

MRSPTU B.Sc. (FOOD SCIENCE AND TECHNOLOGY)/B.F.S.T (Hons.) SYLLABUS
2021 BATCH ONWARDS

Total Credits =21

Semester 1 st		Contact Hrs.			Marks			Credits
Subject code	Subject Name	L	T	P	Internal	External	Total	
BFOTS1-101	General Microbiology	3	1	-	40	60	100	4
BFOTS1-106	Introduction to Food Technology-I	3	1	-	40	60	100	4
BFOTS1-103	*Mathematics	3	1	-	40	60	100	4
BFOTS1-104	Computer Science and Applications	3	1	-	40	60	100	4
BFOTS1-105	General Microbiology Lab I	-	-	4	60	40	100	2
BPHAR0-002	**Life Sciences	3	1	-	40	60	100	4
BHUMA0-001	Communicative English	3	-	-	40	60	100	3
Total		-	-	-	260	340	600	21

*Mathematics for Medical Students

** Life Sciences for Non-Medical students.

Total Credits =19

Semester 2 nd		Contact Hrs.			Marks			Credits
Subject code	Subject Name	L	T	P	Internal	External	Total	
BFOTS1-201	Introduction to Food Technology II	3	1	-	40	60	100	4
BFOTS1-202	Principles of Food Preservation	3	1	-	40	60	100	4
BFOTS1-203	Environmental studies	3	-	-	40	60	100	3
BFOTS1-204	Food Chemistry	3	1	-	40	60	100	4
BFOTS1-205	Introduction to Food Technology II Lab-II	-	-	4	60	40	100	2
BFOTS1-206	Principles of food preservation Lab-III	-	-	4	60	40	100	2
Total		-	-	-	280	320	600	19

SEMESTER FIRST

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GENERAL MICROBIOLOGY

Subject Code: BFOTS1-101

L T PC

Duration: 60Hrs.

3 1 0 4

Course Objectives:

1. To understand theories related to growth of micro-organisms and their disease causing abilities.
2. To memorize the general characteristics of micro-organisms in relation to their effect on plant and human health.
3. To identify suitable tools, equipments and environmental conditions for the growth of micro-organisms.
4. To analyze the appropriate techniques for the control of microbial spoilage in foods.
5. To evaluate the various environmental factors affecting microbial growth.

Course Outcomes:

1. Understanding the various theories related to growth of micro-organisms and their disease causing abilities
2. Remembering the general characteristics of micro-organisms in relation to their effect on plant and human health.
3. Selection of suitable tools, equipments and environmental conditions for the growth of micro-organisms.
4. Identifying the appropriate method for the control of micro-organisms that result in food preservation.
5. Evaluation of various environmental factors affecting microbial growth.

MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2						2						
CO3					3							
CO4		3										
CO5							3					

UNIT-I (15Hrs.)

Introduction: Discovery of microbial world, theory of spontaneous generation, Germ theory of disease, Koch's postulates, Pure culture concept, Nature and properties of prokaryotic and eukaryotic micro-organisms.

UNIT-II (15Hrs.)

General characteristics and Nutritional requirements: General characteristics of bacteria, yeast, mold, viruses, algae. Types of bacteria, nutritional classification of bacteria.

Reproduction of micro-organisms: Brief account of bacteria, yeast and mold reproduction.

UNIT-III (15Hrs.)

Microbial Growth: Definition of growth, growth cycle, growth rate, generation time,

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measurement of growth, effect of environmental factors such as temperature, oxygen, moisture, salt, pH, oxidation- reduction potential and radiations on growth.

UNIT-IV (15Hrs.)

Cultivation of micro-organisms: Pour plate method, spread plate method and streak plate

Control of Micro-organisms: Control of micro-organisms by physical, chemical and biological methods.

Recommended Books:

1. Pelczar M. J., Chan E.C.S. and Krieg N.R., 'Microbiology', 5th Edition., McGraw Hill Co, Singapore, **1987**.
2. Stanier R.Y., Graham J.L., Wheelies M.L. and Painter P.R., 'General Microbiology', 5th Edition., The Macmillan Press Ltd., London, **1993**.
3. Cappuccino J.G. and Sherman N., 'Microbiology: A Laboratory Manual', Benjamin-Cummings Publishing Co., USA, **2004**.
4. Gunase K. P., 'Laboratory Manual in Microbiology', New Age International (P) Ltd. New Delhi, **1996**

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INTRODUCTION TO FOOD TECHNOLOGY-I

Subject code: BFOTS1-106

L T P C
3 1 0 4

Duration: 60Hrs.

