

Detail Syllabus of Ph. D Entrance exam

Foods and Nutrition

FOODS & NUTRITION

PAPER-1

Course Code: CFG101

Course Category: Multi-disciplinary

Course Title: RESEARCH METHODS

Credit: 04

Contact hour/week=04

Objectives:

- To understand the significance of statistics and research methodology in Home Science research
- To understand the types, tools and methods of research and develop the ability to construct data gathering instruments appropriate to the research design.
- To understand an
- To apply the appropriate statistical technique for the measurement scale and design.

Contents:

1. Science, Scientific methods, scientific approach.
2. Role of statistics and research in Home Science Discipline.
Objectives of research: Explain, control and pre-diction.
3. **Types of Research:** Historical, descriptive, experimental, case study, Social research, participatory research.
4. **Definition and identification of a Research Problem**
 - Selection of research problem
 - Justification
 - Theory, hypothesis, basic assumptions, limitations and delimitations of the problem.
5. **Types of variables**
6. **Theory of probability**

- Population and sample
- Probability sampling : Simple random, systematic random sampling, two stages and multi stage sampling, cluster sampling
- Non-Probability sampling : purposive, quota and volunteer sampling / snowball sampling

7. Basic principles of Research Design

- Purpose of research design: Fundamental, applied and action, exploratory and descriptive, experimental, survey and case study, ex-post factor.
- Longitudinal and cross sectional, co-relational

8. Data Gathering Instruments :

- Observation, questionnaire, Interview, Scaling Methods, Case study, Home Visits, reliability and validity of measuring instruments.

References:

1. Bandarkar, P. L. and Wilkinson T. S. (2000): Methodology and Techniques of Social Research, Himalaya. Publishing House, Mumbai.
2. Bhatnagar, G.L. (1990): Research Methods and Measurements in Behavioural and Social Sciences, Agri Cole Publishing Academy. New Delhi.

Course Code: FN102

Course Category: Core

Course Title: ADVANCED NUTRITIONAL BIOCHEMISTRY

Credit: 04

Contact hour/week=04

Objectives

This course will enable the students to:

- Augment the biochemistry knowledge acquired and at the undergraduate level
- Understand the mechanisms adopted by the human body for regulation of metabolic Pathways
- Get an insight into interrelationships between various metabolic pathways
- Become proficient for specialization in nutrition.
- Understand integration of cellular level metabolic events to nutritional disorders and imbalances.

Contents

1. **Heteropolysaccharides:** Definition, classification, structure and properties of glycoprotein and proteoglycans.
2. **Plasma Proteins** – Nature, properties and functions
3. **Overview of regulation of intermediary metabolism:** Equilibrium and non-equilibrium reactions, committed steps, allosteric modifications, covalent modulation, cross-over theorem and futile cycles.
4. **Intermediary metabolism:** Reactions, standard free energy changes and regulation.
 - Carbohydrates – glycolysis, gluconeogenesis, citric acid cycle, hexose monophosphate pathway.
 - Lipids, beta-oxidation, de novo synthesis of fatty acids, synthesis and breakdown of unsaturated fatty acids, cholesterol, phospholipids and triacylglycerol
5. **Purines and Pyrimidines** – Synthesis and breakdown.
6. **Nucleic acids** – DNA replication and transcription, DNA repair systems, DNA recombinant Genetic mutation, regulation of gene expression and protein biosynthesis.

7. **Hormones** – Mechanism of action of hormones.

References:

1. Murray, R.K. Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. Harpers Biochemistry, Macmillan worth Publishers.
2. Nelson, D.L. and Cox, M.M. (2000): 3rd Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
3. Devlin, T.M. (1997): 4th Ed. Text book of Biochemistry with Clinical Correlations, Wiley Liss Inc.
4. Stryer, L. (1998): 4th Ed. Biochemistry, WH Freeman and Co.,
5. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
6. Voet, D. Voet, J.G. and Pratt, C.W. (1999). Fundamentals of Biochemistry.
7. Oser, B.L. (1965). 14th Ed. Hawk's Physiological Chemistry. Tata McGraw-Hill Publishing Co. Ltd.
8. Varley, H. Gowenlock, A.H. and Bell, M.(1980). 5th Ed. Practical Clinical Biochemistry, Heinemann Medical Books Ltd.,
9. Tietz, N.W.: (1976) Fundamentals of Clinical Chemistry. S.B. Saunders Co.,
10. Vogel, A.I. (1962): 3rd Ed. A. Textbook of Quantitative Inorganic Analysis. The English Language book Society and Longman
11. Raghuramulu, N : Madhavan nair and K. Kalyanasundaram, S. (1983). A Manual of Laboratory Techniques NIN, ICMR.
12. Plummer, D. T. (1987). 3rd Ed. An Introduction to Practical Biochemistry McGraw-Hilol Book Co.,
13. Winton, A.L. and Winton, K.B. (1999). Techniques of Food Analysis. Allied Scientific Publishers.

