

**SWAMI RAMANAND TEERTH
MARATHWADA UNIVERSITY,
NANDED - 431 606 (MS)**



**(Credit Framework and Structure of Four Year UG Program with
Multiple Entry and Exit Option as per NEP-2020)**

**UNDERGRADUATE PROGRAMME OF
SCIENCE & TECHNOLOGY**

B.sc. Food Science

Major in **DSC** and Minor in **DSM** (Subject)

Under the Faculty of Science & Technology

(Revised as per the Govt. Of Maharashtra circular dt. 13th March 2024)



SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED - 431 606

Summary of the Credits Assigned to various courses to be proposed by the Board of Studies under the Faculty of Science and Technology

| Sr No. | Heads | Credits assigned in each Semester | | | | | | | | Total Credits |
|--------|---|-----------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------------|
| | | I | II | III | IV | V | VI | VII | VIII | |
| 1 | Major Subject | 4 | 4 | 8 | 8 | 16 | 16 | 18/14 | 18/14 | 92/84 |
| 2 | Minor 1 Subject | 4 | 4 | 2 | 2 | -- | -- | -- | -- | 12 |
| 3 | Minor 2 Subject | 4 | 4 | -- | -- | -- | -- | -- | -- | 08 |
| 3 | Generic Electives / Research Methodology | 2 | 2 | 4 | 2 | -- | -- | 4 | -- | 10 + 4 (14) |
| 4 | Vocational and Skill Enhancement Course / Indian Knowledge System | 2 | 2 | 2 | 2 | 4 | 2 | -- | -- | 8+6 (14) |
| 5 | Ability Enhancement Course L1 (English) | 2 | -- | 2 | -- | -- | -- | -- | -- | 4 |
| 6 | Ability Enhancement Course L2 (SL) | -- | 2 | -- | 2 | -- | -- | -- | -- | 4 |
| 7 | Value Added Course /IKS (Constitution of India / EVS) | 2 | 2 | -- | 2 | -- | -- | -- | -- | 6 |
| 8 | Community Engagement Services NCC/NSS/Sports/Culture | 2 | 2 | 2 | 2 | -- | -- | -- | -- | 8 |
| 9 | Project/ Field Work/ OJT /Internship | -- | -- | 2 | 2 | 2 | 4 | --/4 | 4/8 | 14/22 |
| 10 | Total Credits | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 176 |



B. Sc. First Year Semester I (Level 4.5)

Teaching Scheme

| | Course Code | CourseName | CreditsAssigned | | | TeachingScheme (Hrs/ week) | |
|---|-------------|---|-----------------|-----------|-----------|----------------------------|-----------|
| | | | Theory | Practical | Total | Theory | Practical |
| Optional 1 | FS 101 | Principle of food processing and preservation | 02 | -- | 04 | 02 | -- |
| | FS 101 | Principle of food processing and preservation2 (practical) | - | 02 | | | 04 |
| Optional 2 | FS 102 | Food biochemistry | 02 | -- | 04 | 02 | -- |
| | FS 102 | Food biochemistry(practical) | - | 02 | | | 04 |
| Optional 3 | FS 103 | Food microbiology | 02 | -- | 04 | 02 | -- |
| | FS 103 | Food microbiology(practical) | - | 02 | | | 04 |
| Generic Electives <i>(from other Faculty)</i> | FS 104 | Enzyme in food industry(Basket 3 of respective Faculty) | 02 | -- | 02 | 02 | -- |
| Skill Based Course <i>(related to Major)</i> | FS 105 | Dairy technology | -- | 02 | 02 | -- | 04 |
| Ability Enhancement Course | FS 106 | L1 – Compulsory English | 02 | -- | 02 | 02 | -- |
| Indian Knowledge System (IKS) | FS 107 | Nutraceuticals & diet therapy Basket 5 | 02 | -- | 02 | 02 | -- |
| CommunityEngage ment Services (CES) | FS 108 | Any one of NCC/ NSS /Sports/ Culture /Health Wellness /Yoga Education / Fitness (Basket 6) | - | 02 | 02 | -- | 04 |
| Total Credits | | | 12 | 10 | 22 | 12 | 20 |



B. Sc. First Year Semester I (Level 4.5)

Examination Scheme

[20% Continuous Assessment (CA) and 80% End Semester Assessment (ESA)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

| Subject (1) | Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total Col (6+7) / Col (8+9) (10) |
|---|-----------------------|--|----------------------------|----------------|------------------------------|--------------|-----------|------------|---|
| | | | Continuous Assessment (CA) | | | ESA | CA (8) | ESA (9) | |
| | | | Test I (4) | Test II (5) | Average of T1 & T2 (6) | Total (7) | | | |
| Optional 1 | FS101 | Principle of food processing and preservation | 10 | 10 | 10 | 40 | -- | -- | 50 |
| | FS101 | Principle of food processing and preservation (Practical) | -- | -- | -- | -- | 20 | 30 | 50 |
| Optional 2 | FS102 | Food biochemistry | 10 | 10 | 10 | 40 | -- | -- | 50 |
| | FS102 | Food biochemistry (Practical) | -- | -- | -- | -- | 20 | 30 | 50 |
| Optional 3 | FS103 | Food microbial logy | 10 | 10 | 10 | 40 | -- | -- | 50 |
| | FS103 | Food microbiologypractical | -- | -- | -- | -- | 20 | 30 | 50 |
| Generic Elective | FS104 | Enzyme in food industry (Basket 3) | 10 | 10 | 10 | 40 | -- | -- | 50 |
| Skill Based Course | FS105 | Dairy technology | -- | -- | -- | -- | 20 | 30 | 50 |
| Ability Enhancement Course | FS106 | L1 – Compulsory English | 10 | 10 | 10 | 40 | -- | -- | 50 |
| Indian Knowledge System | FS107 | Nutraceuticals& diet therapy (Basket5) | 10 | 10 | 10 | 40 | -- | -- | 50 |
| Community Engagement Services (CC) | FS108 | Any one of NCC/ NSS/Sports/ Culture /Health Wellness /Yoga Education / Fitness (Basket 6) | -- | -- | -- | -- | 20 | 30 | 50 |