Course Objectives:

1. To impart knowledge regarding various disciplines of food science and technology and their applications in food production and preservation.
2. To understand the selection of appropriate techniques for the production of nutrient dense foods.
3. To acquire knowledge about compositional and nutritional properties of different cereal grains that aid in the production of different food products.
4. To summarize degradation of fats and oils and its prevention.
5. To analyze the effects of various physico-chemical changes occur during processing of foods.

Course Outcomes:

1. Creating awareness about various disciplines of food science and technology and their applications in food production and preservation.
2. Understanding about selection of appropriate techniques for the production of nutrient dense foods.
3. Acquire knowledge about compositional and nutritional properties of different cereal grains that aids in the production of different food products.
4. Identifying problems related to the degradation of fats and their solutions that results in preservation.
5. Imparting knowledge about various physical and chemical changes occur during processing.

MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2					2							
CO3			3									
CO4		3										
CO5	3											

UNIT-I (11Hrs.)

Introduction to Food Science and Technology, its scope and importance.

UNIT-II (18Hrs.)

Compositional, Nutritional and Technological aspects of Plant foods

Wheat: structure and composition, types (hard, soft/strong, weak) Diagrammatic representation of structure of wheat grain.

Rice: Structure and composition, parboiling of rice- advantages and disadvantages. Malting, gelatinization of starch, types of browning- Maillard & caramelization.

Corn: Structure and composition, Dry and wet milling.

Millets: Types of millets and its nutritional properties

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UNIT-III (15Hrs.)

Pulses: Structure and composition of pulses, toxic constituents in pulses, processing of pulses: soaking, germination, decortication, cooking and fermentation.

UNIT-IV (16Hrs.)

Fats and Oils: Classification of lipids, types of fatty acids - saturated fatty acids, unsaturated fatty acids, essential fatty acids, trans fatty acids. Rancidity –Types- hydrolytic and oxidative rancidity and its prevention.

Recommended Books

1. Manay, S. and Shadaksharaswami, M., 'Foods: Facts and Principles', New Age Publishers, 2004.
2. Srilakshmi B., 'Food science', New Age Publishers, 2002.
3. Meyer L. H., 'Food Chemistry', New Age, 2004
4. Kenneth F. et al, edited-Vol-1, 2, 'The Cambridge World History of Food, Cambridge', Univ. Press, 2000.
5. Eastwood M., 'Principles of Human Nutrition', 2nd Edition, Blackwell Publishing, 2003.

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MATHEMATICS

Subject Code: BFOTS1-103

L T PC

Duration:60Hrs.

3 1 0 4

Course Objectives:

1. To impart knowledge about basics of algebra and geometry.
2. To understand the numerical part and its application in solving problems related to processing and preservation.
3. To summarize the link between mathematics and Food Science.
4. To select appropriate techniques and methodologies for application in food engineering.
5. To develop an ability of cost analysis involved during construction and designing of food processing plants.

Course Outcomes:

1. Imparting knowledge about basics of algebra and geometry.
2. Understanding the numerals and their application in solving problems related to processing and preservation.
3. Summarizing the link between mathematics and Food Science.
4. Selection of appropriate techniques and methodologies for application in food engineering.
5. Developing an ability of cost analysis involved during construction and designing of food processing plants.

MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2				3								
CO3	2											1
CO4					3							
CO5											3	

UNIT-I (17Hrs.)

Mensuration: Mensuration of rectangles, easy examples of garden paths, cost of planting trees and fencing gardens. Area of right angled triangles area and height of isosceles and equilateral triangles, area of triangles in terms of sides, rent of field. Area of parallelograms, rhombus, quadrilateral and trapezoid. Regular polygons with emphasis on hexagon and octagon. Simple cases of similar figures. Circumference and area of circles. Circular rings. Cost of fencing circular fields and paths.

UNIT-II (14Hrs.)

Mensuration: Volumes of cubes and rectangular solids. Cubic contents of tanks and cisterns, Volumes of triangular & rectangular prisms, right circular cylinders and segments of cylinders (Easy numerical examples based on Science only to be set Proofs of formulae).

