

**MRSPTU B.Sc. (FOOD SCIENCE AND TECHNOLOGY)/B.F.S.T (Hons.)
SYLLABUS 2019 BATCH ONWARDS**

Total Credits= 21

Semester 3 rd		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BFOTS1-301	Dairy Technology	3	1	-	40	60	100	4
BFOTS1-302	Technology of Fruits & Vegetables	3	1	-	40	60	100	4
BFOTS1-303	Food Microbiology and Food Safety	3	1	-	40	60	100	4
BFOTS1-304	Dairy Technology Lab IV	-	-	4	60	40	100	2
BFOTS1-305	Technology of Fruits & Vegetables Lab V	-	-	4	60	40	100	2
BFOTS1-306	Food Microbiology and Food Safety Lab VI	-	-	4	60	40	100	2
Departmental Elective (Select any one)-I								
BFOTD1-311	Entrepreneurship Development	3	-	-	40	60	100	3
BFOTD1-312	Food Fermentation technology							
BFOTD1-313	Food Additives							
BMNCC0-004	Drug Abuse	2	-	-	100	-	100	0
Total		14	3	12	440	360	800	21

**MRSPTU B.Sc. (FOOD SCIENCE AND TECHNOLOGY)/B.F.S.T (Hons.)
SYLLABUS 2019 BATCH ONWARDS**

Total Credits= 24

Semester 4 th		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BFOTS1-401	Technology of Cereals, Pulses and Oilseeds	3	1	-	40	60	100	4
BFOTS1-402	Egg, Poultry & Meat Technology	3	1	-	40	60	100	4
BFOTS1-403	Food Plant Hygiene and Sanitation	3	1	-	40	60	100	4
BFOTS1-404	Technology of Cereals, Pulses and Oilseeds Lab VII	-	-	4	60	40	100	2
BFOTS1-405	Egg, Poultry & Meat Technology Lab VIII	-	-	4	60	40	100	2
BFOTS1-406	Food Plant Hygiene and Sanitation Lab IX	-	-	4	60	40	100	2
Departmental Elective-II								
BFOTD1-411	Nutraceutical and Functional Foods	4	-	-	40	60	100	4
BFOTD1-412	Nutraceutical and Functional Foods Lab X	-	-	4	60	40	100	2
OR								
BFOTD1-413	Bakery Technology	4	-	-	40	60	100	4
BFOTD1-414	Bakery Technology Lab XI	-	-	4	60	40	100	2
Total		13	3	16	400	400	800	24

Note:

- All the students are required to undergo 'In Plant Training' for 4 weeks in a Food Processing unit after IVth semester's final examinations. Final degree to the students will be awarded subject to their successfully completing the 'In Plant Training' as per university norms.

Overall Marks / Credits

Semester	Marks	Credits
3 rd	800	21
4 th	800	24
Total	1600	45

DAIRY TECHNOLOGY		
Subject Code: BFOTS1-301	L T P C	Duration: 60 (Hrs.)
	3 1 0 4	
Course Objectives: <ol style="list-style-type: none"> 1. To familiarise students with basics of dairy technology. 2. To illustrate the technologies of processing milk and milk products. 3. To enlighten their knowledge about various dairy equipment. 4. To make them familiar about various storage and preservation techniques of milk. 		
Course Outcomes: <ol style="list-style-type: none"> 1. Students gain knowledge regarding different properties of milk and milk products. 2. Students learn about the techniques of processing of dairy products. 3. Learn the technology behind fat rich dairy products. 4. Students' acquire knowledge regarding various equipments present in dairy industry. 		
UNIT-I (15 Hours)		
Definition of milk, Market milk, Composition, Physicochemical properties and nutritive value of milk, microbiology of milk, Factors affecting composition of milk.		
UNIT-II (15 Hours)		
Liquid milk processing: Collection of milk, Reception, Platform testing. Various stages of processing: Filtration, Clarification, Homogenization and Pasteurization. Description and working of clarifier, cream separator, homogenizer and plate heat exchanger.		
UNIT-III 15 Hours)		
Cream: Types, manufacturing and defects. Butter: Types, preparation, theories of churning, defects. Preparation and defects of Ghee, flavored milk, condensed milk and milk powder.		
UNIT-IV (15 Hours)		
Manufacturing and defects of Ice-cream and cheese. Fermented milk and milk products: Yoghurt, dahi and shrikhand. Indigenous milk products.		
Recommended Text Books / Reference Books:		
<ol style="list-style-type: none"> 1. De Sukumar, Outlines of Dairy Technology, Oxford University Press, Oxford, UK, 2007. 2. Webb and Johnson, Fundamentals of Dairy Chemistry, 3rd ed., CBS Publishers, New Delhi, 1988. 3. Eckles, Combs, Henery C, and Willes C, Milk & Milk Products, Tata McGraw Hill Publishers, USA, 1997. 		