B. Sc. First Year Semester II (Level 4.5)

Teaching Scheme

| | Course Code | CourseName | CreditsAssigned | | | TeachingScheme (Hrs/ week) | |
|---|-------------|---|-----------------|-----------|-----------|----------------------------|-----------|
| | | | Theory | Practical | Total | Theory | Practical |
| Optional 1 | FS 201 | Cereal processing | 02 | -- | 04 | 02 | -- |
| | FS 201 | Cereal processing (practical) | - | 02 | | | 04 |
| Optional 2 | FS 202 | Food packaging | 02 | -- | 04 | 02 | -- |
| | FS 202 | Food packaging (practical) | - | 02 | | | 04 |
| Optional 3 | FS 203 | Legumes & oil seed technology | 02 | -- | 04 | 02 | -- |
| | FS 203 | Legumes & oil seed technology (practical) | - | 02 | | | 04 |
| Generic Electives <i>(from other Faculty)</i> | FS 204 | Marketing management & international trade (Basket 3 of respective Faculty) | 02 | -- | 02 | 02 | -- |
| Skill Based Course <i>(related to Major)</i> | FS 205 | Wheat milling & baking technology | -- | 02 | 02 | -- | 04 |
| Ability Enhancement Course | FS 206 | L1 – Compulsory English | 02 | -- | 02 | 02 | -- |
| Indian Knowledge System (IKS) | FS 207 | Information communication technology (ICT) Basket 5 | 02 | -- | 02 | 02 | -- |
| Community Engagement Services (CES) | FS 208 | Any one of NCC/ NSS /Sports/ Culture /Health Wellness /Yoga Education / Fitness (Basket 6) | - | 02 | 02 | -- | 04 |
| Total Credits | | | 12 | 10 | 22 | 12 | 20 |



B. Sc. First Year Semester II (Level 4.5)

Examination Scheme

[20% Continuous Assessment (CA) and 80% End Semester Assessment (ESA)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

| Subject (1) | Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total Col (6+7) / Col (8+9) (10) |
|---|-----------------------|--|-------------------------------|----------------|------------------------------|--------------|-----------|------------|---|
| | | | Continuous Assessment (CA) | | | ESA | CA (8) | ESA (9) | |
| | | | Test I (4) | Test II (5) | Average of T1 & T2 (6) | Total (7) | | | |
| Optional 1 | FS201 | Cereal processing | 10 | 10 | 10 | 40 | -- | -- | 50 |
| | FS201 | Cereal processing(Practical) | -- | -- | -- | -- | 20 | 30 | 50 |
| Optional 2 | FS202 | Food packaging | 10 | 10 | 10 | 40 | -- | -- | 50 |
| | FS202 | Food packaging(Practical) | -- | -- | -- | -- | 20 | 30 | 50 |
| Optional 3 | FS203 | Legumes & oil seed technology | 10 | 10 | 10 | 40 | -- | -- | 50 |
| | FS203 | Legumes & oil seed technology (practical) | -- | -- | -- | -- | 20 | 30 | 50 |
| Generic Elective | FS204 | Marketing management & international trade (Basket 3) | 10 | 10 | 10 | 40 | -- | -- | 50 |
| Skill Based Course | FS205 | Wheat milling & baking technology | -- | -- | -- | -- | 20 | 30 | 50 |
| Ability Enhancement Course | FS206 | L1 – Compulsory English | 10 | 10 | 10 | 40 | -- | -- | 50 |
| Indian Knowledge System | FS207 | Information communication technology (ICT) (Basket 5) | 10 | 10 | 10 | 40 | -- | -- | 50 |
| Community Engagement Services (CC) | FS208 | Any one of NCC/ NSS/Sports/ Culture /Health Wellness /Yoga Education / Fitness (Basket 6) | -- | -- | -- | -- | 20 | 30 | 50 |

Course Structure: Major 1 -Teaching Scheme

FS101: Principle of food processing and preservation (Major 1) Curriculum Details

| Course Code | Course Name (Paper Title) | Teaching Scheme (Hrs.) | | Credits Assigned | | |
|-------------|---|------------------------|-----------|------------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS101 | Principle of food processing and preservation | 32 | 48 | 02 | 02 | 04 |

Major 1 -Assessment Scheme

| Course Code (2) | Course Name (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|---|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 101 | Principle of food processing and preservation | 10 | 10 | 10 | 40 | 20 | 30 | 100 |

Course pre-requisite:

1. Basic knowledge of food and food preservatives is required to learn this subject.

Course Objectives:

1. To understand the types of foods and their sources.
2. To provide knowledge about methods of food preservation
3. To introduce students to new developments in the field of food processing.

Course Outcomes:

- Will prepare students to understand various methods of food preservations & processing.
- It will also help students to learn the application in industries.

Curriculum Details:*(There shall be FOUR Modules in each course)*

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------|------------|--|-------------------------------------|
| 1.0 | | Introduction to food preservation: | |
| | 1.1 | Principle and importance of preservation. | 8 hrs |
| | 1.2 | Food spoilage, classify food on the basis of spoilage | |
| | 1.3 | Define spoilage and causes of spoilage | |
| | 1.4 | Preservation methods with emphasis on inactivation, inhibition, and avoiding recontamination | |
| 2.0 | | Drying and fermentation | |
| | 2.1 | Drying curve and drying time calculation. | 8 hrs |
| | 2.2 | Water activity and moisture absorption isotherms, Psychometric chart | |
| | 2.3 | Different types of dryers Conductive, convective, and combined, IMF foods; osmotic dehydration | |
| | 2.4 | Preservation by fermentation | |
| 3.0 | | Temperature | |
| | 3.1 | High temperature- Sterilization and Pasteurization, , Thermal death time,Dvalue,F value value | 8 hrs |
| | 3.2 | canning, aseptic packaging | |
| | 3.3 | Low temperature:Chilling and Freezing; Freezing curve and water activity; Properties of frozen foods | |
| | 3.4 | Enthalpy change during freezing; Plank's equation for freezing time; Cold storage andRefrigeration load, types of freezing | |
| 4.0 | | Recent techniques in processing | |
| | 4.1 | Newer techniques in thermal processing:HTST, UHT; Ohmic, Dielectric, Infra-red Heating; Microwave heating | 8 hrs |
| | 4.2 | Non-thermal processing of food: High-pressure processing, Pulsed electric field, Cold extrusion; Plasma processing; Ionizing radiation; Ultrasound processing; UV and Pulsed light processing; Membrane Technology | |
| | 4.3 | Magnetic technique | |
| | 4.4 | Hurdle technology | |
| | | Total | 32 hrs |

TextBooks:

1. Technology of Food preservation N.W. Dersoir and N.W.Dersoir
2. Introduction to Food Science and Technology. G.P. Stewart and M.A. Amerine