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UNIT-III (15Hrs.)

Algebra: Solution of quadratic equations and of those reducible to quadratic equation (One variable). Relation between roots and co-efficients.nth term and sum to n terms of an A. P. and G.P. nth term of an H. P.(excluding means and problems on numbers). Permutation and combinations: simple problems only. (Proofs of formulae not required).

UNIT-IV (14Hrs.)

Matrix and Determinant: Introduction matrices, Types of matrices, Operation of matrices, Transpose of matrix, Matrix multiplication, Determinants, Properties of determinants, Products of determinants, Minors and co-factors, Adjoint of a square matrix, Singular and non singular matrices, Inverse of Matrices.

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Recommended Books

1. Algebra by Kapoor D. C. and SinghG.
2. Algebra by Nagpal T. N. and GuptaK.K.
3. Comprehensive Calculus by Dehiya R.S.
4. New Style Calculus for T. D.C

COMPUTER SCIENCE & APPLICATIONS

Subject Code: BFOTS1-104

L T PC
3 1 0 4

Duration: 60Hrs.

Course Objectives:

1. To understand the basics of computers and terminologies used.
2. To identify problems related to security against computer viruses along with their preventive measures.
3. To provide knowledge about collection, storage and analysis of data with least human errors.
4. To create an ability to prepare effective presentations and communicate with target audience.
5. To develop managerial skills by imparting knowledge about applications of computers in different fields.

Course Outcomes:

1. Understanding the basics of computers and terminologies used.
2. Identifying the problems related to security against computer viruses along with their preventive measures.
3. Providing knowledge about collection, storage and analysis of data with least human errors.
4. Creating an ability to prepare effective presentations and communicating with target audience.
5. Developing managerial skills by imparting knowledge about applications of computers in different fields.

MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2		3										
CO3				3								
CO4										3		
CO5											3	

UNIT-I (16Hrs.)

Computer Fundamentals Introduction to Computers: Characteristics of computers, Historical perspectives of computers, Computer generations, types of computers and uses, Software, Hardware, Basic architecture and functions of CPU and its parts, Important I/O devices like Keyboard, Mouse, Printers, Video Monitors.

Memory Storage: Memory Cells, Semiconductor and Magnetic core memory, ROM (its types), RAM, Cache and Virtual memory, Secondary storage devices and their organization (Hard disk,

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Floppy disk, CD, DVD).

UNIT-II (16Hrs.)

Operating Systems: Definitions, Need, Organization, Functions, Types of Operating Systems, DOS, Windows, Handling Drives, Directories and files, Commands (Internal & External), Icons, Clipboard, Folders, Major differences between DOS & Windows.

Communication Networks: Hardware and software components, seven layers of OSI architecture, Network Topologies (Ring, Star, Fully Connected and Bus), LAN and WAN, Bounded and unbounded communication media, Internet, World Wide Web and I.T., Browsers, Important terminology regarding Internet applications.

UNIT-III (14Hrs.)

Computer Applications Word Processing: Techniques, File manipulation, Formatting, Printing setups Table handling, Mail merge, etc. using MS-Word.

Spreadsheet Package: Worksheets, formatting sheets, Calculations and graphing using formulae and functions, Import and export of data using MS-Excel.

UNIT- IV (14Hrs.)

Computer Applications Graphics: Objectives and types of graphics, Presentation packages, Slides designing, Diagrams and graphs, Import & Export data using MS-Power Point.

Data Security against Viruses: Definition of computer viruses, detection, prevention and cure against viruses using anti-virus software packages.

Recommended Books

1. Rajaraman, 'Fundamentals of Computers', Prentice Hall of India.
2. N.K. Tiwari, 'Computer Fundamental with Pharmacy Applications', 1st Edition, Pharm. MedPress,2008.
3. Stultz, 'Learn MS-Office 2000', BPB Publications.
4. Ivens, 'Using Microsoft Windows', Prentice Hall of India,1998.
5. Stultz, 'Learn DOS in a day', BPB Publication.

LAB-I GENERAL MICROBIOLOGY

Subject Code: BFOTS1-105

**L T P C
0 0 4 2**

Duration: 30Hrs.

