

Syllabus for Ph.D. entrance examination in Food Science and Nutrition

Research Methodology

UNIT I: Introduction to Research Methodology

Research- Definitions, importance, types, essential steps, significance, problems; Experimental design; literature, data collection and citation. Research reports, abstracts, dissertation, thesis, manuscripts, review papers, book reviews, conference and project reports, bibliography & references, acknowledgements, indexing, tables and illustrations.

UNIT II: Elementary Computer and internet Applications

Concept of computer hardware, languages, and softwares. Introduction to spreadsheet applications, features, using formulas and functions, data storing, features for statistical data analysis, generating charts/graph and other features using Microsoft excel or similar softwares. Presentation tools, features and functions, power point presentation, internet browsing, WWW, use of search engines, biological data bases. Computer networking LAN and WAN.

UNIT III: Biostatistics and Bioinformatics

Random sampling, use of random number tables. Classification & representation of data, histogram, frequency curve, pie chart. Normal & binomial distribution. Probabilities, error estimation, confidence levels, mean estimation, variance & standard deviations. Hypothesis and hypothesis testing, students "t" test, Chi-square test, tests of independence, Anova.

UNIT IV: Research Ethics & IPR

Perspective of ethics, personal vs professional ethics. Moral reasoning, ethical theories, deontological, utilitarianism, ethical leadership (integrity and ingenuity). Framework for ethical decision making. Plagiarism software, intellectual property rights, types, patents, copy rights, trade marks, design rights, geographical indications. Patentable and non patentable, legal protection of biotechnological inventions, world intellectual property rights organization (WIPO).

UNIT V: Biosafety Guidelines

Introduction to biosafety, biosafety issues in life sciences, risk assessment and risk management. Safety protocols, risk groups, biosafety levels, biosafety guidelines and

regulations (National and International), Types of biosafety containment; depository regulation, national & international centres for biological databases.

UNIT VI: Research Tools and Techniques:

Chromatography and Electrophoresis Chromatography – Thin layer chromatography - Gas chromatography - Column chromatography - Ion exchange chromatography - Gel exclusion chromatography - HPLC Affinity chromatography and Immunoabsorption.

Electrophoresis: Polyacrylamide gel electrophoresis (PAGE) – Nucleic acid and sequencing gels - Agarose gel electrophoresis, Two dimensional electrophoresis -Pulse Field Gel Electrophoresis (PFGE) isoelectric focusing - Gel documentation. Blotting - Western, Southern and Northern blots. PCR Techniques.

Colorimetry and Centrifugation: Colorimetry - ultraviolet - visible spectrophotometry - principles, instrumentation - applications, Fluorescence spectrophotometry. ELISA. Centrifugation - principles and instruments - applications. Enzymology- enzyme assay, enzyme activity and specific activity.

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- Gupta S. P., (2008). Statistical Methods, 37th Ed. (Rev) Sultan Chand and Sons, New Delhi. 1470 P.
- Attwood T. K. and Parry-Smith D. J., (1999). Introduction to Bioinformatics Addison Wesley Longman Limited, Harlow.
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Core Subject

Unit I: Food Science

A. Food Commodities: Cereals and cereal products, millets, legumes, fruits and vegetables, fats and oils, sugar and confectionaries, beverages, milk and milk products, eggs, meat and fish.

B. Food Microbiology: Food borne illness, Intrinsic and extrinsic factors of microbial growth, Spoilage and Contamination of Food commodities, Techniques and Principles of Preservation.

C. Food Safety: International and National Food Laws, Food Standards, Quality control, Hazard analysis, Governing bodies of Food Regulations

D. Food Processing: Food fortification and Food packaging, Physio-chemical and functional attributes of food components. Instrumentation and applications of food processing.

Unit II: Nutrition

A. Nutrients: Carbohydrate, Protein, Lipids, Fat and Water soluble Vitamins and Minerals- Digestion, Absorption, bioavailability and functions

B. Nutritional Epidemiology: Nutritional assessments-anthropometry, biochemical, clinical and diet surveys, Monitoring and evaluation of nutrition programmes.

C. Nutrition through Life Cycle: Balanced Diet, Pregnancy, Lactation, Infancy, Preschool age, School going children, Adolescence, Adult and Geriatrics.

D. Nutrient Requirement: RDA-WHO and ICMR, Limitations and Uses, Dietary Recommendations, Sources, Energy metabolism

Unit III: Advances in Food Science and Nutrition

A. Special Nutrition: Nutrition during Physical activity and exercise, sports nutrition, nutrition in space, submarines.

B. Advances in Food science: Nutrigenomics and nutrigenetics, genetically modified Foods, Non-nutritional food components with potential health benefits, Functional foods

C. Food and Drug Interactions: Affects on Kinetic properties, chemical properties, bioavailability and Metabolisms, Adverse affects.

D. Interactions of Nutrition and Immunity: Defense mechanisms and nutrients essential in the development of immune system. Malnutrition affecting the immuno-competence and susceptibility to infections.

Unit IV: Therapeutic Nutrition

A. Diet Therapy: Principles, Diet prescription, Modification of normal diet, Nomenclature of diet adequacy in standard hospital diet

B. Medical Nutrition Therapy: Modifications of diets in febrile conditions, Oral and dental conditions, Gastrointestinal disorders, Nutrition in critical care, cancer, allergies and food intolerances.

C. Nutrition in Non-communicable Disease: Cardiovascular disorders, diabetes mellitus, hypertension, renal diseases, pulmonary disorders, Liver, pancreas and Gall bladder.

D. Nutrition in metabolic diseases: Gout, inborn errors of metabolism, etiology, symptoms and complications, nutritional management.

REFERENCES:

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- Visakh P. M., Laura B. Iturriaga & Pablo Daniel Ribotta. (2013). Advances in Food Science and Nutrition. Scrivener Publishing LLC.
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