES	0+1
PGS 502	TECHNICAL WRITING AND COMMUNICATIONS SKILLS	0+1
PGS 503 (e-Course)	INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE	1+0
PGS 504	BASIC CONCEPTS IN LABORATORY TECHNIQUES	0+1
PGS 505 (e-Course)	AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES	1+0
PGS 506 (e-Course)	DISASTER MANAGEMENT	1+0

Course Contents

PGS 501 LIBRARY AND INFORMATION SERVICES 0+1

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Practical

Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; e- resources access methods.

PGS 502 TECHNICAL WRITING AND COMMUNICATIONS SKILLS 0+1

Objective

To equip the students/scholars with skills to write dissertations, research papers, etc.

To equip the students/scholars with skills to communicate and articulate in English (verbal as well as writing).

Practical

Technical Writing - Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts, summaries, précis, citations etc.; commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof-reading; Writing of a review article. ***Communication Skills -*** Grammar (Tenses, parts of speech, clauses, punctuation marks); Error analysis (Common errors); Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers.

Suggested Readings

Chicago Manual of Style. 14th Ed. 1996. Prentice Hall of India.

Collins' Cobuild English Dictionary. 1995. Harper Collins.

Gordon HM & Walter JA. 1970. *Technical Writing*. 3rd Ed. Holt, Rinehart & Winston.

Hornby AS. 2000. *Comp. Oxford Advanced Learner's Dictionary of Current English*. 6th Ed. Oxford University Press.

James HS. 1994. *Handbook for Technical Writing*. NTC Business Books. Joseph G. 2000. *MLA Handbook for Writers of Research Papers*. 5th Ed.Affiliated East-West Press.

Mohan K. 2005. *Speaking English Effectively*. MacMillan India. Richard WS. 1969. *Technical Writing*. Barnes & oble.

Robert C. (Ed.). 2005. *Spoken English: Flourish Your Language*. Abhishek. Sethi J & Dhamija PV. 2004. *Course in Phonetics and Spoken English*. 2nd Ed. Prentice Hall of India.

Wren PC & Martin H. 2006. *High School English Grammar and Composition*. S. Chand & Co.

PGS 503 INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE 1+0

(e-Course)

Objective

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Theory

Historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs; Indian Legislations for the protection of various types of Intellectual Properties; Fundamentals of patents, copyrights, geographical indications, designs and layout, trade secrets and traditional knowledge, trademarks, protection of plant varieties and farmers' rights and bio- diversity protection; Protectable subject matters, protection in biotechnology, protection of other biological materials, ownership and period of protection; National Biodiversity protection initiatives; Convention on Biological Diversity; International Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material

transfer agreements, Research collaboration Agreement, License Agreement.

Suggested Readings

Erbisch FH & Maredia K.1998. *Intellectual Property Rights in Agricultural Biotechnology*. CABI.

Ganguli P. 2001. *Intellectual Property Rights: Unleashing Knowledge Economy*. McGraw-Hill.

Intellectual Property Rights: Key to New Wealth Generation. 2001. NRDC & Aesthetic Technologies.

Ministry of Agriculture, Government of India. 2004. *State of Indian Farmer*. Vol. V. *Technology Generation and IPR Issues*. Academic Foundation.

Rothschild M & Scott N. (Ed.). 2003. *Intellectual Property Rights in Animal Breeding and Genetics*. CABI.

Saha R. (Ed.). 2006. *Intellectual Property Rights in NAM and Other Developing Countries: A Compendium on Law and Policies*. Daya Publ. House.

The Indian Acts - Patents Act, 1970 and amendments; Design Act, 2000; Trademarks Act, 1999; The Copyright Act, 1957 and

amendments; Layout Design Act, 2000; PPV and FR Act 2001, and Rules 2003; National Biological Diversity Act, 2003.

PGS 504 BASIC CONCEPTS IN LABORATORY TECHNIQUES 0+1

Objective

To acquaint the students about the basics of commonly used techniques in laboratory.

Practical

Safety measures while in Lab; Handling of chemical substances; Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vaccupets; washing, drying and sterilization of glassware; Drying of solvents/chemicals. Weighing and preparation of solutions of different strengths and their dilution; Handling techniques of solutions; Preparation of different agro-chemical doses in field and pot applications; Preparation of solutions of acids; Neutralisation of acid and bases; Preparation of buffers of different strengths and pH values. Use and handling of microscope, laminar flow, vacuum pumps, viscometer, thermometer, magnetic stirrer, micro-ovens, incubators, sandbath, waterbath, oilbath; Electric wiring and earthing. Preparation of media and methods of sterilization; Seed viability testing, testing of pollen viability; Tissue culture of crop plants; Description of flowering plants in botanical terms in relation to taxonomy

Suggested Readings

Furr AK. 2000. *CRC Hand Book of Laboratory Safety*. CRC Press.

Gabb MH & Latchem WE. 1968. *A Handbook of Laboratory Solutions*.

Chemical Publ. Co.

PGS 505 AGRICULTURAL RESEARCH, RESEARCH ETHICS 1+0

(e-Course)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Theory

UNIT I

History of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR): International Agricultural Research Centres (IARC), partnership with NARS, role as a partner in the global agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility.

UNIT II

Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.

UNIT III

Concept and connotations of rural development, rural development policies and strategies. Rural development programmes: Community Development Programme, Intensive Agricultural District Programme, Special group – Area Specific Programme, Integrated Rural Development Programme (IRDP) Panchayati Raj Institutions, Co-operatives, Voluntary Agencies/Non-Governmental Organisations. Critical evaluation of rural development policies and programmes. Constraints in implementation of rural policies and programmes.

Suggested Readings

Bhalla GS & Singh G. 2001. *Indian Agriculture - Four Decades of Development*. Sage Publ.

Punia MS. *Manual on International Research and Research Ethics*. CCS, Haryana Agricultural University, Hisar.

Rao BSV. 2007. *Rural Development Strategies and Role of Institutions - Issues, Innovations and Initiatives*. Mittal Publ.

Singh K.. 1998. *Rural Development - Principles, Policies and Management.* Sage Publ.

PGS 506 (e-Course) DISASTER MANAGEMENT 1+0

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Theory

UNIT I

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches,

Volcanic eruptions, Heat and cold Waves, Climatic Change: Global warming, Sea Level rise, Ozone Depletion

UNIT II

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

UNIT III

Disaster Management- Efforts to mitigate natural disasters at national and global levels. International Strategy for Disaster

reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community-based organizations, and media. Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.

Suggested Readings

Gupta HK. 2003. *Disaster Management*. Indian National Science Academy. Orient Blackswan.

Hodgkinson PE & Stewart M. 1991. *Coping with Catastrophe: A Handbook of Disaster Management*. Routledge.

Sharma VK. 2001. *Disaster Management*. National Centre for Disaster Management, India.