Course Objectives:

1. To understand working of different equipments used in microbiology and their applications in food production and preservation.
2. To impart knowledge about practical handling of microbiological tools.
3. To determine the microbial load of different food products with suitable techniques and interpret the factors associated with them.
4. To identify the methods for cultivation, isolation and storage of micro-organisms that can be beneficial for human health and environment.
5. To develop an ability to work effectively both individually and as a team member during the collection of samples from different sources.

Course Outcomes:

1. Understanding about working of different equipment's of microbiology and their applications in food production and preservation.
2. Imparting knowledge about practical handling of microbiological tools that ensures safety of food products.
3. Determination of microbial load of different food products with suitable techniques and interpret the factors associated with them.
4. Identification of suitable methods for the cultivation, isolation and storage of micro-organisms that can be beneficial for human health and environment.
5. Creating ability to work effectively both individually and as a team during the collection of samples from different sources.

MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3									

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CO2					3							
CO3				3								
CO4							3					
CO5									3			

Practical

1. To study different parts of a microscope.
2. Study of instruments (Autoclave, Hot air oven, Incubator, Laminar flow, pH meter, and spectrophotometer) of microbiology laboratory.
3. Preparation of nutrient agar and MacConkey's Agar plates, slants and broth.
4. To study the serial dilution method.
5. To perform pour plate, spread plate and streak plate methods for isolation and enumeration of micro-organisms.
6. To perform Simple staining.
7. To stain the given bacteria by Gram's staining method.
8. To perform negative staining.
9. To determine the number of micro-organisms with a Haemocytometer.
10. To determine the motility of bacteria by hanging drop method.

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LIFE SCIENCES

Subject code: BPHAR0-002

L T PC

Duration: 60 Hrs.

3 1 0 4

Course Objectives

1. To understand the basics of cell and molecular biology.
2. To impart knowledge regarding physiology and anatomy of human body.
3. To identify the micro-organisms responsible for infectious and contagious diseases along with their preventive measures.
4. To create an ability to develop vaccines and antibiotics for societal benefits.
5. To apply basics of genetic engineering in food and human health that can support agro-food industries.

Course outcome:

1. Understanding the basics of cell and molecular biology.
2. Imparting knowledge regarding physiology and anatomy of human body.
3. Identification of micro-organisms responsible for infectious and contagious diseases along with their preventive measures.
4. Creating an ability to develop vaccines and antibiotics for societal benefits.
5. Application of basics of genetic engineering in food and human health that can support agro-food industries.

MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	1											
CO3		3										
CO4						3						
CO5											2	

UNIT-I (15Hrs.)

Cell & Molecular Biology: Cell theory, Prokaryotic cell, eukaryotic cell, cell wall, cell membrane, cytoskeleton, nucleus, chloroplast, mitochondria, endoplasmic reticulum, golgi bodies, ribosomes, lysosomes, vacuoles and centrosomes.

UNIT- II (15Hrs.)

Cell cycle & division, amitosis, mitosis and meiosis. Study of genetic material, structure of DNA and RNA, replication, transcription, genetic code, translation & DNA repair.

Human physiology: Digestion and absorption, breathing and respiration, circulation, excretory system, nervous system, skeletal and muscular systems.

UNIT-III (12Hrs.)

Human health and diseases: Pathogens, Parasites causing human disease (malaria, dengue, chickenguinea, typhoid, pneumonia, common cold, ringworm) and their control. Basic concepts of

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immunology, vaccines, antibiotics, cancer, HIV and AIDS.

UNIT-IV (18Hrs.)

Biotechnology and its applications: Recombinant DNA technology, applications in health, agriculture and industries, genetically modified organisms; Plant breeding, tissue culture, single cell protein, Transgenic plants and transgenic animals.

Recommended books:

1. Lehninger A. L., David L. N. and Michael M. C., 'Principles of Biochemistry', Worth Publishers, **1993**.
2. Singh B.D., 'Biotechnology', KalyaniPublishers.
3. Harvey L., Arnold B., Chris A. K., Paul M., Monty K., Jems D. and Mathew P. S., 'Molecular Cell Biology', W.H. Freeman,**2004**.

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COMMUNICATIVE ENGLISH

Subject Code: BHUMA0-001

L T P C
3 0 0 3

Duration:45 Hrs.