3. Advances in Thermal food preservation,2007, GauravTewari& Vijay K Juneja, Blackwell Publishing

ReferenceBooks:

1. William Frazier, Food Microbiology, Tata McGraw-Hill Publication.
2. P. Fellows, Food Processing Technology, second edition 2000, Woodhead Publishing limited & CRC Press...
3. Handbook of food preservation Edited by M.ShaffurRahman, 2007, CRC Press

Practicals

| Sr.No. | Practicals |
|---------------|---|
| 1 | Study of various machineries used in processing. |
| 2 | Demonstration of effect of blanching on quality of foods. |
| 3 | Study of preservation of foods by heat treatment canning-Canning of fruitsand vegetables. |
| 4 | Preservation of food by high concentration of sugar i.e., preparation of jam |
| 5 | Preservation of food by using salt-pickle. |
| 6 | Preservation of food by using chemicals |
| 7 | Preservation of bread, cake using mold-inhibitors. |
| 8 | Drying of Mango/other pulp |

FS102: *Food Biochemistry*

| Course Code | Course Name (Paper Title) | Teaching Scheme (Hrs.) | | Credits Assigned | | |
|-------------|------------------------------|------------------------|-----------|------------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS102 | Food Biochemistry | 32 | 48 | 02 | 02 | 04 |

Major 1 - Assessment Scheme

| Course Code (2) | Course Name (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|--------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 102 | Food biochemistry | 10 | 10 | 10 | 40 | 20 | 30 | 100 |

Coursepre-requisite:

1. Basic knowledge of chemistry to learn from this subject

Course Objectives:

- 1) Understand the nature and scope of biochemistry.
- 2) Understand the cellular biochemistry.
- 3) Learn about nutrients and enzymes.
- 4) To outline the important aspects of food relating to nutrition

Course Outcomes:

- After successful completion of this course students will be able to understand cell structure, metabolism of carbohydrates, classification, structure and metabolic function of proteins, lipids and vitamins.
- Evaluate the biological functions of foods for health in addition to nutritional values

Curriculum Details:

FS102 Subject: Food Biochemistry

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------|------------|---|-------------------------------------|
| 1.0 | | Carbohydrates & lipids | |
| | 1.1 | Carbohydrates:- Classification, Kiliani synthesis, mutarotation, structures and importance of Mono, Oligo and polysaccharides, Maltose, Lactose, Sucrose, Isomaltose, glycogen starch, Homo and Hetro, polysaccharides, Proteoglycan, Mucopolysaccharides | 8hrs |
| | 1.2 | Carbohydrates Metabolism: -Glycolysis fermentation, gluconeogenesis Glycogenolysis, Pentose phosphate pathway: TCA cycle, Gatyoxylate pathway Electron transport chain. | |
| | 1.3 | Lipids. Simple and compound lipids, Phosphoglycerides sphingolipids, terpens, sterols and Ecosanoides structure of Biological membrane | |
| | 1.4 | Lipid Metabolism:- Digestion and absorption, β , & ω Oxidation of fatty acids, , fatty acid Biosynthesis, Ketone body formation, cholesterol biosynthesis, Urea Cycle | |
| 2.0 | | Proteins and water | |
| | 2.1 | Amino acids | 8hrs |
| | 2.2 | Structure of peptides, peptide bond, protein structure primary, secondary, Tertiary and Quaternary structure of protein | |
| | 2.3 | Forces stabilize the protein structure , salting out , salting in, Denaturation and renaturation | |
| | 2.4 | Properties of water, weak acids & weak bass, pH & buffers | |
| 3.0 | | Enzymes | |
| | 3.1 | Name culture, classification: MichelisMenten equation | 8hrs |
| | 3.2 | Line -Vierburk plot competition, non competition and un competition inhibition, enzymes | |
| | 3.3 | catalysis, substrate enzyme reaction, pro-enzyme and enzyme activation- Allosteric enzyme co-operativity. Importance of enzyme. | |
| | 3.4 | Nucleic Acid:- Structure of Nucleic acid (DNA & RNA)) Nucleotides & nucleosides, different forms of DNA, Denaturation and renaturation | |
| 4.0 | | Molecular Biology & Biotechnology | |
| | 4.1 | Replication of DNA (E. coli) | 8hrs |

| | | | |
|--|------------|---|---------------|
| | 4.2 | Transcription & translation | |
| | 4.3 | Recombinant DNA technology, plasmid, cosmid, Phage vector | |
| | 4.4 | Genomic and cDNA Library, Southern Northern, and western blotting | |
| | | Total | 32 hrs |

TextBooks:

1. SunetraRoday. Food Science and Nutrition. Oxford Education/Oxford University Press, 2 nd Edition, 2012
2. AmbikaShanmugam. Fundamentals of Biochemistry for Medical Students. Nagaraj and Company Pvt Ltd. 7th Edition (reprinted), 2005.
3. Vasudevan DM and Sreekumari S. Textbook of Biochemistry. Jaypee Brothers Medical Publsihers Pvt Ltd. New Delhi, 3rd Edition, 2001.

ReferenceBooks:

1. Biology for Chemist by Agrawal&Agrawal.
2. Biochemistry by Albert L Lehninger.
3. Biochemistry by U Satyanarayana& U Chakrapani
4. Fundamentals of Biochemistry by J L Jain, Sunjay Jain &Nitin Jain.
5. Lehninger A L, Nelson D L and Cox M M (2009). Principles of Biochemistry, 6th Ed. CBS Publishers and Distributors.
6. Murray R.K, Granner D K, Mayes P A and Rodwell V W (2009). Harper's Biochemistry, 28th Ed, Lange Medical Book

Practicals

| Sr.No. | Practicals |
|--------|---|
| 1. | Safety measures in the laboratory. |
| 2. | Preparation of various solutions and buffers. |
| 3. | Qualitative and quantitative estimation of carbohydrates. |
| 4. | Study of swelling and solubility characteristics of starches. |
| 5. | Determination of crude protein by micro kjeldhal method. |
| 6. | Determination of Fat |
| 7. | Determination of moisture content of foods using different methods |
| 8. | Preparation of mineral solutions by using ash and tri acid methods (Dry and wet oxidations) |
| 9. | Estimation of calcium. |
| 10. | Determination of iron. |

Course Structure:Major 1 -Teaching Scheme

FS 103 Subject : Food Microbiology

| CourseCode | CourseName (Paper Title) | TeachingScheme(Hrs.) | | CreditsAssigned | | |
|------------|-----------------------------|----------------------|-----------|-----------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS103 | Food microbiology | 32 | 48 | 02 | 02 | 04 |

Major 1 -Assessment Scheme

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|-------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 103 | Food microbiology | 10 | 10 | 10 | 40 | 20 | 30 | 100 |

FS103: Food microbiology (Major 1) Curriculum Details

Coursepre-requisite:

1.Basic knowledge of food groups and microbiology is required to learn this subject.