Course Code: FN103

Course Category: Core

Course Title: FOOD SCIENCE

Credit: 04

Contact hour/week=04

Objectives:

This Course is designed to:

- Provide an understanding of composition of various food stuffs.
- Familiarize students with changes occurring in various foodstuffs as a result of processing and cooking.
- Enable students to use the theoretical knowledge in various applications and food preparations.

Contents:

1. Constituents of Foods : Properties and significance

2. Water and Food Dispersions :

- Free and bound water
- Water activity and Food Spoilage
- Freezing and ice structure
- Colloidal salts, stabilization of colloidal systems, Rheology of food dispersions
- Gels: Structure, formation, strength, types and permanence.
- Emulsions: Formation, stability, surfactants and emulsifiers.
- Foams: Structure, formation and stabilization.

3. Polysaccharides, Sugars and Sweeteners

- Starch: Structure, gelatinization, methods for following gelatinization changes.
- Characteristics of some food starches. Effects of ingredients and conditions on gelatinization. Modified food starches.
- Cellulose, hemicelluloses, pectins, gums.
- Sugars and Sweeteners: Sugars, syrups, sugar alcohols, potent sweeteners, Sugar products.
- Sweetener Chemistry related to usage in food products: solubility & crystallization, hygroscopic, fermentation & non-enzymatic browning.

4. Fats: Functional properties of fat and uses in food preparations. Fat deterioration and antioxidants.

5. **Enzymes:** Nature of enzymes, stability and action. Proteolytic enzymes, oxidases, lipases, enzymes decomposing carbohydrates and applications.
6. **Processed Foods:** Jams, Jellies, Squashes, and Pickles.
Beverages: Synthetic and Natural, alcoholic and non-alcoholic, carbonated and non-carbonated, coffee, tea, cocoa, malted drinks.
Confectioneries and chocolate products, bakery products, dehydrated products
7. **Traditional Processed Products:** Fermented Foods – cereal-based, pulse-based, fruit/vegetable-based, vinegar, pickles.
8. **Leavened Products:** Leavening agents. Biologically leavened and chemically leavened products. Batters and dough.
9. **Food colourants** : Pigments in animal and plant tissues, Food colours – Types, properties, safety issues

REFERENCES

1. Charley, H.(1982): Food Science(2nd edition), John Willey & Sons, New York.
2. Potter, N. and Hotchkiss, J.H. (1996): Food Science, Fifth edition, CBS publishers and Distributors, New Delhi.
3. Belitz, H.D. and Gropsh, W. (1999): Food Chemistry (2nd edition), Springer, New York.
4. Abers, R.J. (Ed.) (1976): Foam, Academic Press, new York.
5. Cherry, J.P. (Ed.) (1981): Protein Functionality in Foods, American Chemical Society, Washington,D.C.
6. Pomeranz, Y. (Ed.) (1991): Functional Properties of Food Components, (2nd edition), Academic Press, New York.
7. Duckworth, R.B. (Ed.) (1978): Water Relation to Foods, Academic Press, London.
8. Parihar, P., Agarwal, R. jain D.K. and Mandhyan, B.L. (1977): Status Report on Dehydration of Eggs. PHT / CAE / Publishers.
9. Marshall, K.R. and Harper, W.J. (1988): Whey Protein Concentrates, IDF Bulletin No.233.
10. Tindall, H.D. (1983): Vegetables in the Tropics, MacMillan, Press, London.
11. Julians, B.O. (Ed.) (1985): Rice Chemistry and Technology, (2nd Edition), American Association of Cereal Chemistry, St. paul Minesota, USA.

12. Bowers, J. (1992): Food Theory and Applications, (2nd Edition), MacMillan Publishing Co., New York.
13. Peckham, G. and Freeland – Graves, G.H. (1979): Foundations of Food Preparation.
14. Becker, P. (1965): Emulsions: Theory and practice, Reinhold, New York.

JOURNALS

1. Journal of Food Sciences.
2. Advances in Food Research
3. Journal of Food Science and Technology
4. Journal of Agricultural and Food Chemistry.
5. Cereal Science
6. Journal of Dairy Science
7. Journal of the Oil Chemistry Society.