Course Objectives:

1. To understand the concept of effective communication, its components, and importance for life-long learning.
2. To impart knowledge regarding different communication styles and their matrix.
3. To engage students in team work by organizing group discussions on different topics.
4. To improve interview skills of students and applying those to crack future interviews.
5. To develop the art of being an effective presenter using specific presentation and communication skills.

Course Outcomes:

1. Understanding the concept of effective communication, its components, and importance for life-long learning.
2. Imparting knowledge regarding different communication styles and their matrix.
3. Engaging students in team work by organizing group discussions on different topics.
4. Improving interview skills of students and applying those to crack future interviews.
5. Developing the art of being an effective presenter using specific presentation and communication skills.

MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												3
CO2										3		
CO3									3			
CO4												2
CO5										3		

UNIT-I (12 Hrs.)

Communication Skills: Introduction, Definition, the Importance of Communication, The Communication Process – Source, Message, Encoding, Channel, Decoding, Receiver, Feedback, Context

Barriers to communication: Physiological Barriers, Physical Barriers, Cultural Barriers, Language Barriers, Gender Barriers, Interpersonal Barriers, Psychological Barriers, Emotional barriers.

UNIT-II (11Hrs.)

Perspectives in Communication: Introduction, Visual Perception, Language, Other factors affecting our perspective - Past Experiences, Prejudices, Feelings, Environment.

Elements of Communication: Introduction, Face to Face Communication - Tone of Voice,

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Body Language (Non-verbal communication), Verbal Communication, Physical Communication.

UNIT-III (12Hrs.)

Communication Styles: Introduction, The Communication Styles Matrix with example for each Direct Communication Style, Spirited Communication Style, Systematic Communication Style, Considerate Communication Style.

Basic Listening Skills: Introduction, Self-Awareness, Active Listening, becoming an Active Listener, Listening in Difficult Situations

UNIT-IV (10Hrs.)

Interview Skills: Purpose of an interview, Do's and Don'ts of an interview

Giving Presentations: Dealing with Fears, Planning your Presentation, Structuring Your Presentation, Delivering Your Presentation, Techniques of Delivery

Group Discussion: Introduction, Communication skills in group discussion, Do's and Don'ts of group discussion.

Recommended Books

1. Ruther Ford A. J., 'Basic Communication Skills for Technology', 2nd Edition, Pearson Education, **2011**.
2. Kumar S. and Pushplata, 'Communication Skills', 1st Edition, Oxford Press, **2011**.
3. Stephen P. Robbins, 'Organizational Behaviour', 1st Edition, Pearson, **2013**.
4. Gill H., 'Brilliant-Communication Skills', 1st Edition, Pearson Life, **2011**.
5. Gopalawamy R., 'The Ace of Soft Skills: Attitude, Communication and Etiquettefor Success', 5th Edition, Pearson, **2013**.
6. Dalley D., Burton L. and Margaret G., 'Developing your Influencing Skills', Green Hall, 1st Edition, Universe of Learning LTD, **2010**.
7. Konarnira, 'Communication Skills for Professionals', 2nd Edition, PHI, **2011**.
8. Mitra B. K., 'Personality Development and Soft Skills', 1st Edition, Oxford Press, **2011**.
9. 'Soft Skill for Everyone', Butter Field, 1st Edition, Cengage Learning India Pvt. Ltd., **2011**.
10. Francis Peters S.J., 'Soft Skills and Professional Communication', 1st Edition, McGraw Hill Education, **2011**.
11. John A., 'Effective Communication', 4th Edition, Pan MacMillan, **2009**.
12. Aubrey D., 'Bringing out the Best in People', 2nd Edition, McGraw Hill, **1999**.

SEMESTER-II

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INTRODUCTION TO FOOD TECHNOLOGY-II

Subject Code: BFOTS1-201

LTPC
3 1 0 4

Duration:60Hrs.

Course Objectives:

1. To understand the physiological-, physical-, chemical-, and pathological changes during storage of fruits and vegetables.
2. To impart knowledge regarding compositional and nutritional aspects of fruits and vegetables, useful in the development of value-added products.
3. To apply ethics during the handling, processing and preservation of animal products.
4. To summarize the general processing methods of Indian spices and their therapeutic uses.
5. To identify appropriate techniques for the quality evaluation of plant and animal based food products.