TECHNOLOGY OF FRUITS AND VEGETABLES		
Subject Code: BFOTS1-302	L T P C	Duration: 60 (Hrs.)
	3 1 0 4	
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To make the students aware about the basics of fruits and vegetables processing. 2. To provide knowledge about the preservation techniques of fruits and vegetables. 3. To make them familiar about value addition of fruits and vegetables. 4. To enrich their knowledge about different equipments used in fruits and vegetable industry. <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Students get an overview of post-harvest handling of fruits and vegetables. 2. Students learn to enhance the shelf life and market value of fruits and vegetables by value addition. 3. Students become familiarize with novel techniques to reduce post-harvest losses in fruits and vegetables. 4. Students acquire knowledge to reduce by product utilization of fruits and vegetables industry waste. 		
UNIT-I (10 Hours)		
Classification and nutritive value of fruits and vegetables, methods of preservation (short & long term), Physical and chemical indices of fruit maturity.		
UNIT-II (10 Hours)		
Quality characteristics of fruits and vegetables for processing. Canning of fruits and vegetables: Selection of fruits and vegetables, process of canning, factors affecting the process- time and temperature, syrups and brines for canning.		
UNIT-III (20 Hours)		
Squashes, cordials, nectars, RTS, Syrups and blending of juices. Jam: Constituents, selection of fruits, processing & technology, defects. Jelly: Essential Constituents, Role of pectin, Theory of jelly formation, Processing & technology, defects.		
UNIT-IV (20 Hours)		
Pickles and sauces: Processing, Types, Causes of spoilage in pickling. Processing of Tomato puree, paste, ketchup and sauce. Dehydration of fruits and vegetables: Sun drying & mechanical dehydration. Refrigeration of fruits and vegetable (Air blast freezing, immersion freezing, plate freezing, cryogenic freezing and IQF). Utilization of fruits and vegetable industry wastes.		
Recommended Text Books / Reference Books:		
<ol style="list-style-type: none"> 1. Khurdia DS, Preservation of fruits and vegetables. Indian Council of Agriculture Research, New Delhi 1995. 2. Potter N, Hotchkiss JH, Food Science. CBS Publishers, Delhi 2006. 3. Siddhapa GS, Lal G and Tandon, Preservation of fruits and vegetables, Indian Council of Agriculture Research, New Delhi, 1986. 4. Srivastava RS, Kumar S. Fruit and Vegetable Preservation; Principles and Practices, International Book Distributing Company, Lucknow, 2005. 5. Srivastava SS, Phal Parirakshan, Kitab Mahal, Lucknow, 2006. 6. Subbalakshmi G, Udipi SA, Food Processing and Preservation, New Age International Publishers, Delhi, 2007. 		

FOOD MICROBIOLOGY AND FOOD SAFETY		
Subject Code: BFOTS1-303	L T P C	Duration: 60 (Hrs.)
	3 1 0 4	
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To understand the importance and types of micro-organisms in food. 2. To study about different techniques to control micro-organisms in foods. 3. To make students familiar with microbiology of different foods. 4. To learn about different food safety tools. <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Students understand the importance of micro-organisms in food. 2. Students learn the techniques to identify microorganisms and prevent food spoilage. 3. Students acquire knowledge of personal hygiene. 4. Students come to know about importance of food safety tools. 		
UNIT-I (15 Hours)		
<p>Types of Microorganisms in Food Classification, Morphology and Structure of microorganisms, Importance in food (bacteria, fungi and viruses), Significance of spores.</p>		
UNIT-II (15 Hours)		
<p>Enumeration techniques & control of microorganisms in foods Qualitative and quantitative methods-conventional as well as rapid, Principles and methods of preservation (thermal and non-thermal), Introduction to Hurdle Technology.</p>		
UNIT-III (15 Hours)		
<p>Microbiology of raw, processed and spoiled foods: Fruits and vegetables, Meat and meat products, milk and milk products, eggs, canned foods, cereals and cereal products. Food infection and Food intoxication.</p>		
UNIT-IV (15 Hours)		
<p>Introduction to Food Safety Definition, Types of hazards, biological, chemical, physical hazards, Factors affecting food safety. Sources of contamination, Control methods using physical and chemical agents, waste disposal, pest and rodent control, personnel hygiene.</p> <p>Food Safety Management Tools HACCP, ISO series, TQM and Risk Analysis.</p>		
<p>Recommended Text Books / Reference Books:</p> <ol style="list-style-type: none"> 1. Frazier William C and Westhoff, Dennis C, Food Microbiology, TMH, New Delhi, 2004. 2. Jay, James M., Modern Food Microbiology, CBS Publication, New Delhi, 2000. 3. Garbutt, John., Essentials of Food Microbiology, Arnold, London,1997. 4. Pelczar MJ, Chan E.C.S and Krieg, Noel R , Microbiology, TMH, New Delhi, 1993. 5. Lawley, R., Curtis L. and Davis,J. , The Food Safety Hazard Guidebook , RSC Publication, 2004. 6. De Vries, Food Safety and Toxicity, CRC, New York, 1997. 7. Marriott, Norman G., Principles of Food Sanitation, AVI, New York, 1985. 8. Forsythe, S J., Microbiology of Safe Food, Blackwell Science, Oxford, USA, 1987. 		

DAIRY TECHNOLOGY LAB-IV

Subject Code: BFOTS1-304

L T P C

Duration: 30 (Hrs.)

0 0 4 2

Course Objectives:

1. To make students understand the basic tests of milk and milk products.
2. To give students knowledge of practical handling of dairy equipments.
3. To provide a platform for implementing their theoretical knowledge to the practical handling.
4. To make them familiar about the dairy industry.

Course Outcomes:

1. Students acquire knowledge of basic laboratory tests of milk and milk products.
2. Students learn about formulation of various dairy products.
3. Students are able to understand the handling of dairy equipments.
4. Students become familiar with environment of dairy industry.