Course Objectives:

- 1) To understand microbial spoilage of foods.
- 2) To study the microbiology of various food groups
- 3) To provide knowledge about role of micro-organisms in food preservation

Course Outcomes:

- After successful completion of this course students will be able to understand role of microbiology in food processing industry, microbiology of various food groups, food spoilage and food preservations

Curriculum Details:*(There shall be FOUR Modules in each course)*

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------|------------|--|-------------------------------------|
| 1.0 | | Basic of Microbiology | |
| | 1.1 | Introduction to Microbiology; Brief history of Microbiology, contribution of A.V Leeuwenhoek, Louis Pasteur, Robert Koch and Edward Jenner in development of microbiology | 8hrs |
| | 1.2 | Structure of prokaryotic and eukaryotic cell, major classes of Microorganisms - Bacteria, Virus, Algae, Fungi and Protozoa, structure and function of microbial cell. | |
| | 1.3 | Nutrient transport phenomenon and physiology of microorganisms. Genetic recombination, transduction, transformation and bacterial conjugation, mutation and mutagenesis | |
| | 1.4 | Methods of isolation of pure Culture- pour plate, spread plate and streak plate methods, | |
| 2.0 | | Food borne diseases and food poisoning | |
| | 2.1 | Introduction to food borne diseases, classification of food borne diseases- food born infection and Intoxication | 8hrs |
| | 2.2 | Food born infection- bacterial, fungal and viral, Gram positive and Gram Negative food borne pathogens- Salmonella, Coliform, Shigella, V.cholerae, Staphylococcus, Clostridium botulinum, L.monocytogenes, fungal and viral food born infection | |
| | 2.3 | Food born intoxication- Biological and Non Biological, Microbial intoxication (Bacterial and fungal) | |
| | 2.4 | Non microbial (plant and Animal) and nonbiological (heavy Metals and metal ions) | |
| 3.0 | | Microbiological analysis of food. | |
| | 3.1 | Detection and Enumeration of microbes in food, Indicator Microorganisms and Microbiological criteria | 8hrs |
| | 3.2 | detection method for Bacteria- E.coli, Staphylococcus, Yersinia, Campylobacter, Bacillus, Clostridium, Salmonella and Shigella | |
| | 3.3 | Detection method for Viruses- Rotavirus, | |
| | 3.4 | Hepatitis A and E virus and polio virus. | |
| 4.0 | | Microbiology of different products | |
| | 4.1 | Microbiology of milk and milk products | 8hrs |
| | 4.2 | Microbiology of fruits and vegetables, Sources of contamination, spoilage and prevention | |
| | 4.3 | Microbiology of cereals and cereal products. Sources of contamination, spoilage and prevention | |
| | 4.4 | Microbiology of meat, poultry eggs, fish, seafoods and | |

| | | | |
|--|--|---|--------------|
| | | their products. Sources of contamination, spoilage and prevention | |
| | | Total | 32hrs |

TextBooks:

1. Food microbiology by W.C Frazier and D.C. Westoff, Tata McGraw Hill Publication.
2. Microbiology by M.J Pelczar Jr., ECS Chan and N.R. Krieg , TMH book company.
3. Modern food microbiology by G.J Banwart , AVI publication.
4. Food microbiology by M.R Adams.
5. Food born bacterial pathogens by Doyle M.P.

ReferenceBooks:

1. Modern food microbiology. James M.Jay
2. Basic food microbiology G.J.Banwart
3. Applied Microbiology-Singh B.D., Nallariu P., Kavikishore P.B. and Singh R.P.
4. Food microbiology and Labpractice-Bell
5. Fundamental Food Microbiology by Bibek Ray and ArunBhunia.
6. Food Microbiology: Fundamentals and Frontiers by Michael P. Doyle, Francisco DiezGonzalez, Colin Hill
7. Compendium of Methods for the Microbiological Examination of Foods by Ed. Salfinger, Yvonne

Practicals

| Sr. No. | Practicals |
|---------|---|
| 1 | Study of isolation of molds from foods. |
| 2 | Microbial examination of cereal and cereal products. Identification, isolation and confirmation of <i>R.nigricans</i> . |
| 3 | Study of microbial examination of Vegetables and fruits. Identification, isolation and confirmation of <i>R. nigricans/Erwiniacarotovora</i> . |
| 4 | Microbial examination of fish and other sea foods. Identification, isolation and confirmation of <i>Proteus</i> . |
| 5 | Study of microbial examination of eggs and poultry identification, isolation and confirmation of <i>Pseudomonas fluorescens</i> . |
| | Study of microbial examination of milk and milk products. Identification, isolation and confirmation of <i>S.thermophilus</i> . |
| 7 | Study of microbial examination of sugar, salt and spices. Identification, isolation and confirmation of <i>L. measenteroides/ L.dextranicum</i> . |
| 8 | Study of thermal death time determination. |

Course Structure: Major 1 -Teaching Scheme

FS 104 Subject: Enzyme in Food Industry

| CourseCode | CourseName (Paper Title) | TeachingScheme(Hrs.) | | CreditsAssigned | | |
|------------|-----------------------------|----------------------|-----------|-----------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS104 | Enzyme in food industry | 32 | 00 | 02 | 00 | 02 |

Major 1 -Assessment Scheme

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|-------------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 104 | Enzyme in food industry | 10 | 10 | 10 | 40 | -- | -- | 50 |

FS104: Enzyme in food industry (Major 1) Curriculum Details

Coursepre-requisite:

1. Basic knowledge of management in food industry.

Course Objectives:

1. To impart comprehensive overview of the scientific and technical aspects of enzymes.
2. To provide knowledge of enzymes in food industry.