Course Outcomes:

1. Understanding the physiological-, physical-, chemical-, and pathological changes during storage of fruits and vegetables.
2. Imparting knowledge regarding compositional and nutritional aspects of fruits and vegetables, useful in the development of value-added products.
3. Applying ethics during the handling, processing and preservation of animal products.
4. Summarizing the general processing methods of Indian spices and their therapeutic uses.
5. Identification of appropriate techniques for the quality evaluation of plant and animal based food products.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3										
CO2	2											
CO3								3				
CO4						3						
CO 5					3							

UNIT-I (16Hrs.)

Fruits and Vegetables: Classification of fruits and vegetables, general composition, enzymatic browning, names and sources of pigments, Dietary fibre.

Postharvest changes in fruits and vegetables: Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes during the storage of fruits and vegetables.

UNIT-II (17Hrs.)

Compositional, Nutritional and Technological aspects of Animal foods Flesh Foods - Meat, Fish, Poultry

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Meat- Definition of carcass, concept of red meat and white meat, composition of meat, marbling, post-mortem changes in meat- rigor mortis, tenderization of meat, ageing of meat.

Fish- Classification of fish (fresh water and marine), aquaculture, composition of fish, characteristics of fresh fish, spoilage of fish- microbiological, physiological, biochemical.

Poultry- Structure of hen's egg, composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality, difference between broiler and layers.

UNIT-III (12Hrs.)

Milk and Milk Products: Definition of milk, chemical composition of milk, its constituents, processing of milk, pasteurization, homogenization. An overview of types of market milk & milk products.

UNIT-IV (15Hrs.)

Food Spices and Condiments: Types and uses of spices and condiments, Chemical composition, Extraction, General processing, uses and special attributes of important Indian spices like pepper, cinnamon, clove, ginger, turmeric, cardamom, fenugreek and fennel, seasonings and condiments blends.

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Recommended Books

1. Manay S. and Shadaksharaswami M., 'Foods: Facts and Principles', New Age Publishers, 2004.
2. Srilakshmi B., 'Food Science', New Age Publishers, 2002.
3. Meyer L. H., 'Food Chemistry', New Age, 2004
4. Kenneth F. et al, edited - Vol-1, 2, 'The Cambridge World History of Food', Cambridge Univ. Press, 2000.
5. Eastwood M., 'Principles of Human Nutrition', 2nd Edition Blackwell publishing, 2003.

PRINCIPLES OF FOOD PRESERVATION

Subject Code: BFOTS1-202

L T PC

Duration: 60Hrs

3 1 0 4

Course Objectives:

1. To impart knowledge regarding various methods of preservation of food and their effect on physiochemical properties of food.
2. To identify appropriate equipments for preservation of different food products aiming at minimal degradation of nutrients.
3. To understand the problems associated with food spoilage and selection of suitable methods of their preservation.
4. To analyze and interpret freezing and drying curves of different food products.
5. To create awareness regarding the effect of chemical and physical preservation techniques on health and nutritional components of food.

Course Outcomes:

1. Imparting knowledge regarding various methods of preservation of food and their effect on physiochemical properties of food.
2. Identification of appropriate equipments for preservation of different food products aiming at minimal degradation of nutrients.
3. Understanding the problems associated with food spoilage and selection of suitable methods of their preservation.
4. Analyzing and interpreting freezing and drying curves of different food products.
5. Creating awareness regarding the effect of chemical and physical preservation techniques on health and nutritional components of food.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2					3							
CO3				3								
CO4		3										
CO5						3						

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Unit-I (11Hrs.)

Introduction: Historical developments of food preservation. Principles of Food preservation, Scope & its benefits.

Chemical preservation: Class I and Class II preservatives.

Unit-II (16Hrs.)

Preservation by low temperature: Introduction, Freezing and Refrigeration, cold storage and freezing, freezing curve, changes during freezing, types of freezing; slow freezing, quick freezing, thawing, changes during thawing and its effects on food.

Unit-III (16Hrs.)

Preservation by high temperature: Thermal processing, Sterilization, commercial sterilization, pasteurization, and blanching. boiling, canning, aseptic processing, thermal death time.

Unit-IV (17Hrs.)

Preservation by Drying: Definition, drying as a means of preservation, differences between sun drying and dehydration (i.e. mechanical drying), factors affecting rate of drying, normal drying

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curve, Various types of driers used in food industry.

Irradiation: Units of radiation, Ultraviolet and ionizing irradiations, their effect on microorganisms & uses in food processing.