Course Code: CFG105

Course Category: Skill Oriented

Course Title: CLINICAL AND THERAPEUTIC NUTRITION (Skill Oriented)

Credit: 04

Contact hour/week=04

Objectives:

This Course will enable students to:

- Understand the etiology, Physiologic and Metabolic Anomalies of acute and chronic diseases and patient needs.
- Know the effect of the various diseases on nutritional status and nutritional and dietary requirements.
- Be able to recommend and provide appropriate nutritional care for prevention / and treatment of the various diseases.

Contents

1. Obtaining medical & dietary history of patients.
2. Nutritional support – Techniques and Feeding substrates – tube feeding, Intra venous feeding.
3. Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of :
 - Weight imbalances
 - Cardio vascular disorders
 - Diabetes mellitus and other metabolic disorders.

 - GI Tract Disorders
 - Liver and gall bladder, Pancreatic disorders
 - Renal disorders
 - Stress and trauma
 - Cancer
 - Infection AIDS
 - Respiratory problems

References:

1. Dave, Nilambari (2004). Nutrition and Diet Therapy, 1st Edition, Dr. Nilambari Dave, Head, Dept. of Home Science, Saurashtra University, Rajkot.
2. Mahan, L.K. and Escott-stump S. (2000): Krause's food nutrition and diet therapy, 10th Edition, W.B. Saunders Ltd.,
3. Shills, M.E. Olson, J.A. Shilke, M. and Ross. A.C. (1999). Modern in Health and Disease, 9th Edition, Williams and Wilkins.
4. Escott-Stump, S. (1998) : Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
5. Garrow, J.S. James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10th Edition, Churohill Livingstone.
6. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition. Times Mirror / Mosby College Publishing.
7. Davis. J. and Sherer. K. (1994): Approval nutrient in pediatrics, Boston, little, Brown & Co.,
8. Walker, W.A. and Watkins, J.B. (Ed.) (1985): Nutrition in Pediatrics, Boston, little, Brown & Co.,
9. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B. Saunders Co.,
10. Ritchie, A.C. (1990): Boyd's textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
11. Fauci, S.A. et al. (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill.
12. World Cancer Research Fund (1997): Food, Nutrition and the Prevention of Cancer. A Global perspective Washington, E.D. WCRF.
13. Dave N R,(2004) "Nutrition & Diet Therapy",Department of Home Science, Saurashtra University .Rajkot.

Journal and Other References Series:

14. Nutrition Update Series
15. World review of nutrition and dietetics.
16. Journal of the American Dietetic Association

17. American Journal of Clinical Nutrition
18. European journal of Clinical Nutrition
19. Nutritional reviews.

Course Code: FN201

Course Category: Core

Course Title: Maternal & Child Nutrition

Credit: 04

Contact hour/week=04

Objectives:

This course is designed to enable the students to:

- Understand physiological changes in pregnancy and lactation.
- Get acquainted with growth and developmental changes.
- Understand the inter-relationship between nutrition and growth and development during life cycle.

Contents

1. Importance of Maternal Nutrition:

- Importance of nutrition prior to and during pregnancy.
- Pre-requisites for successful outcome. Effect of undernutrition on mother and child including pregnancy outcome and Maternal and Child Health – Short term and Long term.
- Physiology and endocrinology of pregnancy and embryonic and fetal growth and development.
- Nutritional requirements during pregnancy
- Adolescent Pregnancy
- Pregnancy and AIDS
- Pregnancy and TB
- Intra-Uterine growth retardation
- Complications of pregnancy and management and importance of antenatal care.
- Congenital malformation, fetal alcohol syndrome and gestational diabetes mellitus.

2. Lactation:

- Development of mammary tissue and role of hormones

- Physiology and endocrinology of lactation – Synthesis of milk components, let down reflex, role of hormones, lactational amenorrhea, and effect of breast feeding of maternal health.
- Human milk composition and factors affecting breastfeeding and fertility
- Management of lactation – Prenatal breastfeeding skill education. Rooming in, problems – sore nipples, engorged breast, inverted nipples etc.
- Exclusive breastfeeding