Practicals:

1. To perform platform tests in milk (Alcohol-Alizarin test, COB, MBRT, specific gravity).
2. To estimate milk fat by Gerber method.
3. Determination of titrable acidity and pH of milk.
4. To determine adulteration of milk.
5. Preparation of pasteurized milk.
6. Preparation of flavoured milk.
7. Preparation of Paneer.
8. To perform neutralization of cream.
9. To study the working of cream separator.
10. Preparation of butter and determination of overrun in butter.
11. Preparation of Ice-cream.
12. Preparation of shrikhand.
13. Preparation of ghee.
14. Visit to milk processing plant.

TECHNOLOGY OF FRUITS AND VEGETABLES LAB-V		
Subject Code: BFOTS1-305	L T P C	Duration: 30 (Hrs.)
	0 0 4 2	
Course Objectives: <ol style="list-style-type: none">1. To make students understand the basic tests of fruits and vegetables.2. To give students knowledge of practical handling of fruits and vegetables industry equipments.3. To provide a platform for implementing their theoretical knowledge to the practical handling.4. To make them familiar about the fruits and vegetables industry.		
Course Outcomes: <ol style="list-style-type: none">1. Students acquire knowledge of basic laboratory tests of fruits and vegetables.2. Students learn about formulation of various fruits and vegetables products.3. Students are able to understand the handling of fruits and vegetables industry equipments.4. Students become familiar with environment of fruits and vegetables industry.		
Practicals: <ol style="list-style-type: none">1. Estimation of total soluble solids (TSS).2. Estimation of brix: acid ratio.3. Preparation of pickles.4. Preparation of tomato paste.5. Preparation of tomato ketchup and sauce.6. Preparation of Jam and marmalades.7. Preparation of Jelly.8. Cut out analysis of canned food products.9. Preparation of fruit preserve from Amla, Apple and carrot.10. Preparation of Mango Leather.11. Determination of dehydration and rehydration ratio of dehydrated vegetables.12. Preparation of candied peels, glazed fruits and reformed fruits.13. Visit to fruits and vegetable processing industry.		

FOOD MICROBIOLOGY AND FOOD SAFETY LAB-VI

Subject Code: BFOTS1-306

L T P C

Duration: 30 (Hrs.)

0 0 4 2

Course Objectives:

1. To make students familiar about different equipments used for sterilization and disinfection.
2. To provide practical exposure about microbiological examination of different food products.
3. To provide knowledge about manufacturing of food products using desirable micro-organisms.
4. To teach students about isolation techniques of fungi.

Course Outcomes:

1. Students become aware about the techniques of sterilisation and disinfection.
2. Students learn to implement their knowledge in examining micro-flora of different food products
3. Students come out with a strong practical handling in manufacturing of different products using micro-organisms.
4. Students become familiar with different isolation techniques.

Practicals:

1. Sterilization and disinfection of equipment used in food microbiology laboratory.
2. Study of different types of microorganism colony shapes on agar plates.
3. Effect of extrinsic factors on growth of micro-organisms.
4. Effect of preservation methods on microbial load of different food samples.
5. Detection of food borne pathogens in a given food sample.
6. Isolation of fungi from food materials.
7. Study of incubation test of heated canned foods.
8. Study of Dye reduction test of milk.
9. Microbiological analysis of egg, cereal product and fruit product.
10. Spawn preparation of different mushrooms.
11. Production of red and white wine.
12. Production of vinegar.
13. Effect of sanitizers on microbial load.

ENTREPRENEURSHIP DEVELOPMENT		
Subject Code: BFOTD1-311	L T P C 3 0 0 3	Duration: 45 (Hrs.)
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To provide basic knowledge about relation of food and business. 2. To make the students aware about the business strategies with some case studies. 3. To make students familiar with techniques used in management of food business. 4. To enrich their knowledge to an extent to become a successful entrepreneur. <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Students acquire the basic knowledge of food business. 2. Students understand the concept of SWOT analysis. 3. Students become familiar with different skills of managing an enterprise. 4. Students acquire the knowledge of writing project report. 		
UNIT-I (9 Hours)		
<p>Entrepreneur, Entrepreneurship and Enterprise: Concept and role in development, characteristics of entrepreneurs, developing entrepreneurial competencies, types of enterprise and ownership, charms of becoming an entrepreneur, reinforcing entrepreneurial motivation and competencies.</p>		
UNIT-II (12 Hours)		
<p>Entrepreneurial development Case studies of successful entrepreneurs. Exercises on ways of sensing opportunities – sources of idea, creating efforts, SWOT analysis. Entrepreneurial skill assessment test. Techniques of development of entrepreneurial skills, positive self-image and locus of control</p>		
UNIT-III (12 Hours)		
<p>Food business management Case studies of Food processing business and its aspects. Business opportunity identification and assessment techniques. Business idea generation and evaluation exercise. Market assessment study and analysis of competitive situation.</p>		
UNIT-IV (12 Hours)		
<p>SWOT Analysis for business and for competitors. Preparation of business plan. Preparation of project report. Methods of arrangement of inputs–finance and material.</p>		
Recommended Text Books / Reference Books:		
<ol style="list-style-type: none"> 1. Vasant Desai, Fundamentals of Entrepreneurship and Small Business Management, Himalya Publishing House Pvt. Ltd., Mumbai, 2012. 2. Vasant Desai, The Dynamics of Entrepreneurial Development and Management, Himalya Publishing House Pvt. Ltd., Mumbai, 2011. 3. D. David and S Erickson, Principles of Agri Business Management, Mc Graw Hill Book Co., New Delhi, 1987. 4. Acharya S S and Agarwal N L, Agricultural Marketing in India, Oxford & ISH Publishing Co., New Delhi, 1987. 5. David H. Holt, Entrepreneurship – Anew Venture Creation, Prentice Hall of India, New Delhi, 2002. 6. Phill Kottler, Marketing Management, Prentice Hall of India Private Limited, New Delhi, 1994. 7. Chandra, Prasanna, Projects, Planning, Analysis, Selection, Implementation and Review, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1996. 		

