

**SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR**



**MASTER OF SCIENCE (Home Science)
SYLLABUS EFFECTIVE FROM: 2018-19
Semester: III**

**PH03CFBT21 RESEARCH METHODOLOGY AND SCIENTIFIC WRITING
(50 MARKS -2 HOURS, CREDITS-2)**

Objective:

- To understand significance of research in Home Science
- To understand sampling methods and techniques.
- To understand types of researches and develop the ability to construct data gathering tools appropriate to research design
- To gain knowledge regarding scientific writing in research report presentations.

Content:

Unit: 1

Basic concepts of research Introduction, meaning of research, objectives of research, characteristics of research, requirements for a scientific research, types of researches: Exploratory and Descriptive

Unit: 2

Research Problem Introduction, selecting the problem, defining the problem, sources of problem, criteria for selection of the problem, delimiting a problem, process of formation of a research problem

Unit: 3

Research design and Hypothesis Formulation
Meaning of research design, types of research designs (exploratory, descriptive, diagnostic, experimental)
What is Hypothesis, sources of hypothesis, forms of hypothesis

Unit: 4

Sampling methods and techniques
Meaning and definition of population and sampling, techniques of sampling (probability and non-probability)

Unit: 5

Data collection and Measurement
Types of data: Secondary and Primary

Methods of Primary data collection: observation, personal interview, questionnaire, schedule, case study, social survey, field study, field experiment
Scaling measurement: types of measurement scales (Nominal, ordinal, interval, ratio)

Unit: 6

Organization of data and presentation

Coding, tabulation and charts

Purpose of report, essentials of a good report, types of report presentations (written, oral, poster) format of a report

Course Learning Outcome:

- The students would become better researchers.
- They would know how to present their research report in a systematic manner
- The students would have also learned the details of a research proposal

Reference Books:

1. Taxman's Research Methodology by Sarangi Prasant, Taxman Publications (P) Ltd, New Delhi (2010)
2. Research Methodology Methods and Techniques by C.K.Kothari , Wiley Eastern Ltd., New Delhi (1990)
3. Research Methodology Concepts and Cases by Chawla. D and Sondhi. N, Vikas Publishing House, Noida
4. Research methodology- Methods and Techniques by C.R.Kothari, Wishwa Prakashan, New Delhi (1990)ISBN-81-7328-035
5. Doing your Master's Dissertation by Cris Hart, Vistaar Publications, New Delhi (2005) ISBN-81-7829-506-7
6. Your Research Project by Nicholas William, Vistaar Publications, New Delhi ISBN-81-7829-540-7
7. Research Methodology for Community Development by Uma Joshi, Authorspress, New Delhi ISBN-978-81-7273-457-2
8. Writing your Thesis by Paul Oliver, Sage Publication, India Pvt. Ltd., Delhi (2008) ISBN-978-81-7829-918-1
9. Research and Writing: Across the Disciplines by P. Ramdass and A. Wilson Aruni, MJP Publishers, Chennai ISBN-978-81-8094-068-2

PH03CFBT22 PRACTICAL - SCIENTIFIC WRITING

(25 MARKS - 2 HOURS, CREDITS -1)

Content:

1. Scientific writing as a means of communication (grammar, punctuation and conventions of scientific writing)
2. Sections of a report:

- research paper
- thesis/dissertation
- poster

Steps in writing a report

3. Tables: Drafting titles, subtitles, construction details
4. Graphs- types, title, elements (scales, title, scale captions and key)
5. Citing the references
6. Appendices- content, need, rules for presentation
7. Writing of proposal (for grants)

PH03CFBT23 FUNDAMENTALS OF INDUSTRIAL MICROBIOLOGY
(100 MARKS -4 HOURS, CREDITS-4)

Objectives:

- To introduce and appreciate the scope and future of bioprocess technology
- To learn how microorganisms can be screened for production of metabolites and activities.
- To understand cultivation methods for a bioprocess.
- To know the types of bioreactor configurations available and the principles of their design
- To understand the role of mass and heat transfer, aeration and mixing in bioprocesses.
- To know how bioprocesses can be controlled.
- To elaborate the various methods available for recovery and purification of biotechnological products

Content:

Unit 1

Isolation and screening of industrially important microorganisms. Improvement of industrially important microorganisms.