Course Outcomes:

- Will prepare students to understand need of enzymes in foods industry

Curriculum Details:*(There shall be FOUR Modules in each course)*

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------------|----------------|---|--|
| 1.0 | | Introduction to enzymes | |
| | 1.1 | Classification and nomenclature | 8hrs |
| | 1.2 | Mechanism of enzyme action | |
| | 1.3 | Enzyme kinetics | |
| | 1.4 | Factors affecting the rate of enzymatic reactions | |
| 2.0 | | Enzyme Kinetics | |
| | 2.1 | Enzyme concentration | 8hrs |
| | 2.2 | Substrate concentration | |
| | 2.3 | Environmental conditions | |
| | 2.4 | Inhibitors, activators and cofactors | |
| 3.0 | | Sources of enzymes | |
| | 3.1 | Sources | 8hrs |
| | 3.2 | Extraction of enzymes and purification | |
| | 3.3 | Enzyme technology and application | |
| | 3.4 | Undesirable and desirable enzymic reactions in foods | |
| 4.0 | | Enzymes in industry | |
| | 4.1 | Enzymes in milk and cheese industries: enzymes in milk processing and cheese production | 8hrs |
| | 4.2 | Enzymes in Meat industry: enzymes in tenderization of meat | |
| | 4.3 | Enzymes in baking industry | |
| | 4.4 | Enzymes in production of beverages and fruit juices: enzymes in tea, cocoa, wine, beer, whiskey, cider, etc | |
| | | Total | 32 hrs |

TextBooks:

1. Enzymes in industry :production and application Aehle W Wiley- VCH Verlag GmbH & Co.

ReferenceBooks:

1. Principles of Enzyme technology Khan M.Y. and Khan F. PHI Publications New Delhi 2015
2. Microbial enzyme technology in Ray R.C. and Rosell C.M. CRC Press,London 2017

Course Structure:Major 1 -Teaching Scheme

FS105 Subject: Dairy Technology

Major 1 -Assessment Scheme

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|---------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 105 | Dairy technology | --- | -- | -- | -- | 20 | 30 | 50 |

FS105: Dairy technology (Major 1) Curriculum Details

Coursepre-requisite:

1. Student should have the basic knowledge of cooking and dairy products are required to learn this subject

Course Objectives:

1. . To learn the manufacturing process of various dairy products

Course Outcomes:

- After successful completion of this course students will be able to understand production of various dairy products.

Practicals

| Practical No. | Practicals |
|----------------------|--|
| 1.0 | Fermented milk products |
| | Curd, Shrikhand, lassi& their types, paneer |
| 2.0 | Chenna Based |
| | Rasgulla, sandesh, Kalakand, Rasmalai |
| 3.0 | Khoa Based |
| | Gulabjamun, Peda. Various types of burfi |
| 4.0 | Whole milk products |
| | Rabri, Various kheers, milk shakes, Ice cream, kulfi |

FS 107 Subject: Nutraceuticals and diet Therapy

| CourseCode | CourseName (Paper Title) | TeachingScheme(Hrs.) | | CreditsAssigned | | |
|------------|---------------------------------|----------------------|-----------|-----------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS107 | Nutraceuticals and diet therapy | | 00 | 02 | 00 | 02 |

Assessment Scheme

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|---------------------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 107 | Nutraceuticals and diet therapy | 10 | 10 | 10 | 40 | -- | -- | 50 |

Coursepre-requisite:

1. Basic knowledge of nutraceuticals to learn from this subject

Course Objectives:

1. The students would be exposed to fundamental knowledge of functional and nutraceutical food, types, scope, application and benefits of nutraceutical.
2. Detail study on Balance diet and Diet therapy

Course Outcomes:

- Better Understanding of the basic concepts of functional and nutraceutical food
- Able to gain knowledge on balance diet, food allergy, intolerance and sensitivity
- To understand in detail about Diet therapy, role of dietitian.
- Able to design the drug and diet interaction & Able to gain knowledge on Transgenic plant foods with health claims.
- Thorough knowledge on diet for obesity, diabetes, cardiovascular disease, cancer and fever & Able to acquire confidence to get a placement in any kind of nutraceutical and functional food Industry.

Curriculum Details:(There shall be FOUR Modules in each course)

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------|------------|--|-------------------------------------|
| 1.0 | | Introduction of nutraceuticals | 8hrs |
| | 1.1 | Introduction and Defining nutraceuticals | |
| | 1.2 | functional foods | |
| | 1.3 | Nature, type and scope of nutraceutical and functional food | |
| | 1.4 | Applications and their health benefits of Nutraceutical. | |
| 2.0 | | Nutraceuticals in diet | 8hrs |
| | 2.1 | Balanced Diet | |
| | 2.2 | Diets During a Normal Life Cycle | |
| | 2.3 | Food Allergy | |
| | 2.4 | Intolerance and Sensitivity. | |
| 3.0 | | Diet therapy | 8hrs |
| | 3.1 | Diet Therapy and Types of Therapeutic Diets, Role of a Dietitian, Drug and Diet Interaction | |
| | 3.2 | Regulations to regulate manufacture, distribution and sale of nutraceuticals | |
| | 3.3 | Diet Therapy for obesity, underweight person, Diabetes Mellitus, Cardiovascular Diseases, cancer, Infections and Fevers. | |
| | 3.4 | Functional foods and dietary supplements in India | |
| 4.0 | | Transgenic plant foods with health claims: | 8hrs |
| | 4.1 | Prebiotics and Probiotics | |
| | 4.2 | Genetically modified foods | |
| | 4.3 | Proprietary foods | |
| | 4.4 | Supplementary foods. | |
| | | Total | 32 hrs |

TextBooks:

1. Handbook of Nutraceuticals and Functional Foods by Robert E.C. Wildman
2. Nutrition and Dietetics, 4th Edition, McGraw Hill Education (India) Private Limited new delhi, by Shubhangini A Joshi
3. Functional food and nutraceuticals, Aluko, Rotimi E., 2012 2.
4. Functional Foods, Maria Saarela, 2nd Edition, 2011, Woodhead Publishing
5. Functional Foods by R. Chadwick, S. Henson, B. Moseley, G.

ReferenceBooks:

1. Introduction to functional food science, Dr. Danik Martirosyan, Third edition, vol. I, Dallas TX, USA.

Course Structure: Major 1 -Teaching Scheme

FS 201 Subject : Cereal Processing

Major 1 -Assessment Scheme

| CourseCode | CourseName (Paper Title) | TeachingScheme(Hrs.) | | CreditsAssigned | | |
|------------|-----------------------------|----------------------|-----------|-----------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS201 | Cereal Processing | 32 | 48 | 02 | 02 | 04 |

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|-------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 201 | Cereal Processing | 10 | 10 | 10 | 40 | 20 | 30 | 100 |

FS201: Cereal Processing (Major 1) Curriculum Details

Coursepre-requisite: Basic knowledge of chemistry, fruits and vegetable harvesting and processing to learn this subject.