FOOD FERMENTATION TECHNOLOGY		
Subject Code: BFOTD1-312	L T P C	Duration: 45 (Hrs.)
	3 0 0 3	
Course Objectives: <ol style="list-style-type: none"> 1. To familiarise students with fermentation technology. 2. To acquaint them about use of fermenters and fermentation technology in production of different food products. 3. To enlighten their knowledge about use of microbes in fermentation technology. 4. To make them understand the production of fermented products at industrial scale. 		
Course Outcomes: <ol style="list-style-type: none"> 1. Students understand the importance of fermentation technology in food. 2. Students acquire knowledge of different types of fermenters used in food industry. 3. Students learn manufacturing of valuable fermented products from cheap raw material. 		
UNIT-I (10 Hours)		
Introduction to fermentation technology, Principles of food fermentation, Types of fermentation (Continuous fermentation, Batch fermentation, Submerged fermentation and solid state fermentation), Microbial culture selection for fermentation.		
UNIT-II (11 Hours)		
Study of a Bio fermenter – its design and operation, Down Stream Processing and Product recovery. Raw material availability, quality, processes and pre-treatments of raw materials. Major alcoholic raw materials.		
UNIT-III (12 Hours)		
Starter cultures, Types of starters used in Food Industry. Fermented foods: methods of manufacture for vinegar, sauerkraut, Yoghurt, soya sauce, wine and traditional Indian foods, Fermented milk and products such as cheese, Fermented pickles.		
UNIT-IV (12 Hours)		
Production of organic acids (citric acid, lactic acid, gluconic acid and acetic acid), production of vitamins (Vitamin B2) and yeast (SCP).		
Recommended Text Books / Reference Books:		
<ol style="list-style-type: none"> 1. Adams M & Moss, M., Food Microbiology. 2nd Edition, RSC Publishing, 2008. 2. Joshi V. K. & Pandey, A., Biotechnology: Food Fermentation Microbiology, Biochemistry and Technology. Volume 2, Sanjanya Books, 1999. 3. John Garbutt, Essentials of Food Microbiology, Arnold International Students, 1997. 4. Brian J. Wood. Elsevier, Microbiology of Fermented Foods. Volume II and I, Applied Science Publication, 1997. 5. Stanbury, P.F., Whitekar A. and Hall, Principles of Fermentation Technology, Pergaman. McNeul and Harvey. (AC) NEW, 1995. 		

FOOD ADDITIVES		
Subject Code: BFOTD1-313	L T P C	Duration: 45 (Hrs.)
	3 0 0 3	
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To aware students about different food additives. 2. To acquaint them about use of additives in different food products. 3. To enhance their knowledge about recent advances in food additives. 4. To aware students about principles of chemical preservation. <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Students understand the importance of additives in food. 2. Students acquire knowledge of different additives and their importance. 3. Students become familiar about recent advances in food additives. 4. Students understand the principles of chemical preservation. 		
UNIT-I (10 Hours)		
Introduction to food additives: General Classification, types (On basis of their origin, natural and synthetic), uses, functions, legal aspects, risks and benefits		
UNIT-II (11 Hours)		
Preservatives: Antimicrobial agents, antioxidants and anti-browning agents (Types, mode of action and their applications in different food products) Flavouring agents: Flavours (Natural and artificial), flavour enhancers, flavour stabilisation and flavour encapsulation.		
UNIT-III (12 Hours)		
Sweeteners: Natural and artificial sweeteners, Nutritive and non-nutritive sweeteners, properties and uses of saccharin, aspartame, acesulfame-K, corn sweeteners, invert sugar and sugar alcohols. Emulsifiers: Types, selection of emulsifier, emulsion stability, functions and mechanism of action. Stabilizers: Types, uses and functions		
UNIT-IV (12 Hours)		
Food Spices and condiments: Types and uses of spices and condiments, Chemical composition, Extraction and processing of Indian spices like pepper, cinnamon, cardamom, clove, ginger, turmeric, fenugreek and fennel, Seasonings and condiment blends. Food Colors: Introduction, natural (biocolors) and synthetic food colors.		
<p>Recommended Books</p> <ol style="list-style-type: none"> 1. A.L. Branen, 'Food Additives', Marcel Dekker Inc., New York, U.S.A. 2. J.W. Purseglove 'Spices' Longman Publishers, London, England. 3. D.R. Tainter and A.T. Grenis, 'Spices and Seasonings- A Food Technology Handbook', VCH Publishers, Inc., Hoboken, U.S.A. 4. J. Merory, 'Food Flavorings, Composition, Manufacture and Use', AVI Publishing Inc., Westport, U.S.A. 5. K.T. Farrell 'Spices, Condiments and Seasonings', Springer, U.S.A. 		