3. Growth and development during infancy, childhood.

References

1. International Food Policy Research Institute (1997). Care and Nutrition: Concepts and Measurement, International Food Policy Research Institute Washington DC., USA.
2. International Child Health: A Digest of Current Information.
3. Barker, D.J.P. (1998). Mothers, Babies and Health in Later Life. Edinburgh, Churchill Livingstone.
4. Ward, R.H.T; Smith, S.K; Donnai, D. (Eds.) (1994) Early Fetal Growth and Development, London, RCOG Press.
5. Sachdev; H.P.S. and Choudhary, P. (1995). Nutrition in Children – Developing Country Concerns. Cambridge Press, New Delhi.
6. King, F.S. (1992). Helping Mothers to Breastfeed. Association for Consumers Action on Safety and Health, Mumbai.
7. Wallace, H.M. and Giri, K.(1990). Health Care of Women and Children in Developing Countries. Third Party Publishing Co. Oakland.
8. Tanner, J.M. (1988) Foetus into Man; Physical Growth From Conception to Maturity. Wheaton and Co. Ltd., Great Britain.
9. Luke, B. Johnson, T.R.B; Petrie, R.H. (1993). Clinical Maternal-Fetal; Nutrition. Little Brown and Co. Boston
10. ACC / SCN Reports.
11. WHO (1999) Nutrition for Health and Development: Progress and Prospects on the Eve of the 21st Century WHO / NHD / 99.9 Geneva.

12. Alderman, H.; Behrman, J. Lavy, V.; Menor, R. (1997) Child Nutrition, Child Health and School Enrollment, Policy Research Working paper 1700. Washington DC. World Bank.

Course Code: FN202

Course Category: Multi-Disciplinary

Course Title: Methods of Investigation

Credit: 04

Contact hour/week=04

Objectives:

This course will enable the students to:

- To understand the principles of various analytical techniques available for nutrition research.
- To familiarize with the applications of the above techniques.

Contents

1. **Introduction to method of analysis:** volumetric analysis, standard substance and solutions, calibration of glasswares, standardization of solutions with examples.
2. **Electrolytic dissociation:** Acids, bases, salts, buffers, Henderson – Hasselbach equation. Theory of indicators and principles of measurement of pH
3. **Basics of Instrumentation:** Physico-chemical principles and methodology: colorimetry, photometry, fluorimetry, flame photometry and atomic absorptiometry.
4. **Chromatography:** Principles and application in paper (circular, ascending and descending), ion-exchange, column, thin layer, gas liquid and high performance liquid chromatographic techniques.
5. **Electrophoresis:** Principle and applications in paper and gel electrophoresis.
6. **NMR and its application.**
7. **Immunological Methods:** RIA, ELISA.
8. **Bioassays:** Animal studies, human studies, microbiological assays.

References

1. Boyer, R. (2000). 3rd Ed. Modern Experimental Biochemistry. Person Education, Asia.
2. Dawes, E.A.(1980)6th Ed. Quantitative Problems in Biochemistry. Longman Group Ltd.,
3. Khosla, B. D., Garg V. C. and Khosla, A. (1987). 5th Ed. Senior Practical Physical Chemistry, R. Chand & Co., New Delhi.
4. Oser, B.L. (1965): 14th Ed. Hawk's Physiological Chemistry. Tata McGraw-Hill Publishing Co. Ltd.,
5. Joshi H D., (2004)' Methods of Analysis, Department of Home Science Saurashtra University, Rajkot.
6. Raghuramulu N.; Madhavan Nair and K. Kalyanasundaram, S. (1983). A Manual of Laboratory Technique. NIN, ICMR.
7. Sharma, B.K. (1999). 8th Ed. Instrumental Methods of Chemical Analysis. Gel Publishing House.
8. Srivastava, A.K. and Jain P. C. (1986) (second edition) Chemical Analysis an instrumental approach. S. chand & co. limited.
9. Varley, H ; Gowenlock, A.H. and Bell, M. (1980). 5th Ed. Practical Clinical Biochemistry. Heinemann Books Ltd.,
10. Vogel, A.I. (1962) 3rd Ed. A Textbook of Quantitative Inorganic Analysis by The English Language Book Society and Longman.

Course Code: FN203

Course Category: Core

Course Title: Advanced Nutrition-I

Credit: 04

Contact hour/week=04

Objectives:

This course is designed to:

- Provide in-depth knowledge of the physiological and metabolic role of various nutrients and their interactions in human nutrition.
- Enable students to understand the basis of human nutritional requirements and recommendations through the life cycle.
- Enable students to understand the pharmacological actions of nutrients and their implications.
- Familiarize students with recent advances in nutrition.

Contents

1. **Energy:** Energy content of foods. Physiological fuel level-review. Measurement of Energy Expenditure: BMR, RMR, thermic effect of feeding and physical activity, methods of measurement. Estimating energy requirements of individuals and groups. Regulation of energy metabolism: Control of food intake, digestion, absorption and body weight.
2. **Carbohydrates:** Types, classification, digestion, and transport – review, dietary fibre, fructo-oligosaccharides, resistant starch – chemical composition and physiological effects Glycemic index of foods. Sweeteners – nutritive and non-nutritive.
3. **Proteins:** Classification, digestion, absorption and transport – review. Metabolism of proteins: Role of muscle, liver and gastro intestinal tract. Protein quality, methods of evaluating protein quality. Protein and amino acid requirements. Therapeutic applications of specific amino acids: Branched chain, glutamine, arginine, homocysteine, cysteine, taurine.
4. **Lipids:** Classification, digestion, absorption, transport – review. Functions of EFA Role of n-3, n-6 fatty acids in health and disease Requirements of total fat and fatty acids. Trans fatty acids. Prostaglandins.