Learning Objectives:-

- 1) Understand the post- harvest technology of fruits and vegetables
- 2) Understand the morphology structure and compositions of various fruits and vegetables..
- 3) Learn about harvesting importance of fruits and vegetables.
- 4) Understand ripening and storage practices of fruits
- 5) Learn about Handling and packaging of fruits and vegetables
- 6) Learn about Principles of transport and commercial transport operations

Out Comes:

After successful completion of this course students will be able to understand Post harvest technology of fruits and vegetables, Morphology, structures and composition of fruit and vegetable, Maturity standards, Fruits ripening, Storage practices, Physiological post- harvest diseases, chilling injury and diseases and Principles of transport and commercial transport operations.

Curriculum Details:*(There shall be FOUR Modules in each course)*

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------------|----------------|---|--|
| 1.0 | | Basic of Cereals | |
| | 1.1 | Present status and future prospects of cereals (Rice, wheat, /corn, sorghum, Rye) | 8hrs |
| | 1.2 | Morphology of Rice | |
| | 1.3 | Physical properties: Density bulk density, Angle of response hardness, asperity, porosity, stack of milling and moisture of physical properties. | |
| | 1.4 | Chemical composition- Distribution of nutrients and Aroma of rice. Drying of paddy- General principles and methods of drying, batch type, continuous type driers. | |
| 2.0 | | Cereal Processing | |
| | 2.1 | Parboiling of rice: Milling of rice: Conventional milling, modern milling. | 8hrs |
| | 2.2 | Advantages and disadvantages of milling machineries, By products of rice milling, aging of rice. | |
| | 2.3 | Enrichment-need of enrichment methods of enrichment, Enrichment levels of fortification of amino acids. | |
| | 2.4 | Processed foods from rice- breakfast cereals, flakes, puffing, canning and instance rice. | |
| 3.0 | | Cereal Morphology | |
| | 3.1 | Corn morphology, Barley-morphology | 8hrs |
| | 3.2 | Sorghum-morphology Physicochemical properties Milling, Malting, Pearling and industrial utilization | |
| | 3.3 | Physicochemical properties, corn milling fractions and preparations of modified starches. | |
| | 3.4 | physicochemical properties and processing (malting) | |
| 4.0 | | Importance of Cereals | |
| | 4.1 | Millet-Oat/Rye- Importance of Millet | 8hrs |
| | 4.2 | Composition, Processing of millets for food uses. | |
| | | Total | 32hrs |

Reference Books:

1. Technology of cereals: Kent
2. Post harvest technology of cereals, pulses and oil seeds: A.Chakrawarthy
3. Modern cereal science and technology: Y.Pomeranz
4. Utilization of rice: Luh
5. Post harvest biotechnology of cereals: D.K.Salunkhe
6. Handbook of cereal science and technology: O.R. Fennema, Markus, Karel

Practicals

| Sr. No. | Practicals |
|---------|---|
| 1 | Study of isolation of molds from foods. |
| 2 | Microbial examination of cereal and cereal products. Identification, isolation and confirmation of <i>R.nigricans</i> . |
| 3 | Study of microbial examination of Vegetables and fruits. Identification, isolation and confirmation of <i>R. nigricans/Erwiniacarotovora</i> . |
| 4 | Microbial examination of fish and other sea foods. Identification, isolation and confirmation of <i>Proteus</i> . |
| 5 | Study of microbial examination of eggs and poultry identification, isolation and confirmation of <i>Pseudomonas fluorescens</i> . |
| | Study of microbial examination of milk and milk products. Identification, isolation and confirmation of <i>S.thermophilus</i> . |
| 7 | Study of microbial examination of sugar, salt and spices. Identification, isolation and confirmation of <i>L. measenteroides/ L.dextranicum</i> . |
| 8 | Study of thermal death time determination. |

FS 202 Subject : Food Packaging

| CourseCode | CourseName (Paper Title) | TeachingScheme(Hrs.) | | CreditsAssigned | | |
|------------|-----------------------------|----------------------|-----------|-----------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS202 | Food Packaging | 32 | 48 | 02 | 02 | 04 |

Assessment Scheme

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|-------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 202 | Food Packaging | 10 | 10 | 10 | 40 | 20 | 30 | 100 |

FS202: Food Packaging

Coursepre-requisite:

Basic knowledge of food processing industry are required to learn this subject.

Learning Objectives:-

1. To impart comprehensive overview of the scientific and technical aspects of food packaging
2. To provide knowledge of packaging machinery, systems, testing and regulations of packaging..

Out Comes:

Will prepare students to understand need of packaging, package functions, packaging materials, lamination coating, packaging of specific foods and mechanical and functional tests of package.

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------------|----------------|--|--|
| 1.0 | | Introduction to packaging | |
| | 1.1 | Introduction to subject, Packaging situations in world and India, need of packaging, plastic consumption/use in world, India etc. package requirements, package functions, hazards acting on package during transportation, storage and atmospheric package, labeling laws | 8hrs |
| | 1.2 | Package materials: classification packages, paper as package material its manufacture, types, advantages, corrugated and paper board boxes etc. | |
| | 1.3 | Glass as package material, manufacture, advantages, disadvantages, metal as package material-manufacture, | |
| | 1.4 | Advantages, disadvantages, aluminum as package material,. Its advantages and disadvantages, plastic as package material. | |
| 2.0 | | Lamination, Coating and Aseptic packaging | |
| | 2.1 | Lamination, need of lamination, types, properties, advantages & disadvantages of each type. | 8hrs |
| | 2.2 | Coating on paper & films, types of coatings, need of coating, methods of coatings, Biodegradable and edible packaging, aseptic packaging-need, advantages, process, comparison of conventional & aseptic packaging. | |
| | 2.3 | System of aseptic packaging and materials used in aseptic packaging machineries used in packing foods. | |
| | 2.4 | Classification of polymers, properties, uses and chemistry of each plastic such as polyethylene. | |
| 3.0 | | Specific Packaging of foods | |
| | 3.1 | polypropylene, polystyrene, polycarbonate, PVC, PVDC, cellulose acetate, nylon etc. | 8hrs |
| | 3.2 | Packaging of specific foods with its properties like bread, biscuits coffee, milk powder, carbonated beverages snack foods etc. | |
| | 3.3 | Mechanical and functional tests on package | |
| | 3.4 | Various mechanical functional testes perform in laboratories on package boxes and package materials | |
| 4.0 | | Permeability of Product | |
| | 4.1 | Permeability – theoretical consideration | 8hrs |

| | | | |
|--------------|------------|---|--------------|
| | 4.2 | permeability of gases and vapours, permeability of multilayer packages, permeability in relation to products. | |
| Total | | | 32hrs |