DRUG ABUSE		
Subject Code: BMNCC0-004	L T P C	Duration: 30 (Hrs.)
	2 0 0 0	
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To make students understand the concept of drug abuse and their impact on public health. 2. To make students understand the types of drugs. 3. To make them aware of the impact of drugs addiction on families and peers. 4. To make students understand the management and prevention of drug abuse. <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Students gain knowledge about detrimental impacts of drug on health and relations. 2. Students become aware about the physiological and sociological causes of drug abuse. 3. Students acquire knowledge about types of drugs. 4. Students acquire knowledge about management and prevention of drug abuse. 		
UNIT-I (10 Hours)		
<p>Problem of Drug Abuse: Concept and Overview; Types of Drug Often Abused</p> <p>Concept and Overview What are drugs and what constitutes Drug Abuse? Prevalence of menace of Drug Abuse How drug Abuse is different from Drug Dependence and Drug Addiction? Physical and psychological dependence- concepts of drug tolerance</p> <p>Introduction to drugs of abuse: Short Term, Long term effects & withdrawal symptoms Stimulants: Amphetamines, Cocaine, Nicotine Depressants: Alcohol, Barbiturates- Nembutal, Seconal, Phenobarbital Benzodiazepines – Diazepam, Alprazolam, Flunitrazepam Narcotics: Opium, morphine, heroin Hallucinogens: Cannabis & derivatives (marijuana, hashish, hash oil), Steroids and inhalants</p>		
UNIT-II (8 Hours)		
<p>Nature of the Problem Vulnerable Age Groups Signs and symptoms of Drug Abuse (a)- Physical indicators (b)- Academic indicators (c)- Behavioural and Psychological indicators</p>		
UNIT-III (6 Hours)		
<p>Causes and Consequences of Drug Abuse</p> <p>Causes Physiological Psychological Sociological</p> <p>Consequences of Drug Abuse For individuals For families For society & Nation</p>		

UNIT-IV (6 Hours)

Management & Prevention of Drug Abuse

Management of Drug Abuse

Prevention of Drug Abuse

Role of Family, School, Media, Legislation & Deaddiction Centres

Recommended Text Books / Reference Books:

1. Kapoor. T., Drug Epidemic among Indian Youth, Mittal Pub, New Delhi, 1985.
2. Modi, Ishwar and Modi, Shalini, Drugs: Addiction and Prevention, Rawat Publication, Jaipur, 1997.
3. Ahuja, Ram, Social Problems in India, Rawat Publications, Jaipur, 2003.
4. National Household Survey of Alcohol and Drug Abuse. New Delhi, Clinical Epidemiological Unit, All India Institute of Medical Sciences, 2004.
5. World Drug Report , United Nations Office of Drug and Crime,2011
6. World Drug Report, United nations Office of Drug and Crime, 2010.
7. Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004.
8. The Narcotic Drugs and Psychotropic Substances Act, 1985, New Delhi: Universal, 2012.

SEMESTER IV

TECHNOLOGY OF CEREALS, PULSES AND OILSEEDS			
Subject Code: BFOTS1-401	L T P C	Duration: 60 (Hrs.)	
	3 1 0 4		
Course Objectives:			
<ol style="list-style-type: none"> 1. To explain structure and composition of different cereal grains and pulses. 2. To illustrate different methods of milling and their technology. 3. To impart knowledge about manufacturing of different products and by-products from different cereal grains, pulses and oilseeds. 			
Course Outcomes:			
<ol style="list-style-type: none"> 1. Students gain knowledge of structure and composition of cereal grains and pulses. 2. Students understand different machinery used in milling of cereal and pulses. 3. Students acquire knowledge of utilisation of cereal grains, pulses and oilseeds for making of different products and by-products. 			
UNIT-I (15 Hours)			
Wheat-Structure and chemical composition of wheat grain, Types, milling, flour grade, flour treatments (bleaching, maturing), flour for various purposes, bread, biscuit, cake manufacturing.			
UNIT-II (15 Hours)			
Rice – Structure and chemical composition of rice grain, physicochemical properties, milling, parboiling of rice, changes during parboiling, Advantages and disadvantages of parboiling, ageing of rice			
UNIT-III (15 Hours)			
Corn – Milling (wet & dry), cornflakes, corn starch and corn sweeteners. Barley- Milling, Malting of barley: steeping, Germination and drying. Sorghum and millets – Milling and uses.			
UNIT-IV (15 Hours)			
Milling of pulses: Dry milling, wet milling, improved milling methods Technology of oil seeds Extraction of oil and refining. Preparation of defatted flour, protein concentrates, isolates, Uses.			
Recommended Text Books / Reference Books:			
<ol style="list-style-type: none"> 1. Kent, N.L., Technology of Cereal, 5th Ed., Pergamon Press, 2003. 2. Chakraverty, Post Harvest Technology of Cereals, Pulses and Oilseeds, revised Ed., Oxford & IBH Publishing Co. Pvt Ltd., 1988. 3. Marshall, Rice Science and Technology, Wadsworth, New York, 1994. 4. Manay, S. and Sharaswamy, M., Food Facts and Principles, Wiley Eastern Limited, 1994. 			