Recommended Books

1. Desrosier N. W. and Desrosier J. N., 'The Technology of Food Preservation', CBS Publication, New Delhi, **1998**.
2. Paine F.A. and Paine H.Y., 'Handbook of Food Packaging', Thomson Press India Pvt Ltd, New Delhi, **1992**.
3. Potter N.H., 'Food Science', CBS Publication, New Delhi, **1998**.
4. Ramaswamy Hand Marcott M., 'Food Processing Principles and Applications', CRC Press, **2006**.
5. Rao P.G., 'Fundamentals of Food Engineering', PHI Learning Pvt Ltd, New Delhi, **2010**.
6. Toledo R. T., 'Fundamentals of Food Process Engineering', Aspen Publishers, **1999**.

ENVIRONMENTAL STUDIES

Subject Code: BFOTS1-203

L T PC
3 0 0 3

Duration: 45Hrs.

Course Objectives:

1. To understand the concept of renewable and non-renewable resources of environment.
2. To identify the problems associated with different environmental resources.
3. To impart knowledge regarding different types of ecosystems and their characteristic features.
4. To analyze the causes of water, soil and air pollution and implementing some effective measures to save them for societal benefits.
5. To create awareness regarding role of an individual in conservation of natural resources and communicating it to society.

Course Outcomes:

1. Understanding the concept of renewable and non-renewable resources of environment.
2. Identifying the problems associated with different environmental resources.
3. Imparting knowledge regarding different types of ecosystems and their characteristic features.
4. Analyzing the causes of water, soil and air pollution and implementing some effective measures to save them for societal benefits.
5. Creating awareness regarding role of an individual in conservation of natural resources and communicating it to society.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2				3								

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CO3							3					
CO4		3										
CO 5										3		

UNIT-I (11Hrs.)

The multidisciplinary nature of environmental studies, Natural Resources, Renewable and non- renewable resources: Natural resources and associated problems.

UNIT-II (12Hrs.)

Forest Resources, Water Resources, Mineral Resources, Food resources, Energy resources, Land resources, Role of an individual in conservation of naturalresources.

UNIT-III (12Hrs.)

Ecosystems, Concept of an ecosystem, Structure and function of an ecosystem, Introduction,

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types, characteristic features, Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT- IV (10Hrs.)

Environmental Pollution: Air pollution; Water pollution; Soil pollution.

Recommended Books

1. Sing Y.K., 'Environmental Science', New Age International Pvt, Publishers, Bangalore.
2. Agarwal K.C., 'Environmental Biology', Nidi Publ. Ltd. Bikaner, 2001.
3. Erach B., 'The Biodiversity of India,' Mapin Publishing Pvt.Ltd.
4. Brunner R.C., 'Hazardous Waste Incineration', McGraw Hill Inc.
5. Clark R.S., 'Marine Pollution', Clarendon Press Oxford.
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 'Environmental Encyclopedia', Jaico Publ. House, Mumbai, 1196p, 2001.
7. De A.K., 'Environmental Chemistry', Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment. <https://www.downtoearth.org.in/>

FOOD CHEMISTRY

Subject Code: BFOTS1-204

L T PC

Duration: 60Hrs.

3 1 0 4

Course Objectives:

1. To understand the compositional aspects of different categories of foods.
2. To impart knowledge regarding role of water activity in extending the shelf life of food products and selection of appropriate packaging material.
3. To summarize various deteriorative changes of fats and oils.
4. To analyze physico-chemical-, and functional properties of proteins and carbohydrates and development of various food products.
5. To create awareness regarding different types of food flavors and importance of water- and fat soluble vitamins.

Course Outcomes:

1. Understanding the compositional aspects of different categories of foods.
2. Imparting knowledge regarding role of water activity in extending the shelf life of food products and selection of appropriate packaging material.
3. Summarizing various deteriorative changes of fats and oils.
4. Analyzing physico-chemical-, and functional properties of proteins and carbohydrates and development of various food products.
5. Creating awareness regarding different types of food flavors and importance of water- and fat soluble vitamins.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2			2									
CO3				3								

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CO4			3									
CO 5						3						

UNIT-I (12Hrs.)

Introduction to Food: Definition and Composition.

Water: Structure of water and ice, Types of water, Sorption phenomenon, Water activity and packaging.