REFERENCE BOOKS

| | |
|-----------------------------------|----------------------|
| 1 Handbook of Package Engineering | Joseph F. Hanlon |
| 2 Fundamentals of Packaging | F.A. Paine |
| 3 Food Packaging | Sacharow and Griffin |
| 4 Principles of Food Packaging | R. Heiss |
| 5 Flexible Packaging of Foods | A.L. Brody |
| 6 Food Packaging and Preservation | M. Mathouthi |

Practicals

| Sr. No. | Unit Name |
|---------|---|
| 1 | Classification of various packages based on material and rigidity |
| 2 | Measurement of thickness of paper, paper boards |
| 3 | Measurement of tensile strength of paper of paper boards |
| 4 | Determination of gas transmission rate of package films |
| 5 | Determination of WVTR of films |
| 6 | Determination of coating on package materials |
| 7 | Identification of plastic films prepackaging practices followed for packing fruits and vegetables |

FS 203 Subject : Legumes and oilseed Technology

| CourseCode | CourseName (Paper Title) | TeachingScheme(Hrs.) | | CreditsAssigned | | |
|------------|--------------------------------|----------------------|-----------|-----------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS203 | Legumes and Oilseed Technology | 32 | 48 | 02 | 02 | 04 |

Assessment Scheme

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|--------------------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 203 | Legumes and Oilseed Technology | 10 | 10 | 10 | 40 | 20 | 30 | 100 |

FS203: Legumes and Oilseed Technology

Coursepre-requisite: Basic knowledge of legumes and oilseed processing industry are required to learn this subject.

Learning Objectives:-

1. To impart comprehensive overview of the scientific and technical aspects of legumes and oilseed.
2. To provide legumes processing knowledge.

Out Comes:

Will prepare students to understand processing of Legumes and oilseed technology.

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------|------------|---|-------------------------------------|
| 1.0 | | Introduction to Legumes and Oilseed | |
| | 1.1 | Present status and future prospects of legumes and oilseeds; Morphology of legumes and oilseeds | 8hrs |
| | 1.2 | Classification and types of legumes and oilseeds | |
| | 1.3 | Anti-nutritional compounds in legumes and oilseeds | |
| | 1.4 | Methods of removal of anti-nutritional compounds | |
| 2.0 | | | |
| | 2.1 | Milling of legumes: home scale, cottage scale and modern and | 8hrs |
| | 2.2 | Milling methods, milling quality, efficiency | |
| | 2.3 | Factors affecting milling; | |
| | 2.4 | Problems in dhal milling industry | |
| 3.0 | | Processing of Legumes | |
| | 3.1 | Soaking and germination of pulses | 8hrs |
| | 3.2 | Cooking quality of legumes – factors affecting cooking quality | |
| | 3.3 | Oilseeds: composition, methods of extraction | |
| | 3.4 | Desolventization and refining of oils: degumming, neutralization bleaching, filtration, deodorization, etc. | |
| 4.0 | | By- Products of legumes and oilseeds | |
| | 4.1 | New technologies in oilseed processing | 8hrs |
| | 4.2 | Utilization of oil seed meals for food uses i.e. high protein products like concentrate, isolates | |
| | 4.3 | Byproduct of pulses and oil milling and their value addition. | |
| | | Total | 32hrs |

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Text book

Legumes Chemistry, Technology and Human Nutrition
Post harvest technology of cereals: pulses and oilseeds
Bailey's Industrial Oil & Fat Products.
Food Legumes

Mathews RH
Chakraverty A.
Bailey A.E. and Shahidi
Kay DE

Reference Book

Food and Feed from Legumes and Oilseeds
Legumes and Oilseed Crops

Smartt J and Nwokolo E.
Bajaj YPS

Practicals

| Sr. No. | Unit Name |
|---------|--|
| 1. | Determination of physical properties of legumes/oilseeds |
| 2. | Determination of antinutritional factors in legumes |
| 3. | Cooking quality of dhal |
| 4. | Puffing of legumes |
| 5. | Preparation of composite legume flour |
| 6. | Milling of legumes |
| 7. | Preparation of soy milk and soy paneer |
| 8. | Measurement of melting point of fats |

FS 204 Subject : Marketing Management and International Trade

| CourseCode | CourseName (Paper Title) | TeachingScheme(Hrs.) | | CreditsAssigned | | |
|------------|--|----------------------|-----------|-----------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS204 | Marketing Management and International Trade | 32 | 48 | 02 | 02 | 04 |

Assessment Scheme

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|--|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS204 | Marketing Management and International Trade | 10 | 10 | 10 | 40 | 20 | 30 | 100 |

FS204: Marketing Management and International Trade

Coursepre-requisite:

Basic knowledge of management in food industry

Learning Objectives:-

1. To impart comprehensive overview of the Marketing management.
2. To provide knowledge of marketing management and international trade.

It-come:-

Will prepare students to understand need of marketing management and international trade.

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------|------------|--|-------------------------------------|
| 1.0 | | Introduction to Marketing Management | 8hrs |
| | 1.1 | Marketing: Concept, functions, scope and marketing management; Process. | |
| | 1.2 | Concepts of marketing-mix, elements of marketing-mix. | |
| | 1.3 | Market structure and consumer buying behaviour | |
| | 1.4 | micro- and macro-environments. | |
| 2.0 | | Importance of marketing | 8hrs |
| | 2.1 | Marketing research and marketing information systems. | |
| | 2.2 | Market measurement, market forecasting, market segmentation, targeting and positioning. | |
| | 2.3 | Allocation and marketing resources. | |
| | 2.4 | Marketing planning process. | |
| 3.0 | | Marketing policies | 8hrs |
| | 3.1 | Product policy and planning: Product-mix, product line, product life cycle; | |
| | 3.2 | New product development process; Product brand, packaging, services decisions | |
| | 3.3 | Advertising: Objectives, budget and advertising message, media planning, personal selling, publicity, sales promotion. | |
| | 3.4 | Promotion-mix decisions | |
| 4.0 | | Scope of Marketing | 8hrs |
| | 4.1 | Marketing channel decisions; Retailing, wholesaling and distribution; Pricing decisions; | |
| | 4.2 | Price determination and pricing policy of milk products in organized and unorganized sectors of dairy industry. | |
| | 4.3 | World consumption of food: Patterns and types of food consumption | |
| | | Total | 32hrs |