References

1. Annual Reviews of Nutrition. Annual Review Inc. California, USA.
2. Shils, M.E.: Olson, J: Shike, M. and Roos, C. (1998): Modern Nutrition in Health and Disease. 9th edition. Williams and Williams. A Beverly Co. London.
3. Bodwell, C.E. and Erdman, J.W. (1988) Nutrient Interactions. Marcel Dekker Inc., New York.
4. World – Reviews of Nutrition and Dietetics.
5. WHO Technical Report Series.
6. Indian Council of Medical Research. Recommended Dietary Intakes for Indians – Latest Recommendations.
7. Indian Council of Medical Research. Nutritive value of Indian Foods – Latest Publication.
8. Bordanier, C.D. and Haargrove, J.L. (Ed.) (1996): Nutrients and Gene Expression : Clinical Aspects. Boca Raton, FL CRP Press.
9. Baeurle, P.A. (Ed.)(1994) Inducible Gene Expression. Part-I : Environmental Stress and Nutrients. Beston : Birkhauser.
10. Chandra, R.K. (Ed.)(1992): Nutrition and Immunology, ARTS Biomedical. St. John's Newfoundland.

JOURNALS

1. Nutrition Reviews
2. Journal of Nutrition
3. American Journal of Clinical Nutrition
4. British Journal of Nutrition
5. European Journal of Clinical Nutrition
6. International Journal of Vitamin and Nutrition Research

Course Code: CFG205

Course Category: Skill Oriented

Course Title: Statistics & Computer Application

Credit: 04

Contact hour/week=04

Objectives:

- To understand the role of statistics and computer applications in research.
- To apply statistical techniques to research data for analyzing & interpreting data meaningfully.

NOTE: Students should be given hands on experiences to use appropriate software packages for selected statistical analyses.

Contents:

1. Conceptual understanding of statistical measures. Classification and tabulation of data. Measurement of central tendency, measures of variation.
2. Frequency distribution, histogram, frequency, polygons, ogive.
3. Binomial distribution
4. Normal distribution – Use of normal probability tables.
5. Parametric and non-parametric tests.
6. Testing of hypothesis. Type I and Type II errors. Levels of Significance.
7. Chi-square test. Goodness of fit. Independence of attributes 2x2 and $r \times c$ contingency tables.
8. Application of **student 't'** test for small samples. Difference in proportion for means and difference in means.
9. Correlation, coefficient of correlation, ranks correlation.

Course Code: FN301

Course Category: Core

Course Title: Institutional Food Administration

Credit: 04

Contact hour/week=04

Objectives:

- To develop a knowledge base in key areas of Institutional Food Administration
- To provide practical field level experience in Institutional Food Administration.
- To impart necessary expertise to functional as a food service manager
- To equip individual to start their own food service unit leading to entrepreneurship
- To develop critical abilities and provide basic grounding in research techniques.

Theory

1. Introduction to Food Service Systems

- Evolution of the Food service industry
- Characteristics of the various types of food service units

2. Approaches to Management

- Theories of Management

3. Management of Resources

Finance

- Determining the finance needed to establish or run an unit
- Budgets
- Sources of finance
- Planning adequate cash flow

Space & Equipment

- Step in Planning layouts
- Determining equipment
- Maintenance of equipment
- Layout analysis

Material

- Menu planning
- Purchase
- Storage

- Quantity food production
- Service and modes of delivery

Staff

- Manpower planning
- Recruitment, induction, training, motivation and performance appraisal

Time and Energy

- Measures of utilization and conservation

4. Cost Accounting / Analysis

- Food cost analysis

5. Marketing and Sales Management

- Marketing strategies
- Sales analysis
- Market Promotion

6. Quality Assurance

- Food quality
- Total quality management

References: Management

1. West, B. Bssie & Wood, Levelle (1998). Food Service in Institutions 6th Edition. Revised by Harger FV, Shuggart SG & Palgne-Palacio June MacMillan Publication Company, new York.
2. Sethi Mohini (1993) Catering management An Integrated Approach 2nd Edition Wiley Publication.
3. Kotas Richard & Jayawardardene, C. (1994): Profitable Food and Beverage management, hodder & Stoughton Publication.
4. Brodner, J. Maschal, H.T., Carlon, H.M. (1982): Profitable Food and Beverage Operation 4th Edition, hayden Book Company, New Jersey.
5. Green, E.E. Drake, G.G. Sweeny, J.F. (1978). Profitable Food and Beverage Management. Planing , operations. Hayden Book Company, new Jersey.