Unit 2

Elements of biochemical engineering: Substrate for microbial processes, Medium optimization. bio-reactor design, sterilization of reactor, sterilization of air, sterilization of medium, aeration and agitation, mass transfer, inoculum development, inoculum addition, sampling, foam control, bio-reactor probe (biosensors), measurement and control process, gas compression, solid liquid handling, scale up of bioprocess, Material balance (C and N), costing and energy, safety of products, type of bioreactors.

Unit 3

Batch, fed batch, continuous bioprocess and their kinetics.

Industrial Products: Production and applications of amino acids (lysine and glutamic acid), citric acid, ethanol, vitamin B12, xanthan gum, Production and applications of amylase, rifampicin, lovastatin.

Unit 4

Immobilization-enzymes, cells, subcellular organelles, cell-immobilization, applications and immobilized reactors.

Unit 5

Downstream processing Cell separation, foam separation, flocculation, filtration, ultrafiltration reverse osmosis, centrifugation, liquid -liquid extraction, chromatography, precipitation, drying, crystallization, cell disintegration.

Course learning outcome:

After the successful completion of the course a student will be able to:

- Know and appreciate the scope and future of bioprocess technology.
- Understand how microorganisms can be screened for production of metabolites and activities.
- Understand how process fluids, air and other utilities can be sterilized and aseptic conditions maintained.
- Delineate the basics of cultivation methods decided for a particular bioprocess.
- Know the types of bioreactor configurations available and the principles of their design
- Understand the role of mass and aeration and mixing in bioprocesses.
- Learn various methods of cultivation of bioprocesses control.
- Gain knowledge of the various methods available for recovery and purification of biotechnological products

Reference Books:

1. Crugers W and Crugers A. : Biotechnology : A textbook of Industrial Microbiology
2. A. H. Patel : Industrial Microbiology, McMillian India Ltd. , New Delhi
3. Biochemical engineering by Aiba, Humphrey and Millis. University of Tokyo Press, Tokyo
4. 2. Biochemical Engineering fundamentals by Bailey and Ollis. McGraw Hill Book Co. New York
5. 3. Principles of Fermentation technology by Stanbury, Whitaker and Hall, Pegamon Press, Oxford
6. Principles of Fermentation Technology : Whitekar & Stanbury
7. Comprehensive MICROBIOLOGY : MurrayMoo Young
8. Methods in Industrial Microbiology : Sikyta
9. Fermentation Microbiology and MICROBIOLOGY, El Mansi and Bryc

PH03CFBT24 PRACTICAL BASED ON PH03CFBT23

(50 MARKS - 4 HOURS, CREDITS -2)

1. Screening of amylase producing micro-organism.
2. Microbial production of amylase and starch hydrolysis.
3. Enzymatic digestion of protein into amino acids.
4. Enzyme in laundry detergent.
5. Microbial production of cellulose and cellulose degradation.

6. Production of wine.
7. Microbial production of citric acid.
8. Yoghurt production / cheese production from milk.
9. Purification of enzymes by
 - salt
 - acetone
 - iso-electric pH.
10. Enzyme immobilization.
11. Cell immobilization & bio-reactor design

PH03CFBT25 ADVANCED NUTRITION

(100 MARKS -4 HOURS, CREDITS-4)

Objectives:

The course will enable the students to:

- Gain knowledge about the physiological and metabolic role of carbohydrates, proteins, fats vitamins and minerals in human body.
- Learn the requirements and food sources of carbohydrates, proteins, fats vitamins and minerals for various age groups and factors affecting it.
- Learn about planning of an animal experiment.