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**REFERENCE
BOOKS Sr. No.**

Name of Book

Author

| | | |
|---|--|---|
| 1 | Marketing Management: A South Asian Perspective | Philip Kotler, Keller, Koshy and Jha |
| 2 | Fundamentals of Marketing | William J. Stanton |

FS 205 Subject: Wheat Milling and Baking Technology-
Teaching Scheme

| CourseCode | CourseName (Paper Title) | TeachingScheme(Hrs.) | | CreditsAssigned | | |
|------------|-------------------------------------|----------------------|-----------|-----------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS205 | Wheat milling and baking technology | 00 | 48 | 00 | 02 | 02 |

Assessment Scheme

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|-------------------------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 205 | Wheat milling and baking technology | - | - | - | - | 20 | 30 | 50 |

FS205: *Wheat milling and baking technology*

Coursepre-requisite:

1. Basic knowledge of baking in food industry.

Course Objectives:

1. To learn about baking technology
2. To learn about bakery industry.

Course Outcome

- Will prepare students to understand need f bakery industry community.

Curriculum Details:*(There shall be FOUR Modules in each course)*

| UnitNo. | Topic |
|----------------|---|
| 1. | Classification of Wheat based on physiochemical properties. |
| 2. | Quality testing of flour and yeast. |
| 3. | Preparation of Cake |
| 4. | Preparation of Pastry |
| 5. | Preparation of Pizza |
| 6. | Preparation of bread |
| 7. | Preparation of Cookies |
| 8. | Preparation of Crackers and Biscuits |

FS 207 Subject: Information Communication Technology

Teaching Scheme

| CourseCode | CourseName (Paper Title) | TeachingScheme(Hrs.) | | CreditsAssigned | | |
|------------|--------------------------------------|----------------------|-----------|-----------------|-----------|-------|
| | | Theory | Practical | Theory | Practical | Total |
| FS207 | Information communication Technology | 32 | 00 | 02 | 00 | 02 |

Assessment Scheme

| Course Code (2) | CourseName (3) | Theory | | | | Practical | | Total [Col (6+7) or Col (8+9)] (10) |
|--------------------|--------------------------------------|---------------|----------------|--------------------------|------------|-----------|------------|---|
| | | CA | | | ESA (7) | CA (8) | ESA (9) | |
| | | Test I (4) | Test II (5) | Avg of T1 & T2 (6) | | | | |
| FS 207 | Information communication Technology | 10 | 10 | 10 | 40 | - | - | 50 |

FS207: *Information communication technology (Major 1) Curriculum Details*

Coursepre-requisite:

1. Basic knowledge of computerization in food industry.

Course Objectives:

1. To impart comprehensive overview of the scientific and technical aspects of Web hosting and webpage design
2. To provide knowledge of SCADA.

Course Outcomes:

- Will prepare students to understand need of COMPUTRIZATION in food industry.

Curriculum Details:*(There shall be FOUR Modules in each course)*

| ModuleNo. | UnitNo. | Topic | Hrs. Required to cover the contents |
|------------|------------|--|-------------------------------------|
| 1.0 | | Introduction | |
| | 1.1 | Importance of computerization in food industry, operating environments, and information systems for various types of food industries. | 8 hrs |
| | 1.2 | Introduction to toolboxes useful to food industry, curve fitting toolbox, fuzzy logic toolbox, neural network toolbox, image processing toolbox, statistical toolbox | |
| | 1.3 | Introduction to computational fluid dynamics (CFD), governing equations of fluid dynamics; Models of flow, substantial derivative, divergence of velocity, continuity, momentum and energy equations; Physical boundary conditions, discretization; Applications of CFD in food and beverage industry; | |
| | 1.4 | Introduction to CFD software, GAMBIT and FLUENT software; LabVIEW – LabVIEW environment: Getting data into computer, data acquisition devices, NI-DAQ, simulated data acquisition, sound card, front panel/block diagram, toolbar/tools palette | |
| 2.0 | | Supervisory control and data acquisition (SCADA); | |
| | 2.1 | systems hardware, firmware | 8 hrs |
| | 2.2 | software and protocols | |
| | 2.3 | landlines, local area network systems, modems | |
| | 2.4 | Spreadsheet applications: Data interpretation and solving problems, preparation of charts | |
| 3.0 | | Use of MATLAB in food industry and Web | |
| | 3.1 | Script files and editor/debugger, MATLAB help system, problem solving methodologies, numeric, cell, arrays, matrix operations, user defined functions, programming using MATLAB | 8 hrs |
| | 3.2 | Debugging MATLAB programs, applications to simulations; Plotting and model building in MATLAB, X-Y plotting functions, subplots and overlay plots | |
| | 3.3 | Special plot types, interactive plotting in MATLAB, function discovery, regression, the basic fitting interface, three dimensional plots; | |
| | 3.4 | Web hosting and webpage design; file transfer protocol (FTP), on-line food process control from centralized server system in processing plant | |
| 4.0 | | Components of a LabVIEW application | 8 hrs |

| | | | |
|--|------------|--|---------------|
| | 4.1 | Creating a VI, data Flow execution, debugging techniques, additional help, context help, tips for working in LabVIEW | |
| | 4.2 | LabVIEW typical programs: Loops, while loop, for loop, functions and sub Vis, types of functions | |
| | 4.3 | Searching the functions palette, creating custom sub Vis, decision making and file I/O, case structure, select (if statement), file I/O; LabVIEW results | |
| | 4.4 | Displaying data on front panel, controls and indicators, graphs and charts, arrays, loop timing, signal processing, textual math, math script | |
| | | Total | 32 hrs |

TextBooks:

Computer Fundamentals

Pradeep K. Sinha and PritiSinha

Computer Fundamentals

Pradeep K. Sinha

ReferenceBooks:

Mastering Office Professional for window 95, BPB Publications, B-14, Connaught Place, New Delhi – 110 001.

- Statistical Methods for Agricultural workers by V.G. Panse and P.V. Sukhatma, ICAR, New Delhi.
- http://www.tutorialsforopenoffice.org/category_index/base.html
- <http://mkisan.gov.in/downloadmobileapps.aspx>
- <http://www.nrsc.gov.in/Agriculture>
- <http://iasri.res.in/>
- <http://communicationtheory.org/berlos-smcr-model-of-communication/>