6. Knootz, H, O. Donnel C. (1968): Principles of Management McGraw Hill Book Company.

Personal management

7. Desseler, Garry (1987): Personnel management Modern Concepts and Techniques, Prentice Hall, New Jersey.
8. Kumar, H.L. (1986): Personal management in Hotel Catering Industries, Metropolitan Book Company, New Delhi.
9. Hich Cock M. J. (1980): Food Service System Administration, McMillan Publishing Company.

Cost Control

10. Keiser, J. & Caillo, E. (1974): Controlling and Analysis of Cost in Food Service Operations Wiley and Sons New York.
11. Khari, W. L. (I) (1977): Introduction to Modern Food and Beverage Service (1979). Advanced Modern Food and Beverage Service Prentice Hall Series.
12. Coltman, M.M. (1977): Food and Beverage Cost Control. Prentice Hall Series.
13. Levison (1976): Food and Beverage Operation Cost Control and System management. Prentice Hall Series.

Layout and Design

14. Kazarian, E.A. (1989) Food Service Facilities Planning 3rd Edition Von. Nostrand Reinhold.
15. Avery A.C. (1980): Modern Guide to Food Service Equipment, Boston CBI Publishing Company.
16. Brichfield, J. (1988): Design and layout of Food Service Facilities, New York, Van Nostrand Reinhold.
17. Tolve, A.P. (1984): Standardising Food Service for Quality and Efficiency, AVI Publishing Company INC.

Course Code: FN302

Course Category: Core

Course Title: Advanced Food Microbiology

Credit: 04

Contact hour/week=04

Objectives:

This course will enable the student to:

- Gain deeper knowledge of role of micro-organisms in human and environment.
- Understand the importance of micro-organism in food spoilage and to learn advanced, techniques used in food preservation.
- Understand the latest procedures adopted in various food operations to prevent food-borne. Disorders and legal aspects involved in these areas.

Contents

1. Introduction to historical developments in food preservation. Spoilage, infections and legislation.
2. Micro-organisms of importance in Food: Their primary sources in foods, Morphology, cultural characteristics.
- Factors affecting the growth of microorganisms in food. Intrinsic and Extrinsic parameters that affect microbial growth
3. **Spoilage of different groups of Foods** : Meat, eggs and poultry, fish and other sea foods, canned food.
4. **Food Preservation**: Physical methods – Drying, freeze, drying, , Cold Storage, heat treatment, Irradiation, High pressure processing Chemical Preservatives and natural antimicrobial compounds probiotic bacteria.
5. **Food borne disease**: Bacterial, food-borne important, Mycotoxins.
6. Role of Microbes in fermented foods.

References

1. Pelezar, M.I. and Reid, R.D. (1933): Microbiology McGraw Hill Book Company, New York, 5th Edition.
2. Atlas, M. Ronald (1995) Principles of Microbiology, 1st Edition Mosby-year Book, Inc. Missouri, U.S.A.

3. Topley and Wilson's (1983) Principles of Bacteriology, Vitology and Immunity, Edited by S.G. Wilson, A Miles and M.T. Parkar Vol. I : General Microbiology and Immunity II : Systematic Bacteriology. 7th Edition Edward Arnold Publishers.
4. Block, J.G. (1999): Microbiology Principles and Explorations, 4th Edition John Wiley and Sone Inc.
5. Frazier, W.C. (1988): Food Microbiology, McGraw Hill Inc. 4th Edition.
6. Jay, James, M.(2000) : Modern Food Microbiology, 6th Edition, Aspen Publishers Inc. Maryland.
7. Banwant, G. (1989): Basic Food Microbiology, 2nd Edition. CBS Publishers.
8. Garbutt, J. (1997): Essentials of Food Microbiology. Ist Edition, Arnold International Students Editions.
9. Doyle, P. Benehat, L.R. and Mantville, T.J. (1997): Food Microbiology, Fundamentals and Frontiers, ASM, Washington DC.
10. Adams, M.R. and M.G. Moss (1995): Food Microbiology, 1st Edition, New Age International (P) Ltd.
11. Bensaon, H. J. (1990): Microbiological applications, C. Brown Publishers U.S.A.
12. Roday, S. (1999): Food Hygiene and Sanitation, 1st Edition. Tata MacGraw Hill, New Delhi.
13. Venderzant C. and D.F. Splitts Toesser (1992): Compendium of Methods for the Microbiological Examination of Foods 3rd Edition American Public Health Association, Washington DC.