Content:

- Unit: 1** Water , energy balance, regulation of food intake and body composition
Water balance – thirst and electrolyte balance; Energy balance - weight loss and weight gain; Regulation of food intake - hunger and satiety regulation, Body composition – general aspects of normal human growth and development from the view point of physical and cellular growth.
- Unit: 2** Diseases caused by either excess or deficiency of carbohydrate, proteins and lipids.
- Unit: 3** Fat-soluble vitamins
Vitamin A, D, E, K
- Historical background, digestion, absorption, functions, metabolism.
- Deficiency and excess states
- Unit: 4** Water soluble vitamins
Vitamin B complex – B₁, B₂, niacin, B₆, folic Acid, B₁₂, biotin, pantothenic acid and Vitamin C
- Unit: 5** (a) **Major Minerals**
Sodium, chloride, potassium, calcium, PH0sPH0rous, magnesium and sulphur.

- Digestion, absorption, functions, metabolism.
- Food sources and RDA
- Deficiency and excess states

(B) Trace Minerals

Iron, zinc, iodine, copper, manganese, fluorine, chromium, selenium and others.

- Digestion, absorption, functions.
- Food sources and RDA
- Deficiency and excess states

Unit: 6 Animal Experimentation

Course learning outcome:

The students will be able to:

- 1) Discuss about the metabolic functions of various nutrients.
- 2) Describe about the B.M.R and factors affecting it.
- 3) Discuss about the signs and symptoms of various deficiency diseases.

Reference Books:

1. Krause's Foods and Nutrition Therapy by L. Kathleen Mahan and Sylvia Escott Stump, Saunders Elseviers Publication.
2. Modern Nutrition in health and diseases, by Maurice E. Shills, Lippincott Williams and Wilkins Publication.

PH03CFBT26 PRACTICAL BASED ON PH03CFBT25

(50 MARKS - 4 HOURS, CREDITS -2)

1. Food Analysis: Nitrogen, ash, calcium, PH0sPH0rous, iron, thiamine, riboflavin, niacin, ascorbic acid.
2. Blood : Hemoglobin
3. Plasma: Total protein, A/G ratio, Vitamin A, and Vitamin C.
4. Urine: Nitrogen, urea, creatinine, uric acid, N⁷ methyl nicotinamide, thiamine, riboflavin, niacin, ascorbic acid.

PH03CFBT27 DISSERTATION

(100 MARKS - 4 HOURS, CREDITS -4)

Objective:

- To provide students with the opportunity to work independently as researchers
- To make students better researchers

Content:

1. A topic for independent research is to be selected by the student in consultation with the guide on the basis of areas of current importance, facilities available in the department of research etc. (the topic selected should have the depth as the work is to be started in the III semester by the student and to be continued in the IV semester also)
2. The student will do extensive literature review on the selected topic

3. The following chapters/ parts of chapters of the research is to be completed by the end of the semester:
 - a) Significance of the research
 - b) Objectives
 - c) Initiation of Review of literature
 - d) Work plan
4. At the end of the semester the student will be making a presentation and submit a report of the same

PH03EFBT21 HUMAN GENETICS

(100 MARKS -4 HOURS, CREDITS-4)

Objectives:

To familiarize students with:

- Basic concepts of genetics and inheritance Chromosomal aberrations and associated genetic disorders
- Mutations and associated human diseases

Content:

Unit 1

Transmission of Genes – Segregation and Independent Assortment Justify how Mendel arrived at his laws of inheritance Define and use correctly the terms: homozygous, heterozygous, dominant and recessive Describe the basic principles of inheritance (segregation and independent assortment) Calculate the probability of inheritance of particular genes or traits based on probability Distinguish between “independent” and “dependent” events

Modes of inheritance and pedigrees Construct a pedigree from given information Calculate the likelihood of a genetic event based on a pedigree Determine which mode of inheritance is most likely based on information in a pedigree

Unit 2

Variations and Extensions of Mendel's laws Explain how having multiple alleles for a single gene results in multiple distinguishable traits (rather than two for two alleles). Explain how alleles can have different relationships besides simple recessiveness or dominance. Explain several possible reasons why a given genotype does not always result in the same phenotype. Compare inheritance of the mitochondrial genome with the nuclear genome. Contrast the inheritance of linked genes with unlinked genes.