EGG, POULTRY AND MEAT TECHNOLOGY		
Subject Code: BFOTS1-402	L T P C	Duration: 60 (Hrs.)
	3 1 0 4	
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To understand the status and scope of egg, meat and poultry industry. 2. To make students understand structure and quality characteristics of egg and meat. 3. To make students understand the processing of poultry and meat products. 4. To understand the value addition of egg, poultry and meat. <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Students gain knowledge about structural, compositional and nutritional quality of egg, poultry and meat. 2. Students learn about storage and processing of various animal products. 3. Students understand the importance of egg, meat and poultry industry. 4. Students acquire knowledge of by-product utilization of poultry and meat. 		
UNIT-I (15 Hours)		
<p>Egg: Structure and composition, Nutritive value and functional properties. Quality of egg: Interior quality evaluation, candling, grading, handling, packaging, storage, transportation. Egg powder. Liquid egg preservation. Packaging and transportation of eggs.</p>		
UNIT-II (15 Hours)		
<p>Poultry: Types, chemical and nutritive value of poultry meat. Poultry dressing and slaughtering methods. Preservation, grading and packaging of poultry meat.</p>		
UNIT-III (15 Hours)		
<p>Status and scope of meat industry in India. Ante-mortem and post-mortem examination of meat animal, their slaughtering and dressing. Structure and physico-chemical properties of muscle. Post-mortem changes in meat. Ageing of meat, meat tenderization-natural and artificial methods. Quality Parameters: Meat color, water holding capacity, Marbling, Firmness and factors affecting it.</p>		
UNIT-IV (15 Hours)		
<p>Restructured meat products, meat analogs. Preservation and spoilage of meat. Meat industry by products: Importance and utilization.</p>		
Recommended Text Books / Reference Books:		
<ol style="list-style-type: none"> 1. Lawrie R A, Lawrie's, Meat Science, 5th Ed, Woodhead Publisher, England, 1998. 2. Parkhurst & Mountney, Poultry Meat and Egg Production, CBS Publication, New Delhi, 1997. 3. Pearson & Gillet Processed Meats, 3rd Ed, CBS Publication, New Delhi, 1997. 4. Shai Barbut, Poultry Products Processing, CRC Press, 2005. 5. Stadelman WJ, Owen J Cotterill Egg Science and Technology, 4th Ed. CBS Publication New Delhi, 2002. 6. Romans. JR and Costillo WJ, Carlson WC, Greaser, ML and Jones KW, The Meat we eat, Interstate Publishers, USA, 2004. 		

FOOD PLANT HYGIENE AND SANITATION		
Subject Code: BFOTS1-403	L T P C	Duration: 60 (Hrs.)
	3 1 0 4	
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To understand the importance of personal and industrial hygiene. 2. To learn about the science behind cleaning and sanitization. 3. To make students aware of efficient ways of food industry waste disposal. 4. To understand the importance of by-product utilization. <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Students acquire knowledge of personal hygiene and food industry sanitation. 2. Students acquire knowledge of various cleaning, sterilizing and disinfection agents. 3. Students become familiarize to various techniques of waste disposal. 4. Students can implement their knowledge to the effective utilization of by-products. 		
UNIT-I (15 Hours)		
<p>Introduction: Importance of personal hygiene of food handler-habits, clothes, illness, education of handler in Handling and service.</p>		
UNIT-II (15 Hours)		
<p>Industrial Hygiene: Cleaning methods – sterilization, disinfection, heat & chemicals, chemical tests for sanitizer strength. Cleaning agents and disinfectants. Food sanitation-Principles & methods, control, inspection. Sanitation in fruits & vegetables industry, cereals industry, dairy industry, meat, egg & poultry units.</p>		
UNIT-III (15 Hours)		
<p>Waste disposal, Control methods using physical and chemical agents, Pest and rodent control, ETP design and layout. Food storage sanitation, transport sanitation and water sanitation.</p>		
UNIT-IV (15 Hours)		
<p>By-products utilization obtained from dairy plant, egg & poultry processing industry and meat industry. Wastewater and solid waste treatment: Waste-types-solid and liquid waste characterization, physical, chemical, biological, aerobic, anaerobic, primary, secondary and tertiary (advanced) treatments.</p>		
<p>Recommended Text Books / Reference Books:</p> <ol style="list-style-type: none"> 1. Norman G. Marriott and Robert B. Gravani, Principles of Food Sanitation, 5th edition, 2006. 1. Rao, D. G., Fundamentals of Food Engineering, PHI learning Private Ltd., 2010. 2. Fellows P., Food Processing Technology, 2nd Edition. Woodhead Publishing Limited and CRC Press LLC, 2000. 3. James A, The supply chain handbook, distribution group, 2013. 4. FAO, US, Design and operations of cold store in developing, 1984. 		

TECHNOLOGY OF CEREALS, PULSES AND OILSEEDS LAB-VII

Subject Code: BFOTS1-404

L T P C

Duration: 30 (Hrs.)

0 0 4 2

Course Objectives:

1. To learn the techniques to assess the quality of cereal grains.
2. To gain experimental knowledge about different processing techniques.
3. To determine various chemical tests of flour.
4. To learn manufacturing methods of various processed products.