Journals

14. Journals of Food Science Published by the Institute of Food technologists, Chicago 1u. U.S.A.
15. Journal of Food Science and Technology Published by Association of Food Scientists and Technologists (India) CFTRI-MYSORE.
16. Food Technology Published by the Institute of Food Technologists, Chicago 1u. U.S.A.

Course Code: FN303

Course Category: Core

Course Title: Advanced Human Physiology

Credit: 04

Contact hour/week=04

Objectives:

This course will enable students to:

- ✘ Advance their understanding of some of the relevant issues and topics of human physiology.
- ✘ Enable the students to understand the integrated function of the system and the grounding of nutritional science in physiology.
- ✘ Understand alterations of structure and function in various organs and systems in disease conditions.

Contents

- 1. Cell structure and function:** Levels of cellular organization and function organelles, tissues, organs and systems. Brief review: Cell membrane transport across cell, membrane and intercellular communication. Regulation of cell multiplication
- 2. Nervous System:** Review of structure and function of neuron - conduction of nerve impulse, synapses, and role of neurotransmitters - Organization of central and Peripheral nervous system.
- 3. Endocrine system:** Endocrine glands (Pituitary gland, Thyroid, parathyroid, Islets of Langerhans, Adrenals, Ovary and Testis, Thymus, Pineal gland structure, function, role of hormones, regulation of hormonal secretion, Disorders of endocrine glands .
- 4. Excretory system:** Structure and function of nephron - Urine formation - Role of kidney in maintaining pH of blood - diuretics
- 5. Immune system:** Cell mediated and humeral Immunity: Activation of WBC and production of antibodies. Role in inflammation and defense
- 6. Exercise physiology:** Nutrition, exercise, physical fitness and health inter-relationship Energy system of body, Fuels and nutrients to support physical activity Shifts in carbohydrate and fat metabolism Mobilization of fat stores during exercise.

References

Ganong, W.F. (1985): Review of Medical Physiology, 12th Edition, lange Medical Publication.

1. Moran Campell E.J., Dickinson, C.J., Slater, J.D., Edwards. C.R.W. and Sikora, K. (1984) *L Clinical Physiology*, 5th Edition, ELBS, Blackwell Scientific Publications.
2. Guyton, A.C. (1985) : *Function of the Human Body*. 4th 'edition, W.B. Sanders Company, Philadelphia.
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Course Code: CFG305

Course Category: Multi-Disciplinary

Course Title: Scientific Writing

Credit: 04

Contact hour/week=04

Objectives:

- To be able to appreciate and understand importance of writing scientifically.
- To develop competence in writing and abstracting skills.

Contents

2. Drafting titles, Sub titles, tables, illustrations

- Tables as systematic means of presenting data in rows and columns and lucid way of indicating relationships and results.
- Formatting tables: Title, Body Sub Column, Column Head, Spanner Head, and Box Head.
- Appendices: use and guidelines.

3. The writing process

- Getting started
- Use outline as a starting device
- Drafting
- Reflecting, re-reading
- Checking organization
- Checking headings
- Checking content
- Checking clarity
- Checking grammar
- Brevity and precision in writing
- Drafting and re-drafting based on critical evaluation

3. Parts of dissertation / research report / article

- Introduction
- Review of literature
- Methods
- Results and discussion
- Summary and abstract
- References
- **Ask questions related to:** content, continuity, clarity, validity internal consistency and objectivity during writing each of the above parts.

6. Writing for Grants

- The question to be addressed
- Rationale and importance of the question being addressed
- Empirical and theoretical framework
- Presenting pilot study / data or background information
- Research proposal and time frame
- Specificity of methodology
- Organization of different phases of study.
- Expected outcome of study and its implications
- Budgeting
- Available infra-structure and resources
- Executive summary

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Course Code: FN401

Course Category: Core

Course Title: FOOD PROCESSING AND TECHNOLOGY (Core)

Credit: 04

Contact hour/week=04

Objectives:

This course is designed for students to:

- Impact systematic knowledge of basic and applied aspects of food processing and technology.
- Provide the necessary knowledge of basic principles and procedures in the production of important food products.
- Orient the students to potential use of various by products of food industry.

Contents

1. **Physical principles in food processing operations:**

Thermal processing: Degree of processing of preservation, selecting heat, treatments, heat resistance of micro organisms, nature of heat transfer, protective effects of food constituents, types of thermal treatments.