Linkage, Crossing over and Chromosome mapping Linkage; Sex determination and sex linkage:

Sexual development and dosage compensation Distinguish how "phenotypic" sex is different from "gonadal" sex Explain how the outward sex characteristics can be mismatched with genetic sex (the sex chromosomes) Describe what dosage compensation is, and the basic mechanism for how it works in humans. Compare the impact of dosage compensation on individuals with sex chromosomal abnormalities.

Unit 3

Molecular Genetics Explain the "central dogma" of genetic information transfer Describe the relationship between chromosomes, genes and DNA Distinguish between the theories for how DNA replication might work, and explain how it does work Draw the process of transcription and explain its utility Diagram the processing of mRNA transcripts before translation and explain why they happen Demonstrate how we know the "code" is non-overlapping and redundant. Interpret how mutations might affect protein structure

Unit 4

Mutations Recognize different kinds of mutations (frameshift, insertions, deletions, point mutations), and predict their effect on amino acid sequence and protein structure. Predict the likelihood of a region of DNA incurring a mutation Give examples of how DNA can be mutated Explain why most of us are relatively normal despite the fact that mutations occur in our DNA

Unit 5

Applications of DNA technology Describe the basic idea of PCR, and how/why it is used. Explain how gel electrophoresis works, and interpret data from a gel. Recognize palindromic restriction enzyme sites, and explain why restriction enzymes might be used. Explain the significance of variable regions in DNA Interpret gel electrophoresis data, and explain how gels can be used Explain what an STR is, and HOW STRs can be used in DNA fingerprint analysis

Biochemical Genetics: Inborn errors of metabolism: (Molecular and biochemical pathways in Phenyl ketonuria, Alkaptonuria, Maple syrup urine disease, Albinism, Mucopolysaccharidosis, Lipidosis and Glycogen storage disorders). Human mitochondrial syndromes.

Pharmacogenetics: Definition, drug metabolism, genetic variation

Course Learning Outcomes:

- Providing a solid understanding of the concepts and scientific methods of modern genetics as it applies to humans.
- Development of a better understanding of genetics of human biology and disease.

- Development of conceptual skills to address questions in genetics research and clinical practice

Reference Books:

1. Gardner, Simmons and Snustad : Principle of Genetics , 8th edition, Willey (India) Ltd.
2. B. D. Singh: Fundamentals of Genetics, 3rd Edition, Kalyani Publishers, 2004.
3. P. K. Gupta, Genetics. Rastogi Publications, Meerut, India., ISBN: 81-7133-842-9.
4. Principles of Genetics by Gardener, Eldon John., Simmons, Michael J., Snustad, D. Peter., 8th Edition, John Wiley & Sons Publications, New York. ISBN: 9971-51-346-3.
5. Essentials of Human Genetics by S.M. Bhatnagar et al, 4th Edition, (1999), Orient Longman. ISBN: 81-250-1426-8

PH03EFBT22 PRACTICALS BASED ON PH02EFBT21

(50 MARKS-4HOURS, CREDITS-2)

1. Isolation of DNA from blood, E .coli, Yeast.
2. Yeast response to UV radiation.
3. RNA isolation from yeast.

PH03EFBT23 FOOD PRODUCT DEVELOPMENT AND QUALITY ASSURANCE

(100 MARKS -4 HOURS, CREDITS-4)

Objective:

- Gain an understanding of the processes involved in the invention process, formulation, and development of new food products.
- Develop an appreciation of the food industry and how innovation is critical to the industry.
- Cultivate basic food science principles to problem solve during product development.
- Develop and enhance team cooperation and communication skills.