Course Outcomes:

1. Students have a better understanding of the methods of quality assessment of cereals, legumes and oilseeds.
2. Students become aware of the role of chemical properties and their analysis.
3. Students learn manufacturing of various processed products from cereals and legumes.
4. Students become familiar with environment of cereal based industry.

Practicals:

1. Physical characteristics of cereal grains.
2. Proximate analysis of wheat flour (moisture, ash, fat, protein and crude fiber content).
3. Estimation of gluten content of flour.
4. Estimation of Polenske value of flour.
5. Estimation of alkaline water retention capacity of flour.
6. Determination of sedimentation value of flour
7. Cooking characteristics of rice.
8. Experimental parboiling of rice by different methods.
9. Determination of soaking and hydration capacity of pulses.
10. Preparation of full fat and defatted soya flour.
11. Extraction of oil from groundnuts.
12. Determination of saponification value.
13. Detection of adulteration of cotton seed oil and ground nut oil.
14. Visit to cereal and oilseed processing industry.

EGG, POULTRY AND MEAT TECHNOLOGY LAB-VIII

Subject Code: BFOTS1-405

L T P C

Duration: 30 (Hrs.)

0 0 4 2

Course Objectives:

1. To check the quality parameters of egg and meat.
2. To improve practical handling during slaughtering and dressing.
3. To learn various preservation techniques of egg and meat.
4. To familiarise students with meat industry environment.

Course Outcomes:

1. Students learn to check the quality parameters of egg and meat.
2. Students learn the skills of slaughtering and dressing of poultry.
3. Students become aware of processing and preservation of egg, poultry and meat products.
4. Students become familiar with environment of meat industry.

Practicals:

- 1) Determination of moisture and ash contents of egg components.
- 2) Determination of percentage of various egg constituents
- 3) Grading and Quality evaluation of eggs.
- 4) Preservation of shell eggs by various methods.
- 5) Candling of eggs.
- 6) Determination of time temperature condition on formation of iron sulphide in egg.
- 7) Preparation of egg products: boiled, fried, poached, scrambled, poached.
- 8) Preparation of egg pickle
- 9) Slaughtering and dressing of poultry.
- 10) Post mortem examination of poultry meat and identifying different parts of poultry.
- 11) Preservation of meat by pickling method.
- 12) Preparation of different meat products.
- 13) Evaluation of meat quality.
- 14) Visit to poultry and meat industry.

FOOD PLANT HYGIENE AND SANITATION LAB-IX

Subject Code: BFOTS1-406

L T P C

Duration: 30 (Hrs.)

0 0 4 2

Course Objectives:

1. To understand different techniques used for sterilization of equipments.
2. To gain the knowledge of quality parameters of water used in food industry.
3. To make them aware of microbial load in food industry and their determination methods.

Course Outcomes:

1. Students can transform theoretical knowledge to practical platforms.
2. Students become aware of different types of microbial load of food industry.
3. Students acquire the knowledge of water quality and analysis.
4. Students gain the knowledge of various sterilizing agents used in food industries.

Practicals:

1. Sterilization of equipments used in the laboratory by using heat and chemicals.
2. Determination of B.O.D
3. Determination of C.O.D
4. Determination of sanitary status of plant equipment.
5. Measurement of Chlorine content in water.
6. Measurement of hardness of water.
7. Measurement of quality parameters and chemical analysis of water.
8. Determination of microbial load of air.
9. Determination of microbial load of workplace.
10. Determination of microbial load of equipments using swab test.

NUTRACEUTICAL AND FUNCTIONAL FOODS

Subject Code: BFOTD1-411	L T P C	Duration: 60 (Hrs.)
	4 0 0 4	

Course Objectives:

1. To make the students understand the concept of nutraceuticals and functional foods.
2. To make them familiarize to the world of dietary fibre and probiotics.
3. To make different functional foods with health beneficial properties.
4. To make them aware of health benefits of fermented products.

Course Outcomes:

1. Students gain the knowledge of nutraceuticals and functional foods.
2. Students are aware of different types of compounds responsible for health benefits.
3. Students become familiar to the role of dietary fibre and probiotics for intestinal health.
4. Students can foresee the future prospects of nutraceuticals and functional foods.

UNIT-I (15 Hours)

Introduction

Background, definitions, difference between nutraceuticals and functional foods, types of nutraceutical compounds and their health benefits, current scenario.

UNIT-II (15 Hours)

Nutraceuticals

Types of nutraceutical compounds – Phytochemicals, phytosterols and other bioactive compounds, peptides and proteins, carbohydrates (dietary fibers, oligosaccharides and resistant starch). Prebiotics, probiotics and synbiotics.
Lipids (Conjugated Linoleic Acid, omega-3 fatty acids, fat replacers), vitamins and minerals; their sources and role in promoting human health.

UNIT-III (15 Hours)

Functional Foods

Cereal and cereal products, milk and milk products, egg, oils, meat and products, sea foods, nuts and oilseeds, functional fruits and vegetables, herbs and spices, beverages (tea, wine etc)

UNIT-IV (15 Hours)

Fermented foods – their health benefits and role in conditions like cardiovascular diseases, hypertension, diabetes etc. Future prospects of functional foods and nutraceuticals and their potential for use in improving health.