2. **Rice Technology** - Production, processing, milling of rice, parboiling, processes, by products of rice milling and their utilization. Nutrient loss during processing.
3. **Wheat Technology** - Production, processing, manufacture of breakfast cereals
4. **Pulses** - Production, types of processing of different pulse products - Soyabean Processing.
5. **Technology of oil seeds** - Processing, meal concentrates and isolates.
6. **Mushroom** - Production, processing, utilization.
7. **Meat** - Production, processing, smoking and curing of meat, grading.
8. **Poultry** - Production, preparing poultry for consumption, packaging.
9. **Fish** - Production, effect of handling practices, storage of eggs.
10. **Fermentation Technology:** Functional foods and Technologies to meet special needs.
11. **Waste disposal and sanitation:** Waste characteristics, treatments and technologies, food plant sanitation.

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Course Code: FN402

Course Category: Core

Course Title: ADVANCED NUTRITION – II

Credit: 04

Contact hour/week=04

Objectives:

This course is designed to:

- Provide in depth knowledge of the physiological and metabolic role of various nutrients and their interactions in human nutrition.
- Enable students to understand the basis of human nutritional requirements and recommendations through the life cycle.
- Enable students to understand the pharmacological actions to nutrients and their implications.
- Familiarize students with the recent advances in nutrition.

Contents

1. Water Regulation of intra and extra cellular volume. Osmolality, water balance and its regulation.

2. Minerals: (Note: For each nutrient sources, bioavailability, metabolism, function, requirements. RDI/ESADDI, deficiency and toxicity, interactions with other nutrients are to be discussed).
Macro minerals: calcium, phosphorus, magnesium, sodium, potassium & chloride.
Micro minerals: Iron, copper, zinc, manganese, iodine, fluoride.
Trace minerals: Selenium, cobalt, chromium , vanadium, silicon, boron, nickel.
3. Vitamins; Historical background, structure, food sources, absorption and transport, metabolism, biochemical function, assessment of status. Interactions with other nutrients
 Physiological, pharmacological and therapeutic effects, toxicity and deficiency with respect to the following:
 - a) Fat soluble: Vitamins A, D, E & K.
 - b) Water soluble: Thiamine, riboflavin, niacin, biotin, pyridoxine, folic acid, pantothenic acid, ascorbic acid, cyanocobalamin, choline, inositol.
4. Non-nutritive food components with potential health effects: Polyphenols, tannins, phytate, phytoestrogens, cyanogenic compounds, lectins and saponins.
5. Nutritional regulation of gene expression.
6. Nutrition management in special conditions: space travel, high altitudes, low temperatures, submarines.

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5. WHO Technical Report Series.
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JOURNALS

10. Nutrition Reviews
11. Journal of Nutrition
12. American Journal of Clinical Nutrition
13. British Journal of Nutrition
14. European Journal of Clinical Nutrition

Course Code: FN403

Course Category: Core

Course Title: FOOD SAFETY AND QUALITY CONTROL (Core)

Credit: 04

Contact hour/week=04

Objectives:

This Course will enable students to:

- Know the importance of quality assurance in food industry.
- Know the various tests and standards for quality assessment and food safety.
- Know the various test used to detect food adulterants
- Be familiar with the fundamentals that should be considered for successful quality control programme.

Contents

1. Introduction to quality assurance and food safety assurance. Current concepts of quality control.
2. Quality assurance programme : Quality plan, documentation of records, process control and HACCP, hygiene and housekeeping, corrective action, quality and programme and total quality process.
3. Product Evaluation :
 - Sampling for product evaluation and line control.
 - Specification and Food standards, International, National
 - Mandatory, Voluntary.

- Sample preparations
 - Reporting results and reliability of analysis.
4. Test for specific raw food ingredients and processed Food including additives:
 - a. Nutrient analysis
 - b. Tests of adulterants
 5. Consumer Protection

Course Code: CFG405

Course Category: Skill Oriented

Course Title: ASSESSMENT OF NUTRITIONAL STATUS

Credit: 04

Contact hour/week=04

Objectives:

The course is designed to:

- Orient the students with all the important state-of-the-art methodologies applied in nutritional assessment and surveillance of human groups.
- Develop specific skills to apply the most widely used methods.

Contents

Theory

1. Nutritional assessment as a tool for improving the quality of life of various segments of the population including hospitalized patients.
2. Current methodologies of assessment of nutritional status, their interpretation and comparative applications of the following :
 - Food consumption
 - Anthropometry
 - Clinical and Laboratory
 - Rapid Assessment & PRA
 - Functional indicators such as grip strength, respiratory fitness, Harvard Step test, squatting test.
3. Nutritional Surveillance – Basic concepts, uses and setting up of surveillance systems.
4. Monitoring and Evaluation

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