UNIT-II (16Hrs.)

Lipids: Classification, Physical properties-melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point. Chemical properties- reichertmeissel value, polenske value, iodine value, peroxide value, saponificationvalue.

Changes in fats and oils: rancidity, lipolysis, flavor reversion, Fat Mimetics.

UNIT-III (17Hrs.)

Proteins: Protein classification and structure, Nature of food proteins (plant and animal proteins). Properties of proteins (electrophoresis, sedimentation, amphoterism and denaturation),

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Functional properties of proteins, organoleptic, solubility, viscosity, binding gelation/texturization, emulsification, foaming.

Carbohydrates: Classification and Functions (monosaccharides, oligosaccharides and polysaccharides), Modified celluloses and starches.

UNIT-IV (15Hrs.)

Vitamin: Importance and Stability, Water soluble & Fat soluble vitamins.

Flavour: Definition and basic tastes, Description of food flavours, Flavour enhancers.

Recommended Books

1. Fennema O. R, 'Food Chemistry', 3rd Edition, Marcell Dekker, New York, **1996**.
2. Whitehurst R. J. and Law B. A., 'Enzymes in Food Technology', CRC Press, Canada, **2002**.
3. Wong Dominic W. S., 'Food Enzyme, Chapman and Hall, New York, **1995**.
4. Potter N.N. and Hotchkiss J. H, 'Food Science', 5th Edition., Chapman & Hall, **1995**.
5. DeMan J.M., 'Principles of Food Chemistry', AVI, New York, **1980**.

LAB II INTRODUCTION TO FOOD TECHNOLOGY-II

Subject Code: BFOTS1-205

L T PC

Duration:30Hrs.

0 0 4 2

Course Objectives

1. To impart knowledge regarding basic instruments used in the food industries for analysis of food components.
2. To familiarize the students with methodologies used for determination of various quality attributes, adhering to legal specifications.
3. To conduct qualitative tests for major food components.
4. To determine chemical components of food products quantitatively.
5. To analyze and interpret data for various quality attributes and using this information for product improvement.

Course Outcomes:

1. Imparting knowledge regarding basic instruments used in the food industries for analysis of food components.
2. Familiarizing the students with methodologies used for determination of various quality attributes, adhering to legal specifications.
3. Conducting qualitative tests for major food components.
4. Determination of chemical components of food products quantitatively.
5. Analysis and interpretation of data for various quality attributes and using this information for product improvement.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					3							
CO2						3						

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CO3		3										
CO4			3									
CO 5				3								

Practicals

1. Demonstration of the instruments used in food technology.
2. Determination of moisture content in different food samples.
3. Determination of ash content of different food samples.
4. Determination of TSS of ketchup by refractometer.
5. Determination of acidity of milk and juices.
6. To study the effect of blanching on vegetables.
7. Determination of specific gravity of oil and milk.
8. Determination of pH of food samples by pH meter.
9. Determination of saponification value and acid value.
10. Qualitative test for starch and protein.

LAB III PRINCIPLES OF FOOD PRESERVATION**Subject Code: BFOTS1-206****L TPC****Duration: 30Hrs****0 0 42****Course Objectives:**

1. To prepare value added products from fruits and vegetables.
2. To understand the effects of hydrothermal processes on different vegetables.
3. To analyze quality attributes of packaged food products.
4. To apply different food preservation techniques for preservation of food products.
5. To gain practical knowledge of various instruments used in food processing industries.

Course Outcomes:

1. Preparation of value added products from fruits and vegetables.
2. Understand the effects of hydrothermal processes on different vegetables.
3. Analysis of quality attributes of packaged food products.
4. Application of different food preservation techniques for preservation of food products.
5. Gaining practical knowledge of various instruments used in food processing industries.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3									
CO2		3										
CO3	3											

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CO4						3						
CO 5					3							

Practical's

1. Cut out analysis of canned foods.
2. Preservation of fruits and vegetables by syruling and salting.
3. Preservation by paraffining.
4. Preparation of sauerkraut.
5. To determine the adequacy of blanching on vegetables.
6. To enhance the shelf life of eggs by oiling and pickling.
7. To study the curing of meat.
8. Preservative effect of honey and different concentrations.
9. Preservation of fruits and vegetables by salt, oil and vinegar.
10. Visit to food industry