Content:

Unit 1

Nutritional concept in food designing. Legal issues in product development. Factors which impact on food product development external factors (macro-environment) that impact on food product development, including the: economic environment– political environment– ecological environment– technological environment– internal factors (micro-environment) that impact on food product development, including: personnel expertise– production facilities, financial position.

Unit 2

Food formulations for various health claims such as infant, children, geriatrics, diabetes, heart diseases, hypertension, menopausal women etc. Speciality food- drought, defense services, sports person, food for space etc. Convenience foods, preparation, sensory analysis, nutrient

analysis, storage stability, packaging, labelling and marketing. Modification of existing commercial food products.

Unit 3

Concept of quality: Quality attributes- physical, chemical, nutritional, microbial, and sensory; their measurement and evaluation; Sensory vis-à-vis instrumental methods for testing quality. Concepts of quality management: Objectives, importance and functions of quality control; Quality management systems in India; Sampling procedures and plans; Food Safety and Standards Act, 2006; Domestic regulations; Global Food safety Initiative; Various organizations dealing with inspection, traceability and authentication, certification and quality assurance (fssai, Agmark etc.); Labeling issues; International scenario, International food standards.

UNIT 4

Quality assurance, Total Quality Management; GMP/GHP; GLP, GAP; Sanitary and hygienic practices; HACCP; Quality manuals, documentation and audits; Indian & International quality systems and standards like ISO and Food Codex; Export import policy, export documentation; Laboratory quality procedures and assessment of laboratory performance; Applications in different food industries; Food adulteration and food safety. IPR and Patent.

Course Learning Outcome:

- Successfully produce food prototypes or food concepts.
- Formulate products by preparing laboratory samples and sourcing raw materials
- Develop formulations to meet cost targets, ingredient statement, nutrition profile and sensory attributes of desired product.
- Determine label and nutrition facts specifications according to regulations for nutrition, product naming, and claims
- Design effective food safety plans (HACCP).
- Create and present effective product development communication materials.

References:

1. Gupta R. K. , Bansal Sangita, MangalManisha : Health Foods : Concept, Technology and Scope, Vol . I and II, Biotech books, New Delhi.
2. Kamaliya M.K. and K. B. Kamaliya : Baking : Sciences and Industry . Volume I and II, 1st Edition, M.K. Kamaliya Publishers, Anand.
3. Brody, A.L. and Lord, J. 2008. Developing New Food Products for a Changing Marketplace, 2nd Edition. CRC Press, Boca Raton, FL. Campbell-Platt, G. 2009.
4. Food Science and Technology. Blackwell Publishing Ltd., Oxford, UK. deMan, J.M. 1999.
5. Principles of Food Chemistry, 3rd Ed. Aspen Publishers, Gaithersburg, MD. Fuller, G.W. 2011.
6. New Food Product Development, 3rd Edition. CRC Press, Boca Raton, FL. Moskowitz, H., Saguy, I. S., and Straus, T. 2009.
7. An integrated Approach to New Food Product Development. CRC Press, Boca Raton, FL. Murano, P. 2003.

8. Understanding Food Science and Technology. Wadsworth/Thompson Learning, Belmont, CA.
9. Inteas Alli : Food Quality Assurance : Principles and practices, CRC Press LLC.
10. Knechtes P.L.: Food Safety: Theory and Practice, Jones and Bartlett Learning, USA.
11. R.A Garg : The Food Safety and Standard Act, 2006 along with Rules and regulation, 2011. Commercial Law Publisher (India) Pvt. Ltd

PH03EFBT24 PRACTICAL BASED ON PH03EFBT23

(50 MARKS – 4 HOURS, CREDITS -2)

1. Planning of food product
2. Optimization of the formula
3. Food product preparation
4. Sensory evaluation
5. Analysis of prepared food product for verification of various health claims.
6. Report writing