Recommended Text Books / Reference Books:

1. Wildman REC, Handbook of Nutraceutical and Functional Foods, CRC Press, 2001.
2. Ghosh D et al, Innovations in Healthy and Functional Foods, CRC Press, 2012.
3. Pathak YV, Handbook of nutraceuticals Volume 2, CRC Press, 2011.

NUTRACEUTICAL AND FUNCTIONAL FOODS LAB-X

Subject Code: BFOTD1-412

L T P C

Duration: 30 (Hrs.)

0 0 4 2

Course Objectives:

1. To make students learn about identification of nutraceuticals and functional foods.
2. To make them aware of estimation techniques of different components present in food.
3. To make them learn about preparation and evaluation of probiotics.
4. To make them aware of development of functional foods.

Course Outcomes:

1. Students gain knowledge about various nutraceuticals and functional foods.
2. They become aware of analysis of compounds responsible for imparting nutraceutical properties to the food product.
3. They become familiarize with the approach behind development of nutraceuticals and functional foods.
4. Students are able to formulate various nutraceutical and functional foods.

Practicals:

1. Identification of various nutraceuticals and functional foods available in the market
2. Estimation of chlorophyll content of green vegetable
3. Determination of lycopene in fruit/vegetable
4. Determination of total pectin in plant material
5. Estimation of crude fibre/dietary fibre content in cereals and their products
6. Estimation of anthocyanins in food sample
7. Determination of Vitamin C content of sample
8. Preparation and evaluation of probiotic/prebiotic foods
9. Determination of antioxidant activity in food.
10. Determination of total phenolic content in foods
11. Determination of total flavonoids content in foods
12. Development of functional foods.

BAKERY TECHNOLOGY		
Subject Code: BFOTD1-413	L T P C	Duration: 60 (Hrs.)
	4 0 0 4	
<p>Course Objectives:</p> <ol style="list-style-type: none"> 1. To make them aware of status and importance of bakery industry in India. 2. To make them familiarize with different categories of bakery products. 3. To make them learn about the ingredients and manufacturing process of various bakery products. 4. To make them aware of development of modified bakery products. <p>Course Outcomes:</p> <ol style="list-style-type: none"> 1. Students are familiarized with scenario of bakery industry in the country. 2. Students gain knowledge regarding formulation of different bakery products. 3. Students learnt about formulation of bakery products with special needs. 4. Students attain better understanding of breakfast cereals and their processing. 		
UNIT-I (15 Hours)		
<p>Bakery industry Current status, growth rate, and economic importance of Bakery Industry in India. Product types, nutritional quality.</p>		
UNIT-III (15 Hours)		
<p>Bread: Ingredients, bread making process, faults and corrective measures Cakes: Ingredients, cake making process, different types of icings.</p>		
UNIT-III (15 Hours)		
<p>Biscuits, cookies & crackers Technology of biscuit, cookies and cracker manufacturing. Baking powders as leavening agents in bakery industry.</p> <p>Modified bakery products Modification of bakery products for people with special nutritional requirements e.g. high fiber, low sugar, low fat, gluten free bakery products.</p>		
UNIT-IV (15 Hours)		
<p>Breakfast cereals, macaroni products and malt Production and quality of breakfast cereals, macaroni products and malt.</p>		
<p>Recommended Text Books / Reference Books:</p> <ol style="list-style-type: none"> 1. Dubey, S.C., Basic Baking 5th Ed., Chanakya Mudrak Pvt. Ltd., 2007. 2. Raina et.al., Basic Food Preparation-A complete Manual. 3rd Ed., Orient Longman Pvt. Ltd., 2003. 3. Manay, S. & Shadaksharaswami, M., Foods: Facts and Principles, New Age Publishers, 2004. 4. Barndt R. L., Fat & Calorie – Modified Bakery Products, Springer US, 1993. 5. Samuel A. Matz, Bakery Technology and Engineering, PAN-TECH International Incorporated, 1999. 6. Faridi Faubion , Dough Rheology and Baked Product Texture, CBS Publications, 1997. 7. Samuel A. Matz, Cookies & Cracker Technology, Van Nostrand Reinhold, 1992. 		

BAKERY TECHNOLOGY LAB-XI		
Subject Code: BFOTD1-414	L T P C	Duration: 30 (Hrs.)
	0 0 4 2	
Course Objectives: <ol style="list-style-type: none">1. To make the students learn about preparation of different bakery products on laboratory scale.2. To make them aware of quality parameters to assess bakery products.3. To make them familiarize to the sensory evaluation of different bakery products.4. To make students familiarize about various bakery industry operations.		
Course Outcomes: <ol style="list-style-type: none">1. Students are able to implement their theoretical knowledge to practical platform.2. Students can judge the quality of different bakery products efficiently.3. Students are able to formulate novel bakery products with special nutritional attributes.4. Students become familiarize with various bakery industry operations.		
Practicals: <ol style="list-style-type: none">1. Preparation of bread and assessment of its quality2. Estimation of fermentation power of yeast.3. Preparation of buns and assessment of quality4. Preparation of cake and assessment of its quality.5. Icing of cake.6. Preparation of cookies and assessment of quality.7. Preparation of biscuits and assessment of quality.8. Sensory evaluation of bakery products.9. Preparation of gluten free biscuits from pseudo cereals.10. Preparation of low calorie biscuits and cakes.11. Preparation of high fiber biscuits and cakes.12. Preparation of pasta and evaluation of its quality.13. Visit to local bakery.		