काशी हिन्दू विश्वविद्यालय

BANARAS HINDU UNIVERSITY

B.VOC. DEGREE PROGRAMME

IN

FOOD PROCESSING & MANAGEMENT

REGULATION, SCHEME AND SYLLABUS

(2019-20 ADMISSION ONWARDS)

B. Voc. FOOD PROCESSING AND MANAGEMENT

Food processing involves a combination of procedures to achieve the intend changes to the raw materials. These are conveniently categorized as unit operations, each of which has a specific, identifiable and predictable effect on a food. Unit operations are grouped together to form a process. The combination and sequence of operations determines the nature of the final product.

Food technologists, technicians, bio technologists and engineers are required in this industry for the practical application of the principles of many disciplines of science in the manufacturing or production, preservation and packaging, processing and canning of various food products.

1. Graduate Attributes

Job Roles proposed to be covered in each year (Along with NSQF level)

Semester /Year	NSQF Level
First semester	**Level 4** **1. Baking Technician / Operative: Reference ID: FIC/Q5005** A baking technician/ operative is responsible for baking of products, maintaining their consistency and quality, while meeting defines SOPs and leveraging his/ her skill to operate ovens in synchronization with proof box/ rest of the plant or unit. **2. Plant biscuit production specialist : Reference ID: FIC/Q5005** A plant biscuit production specialist produces biscuits in industrial units as per defines SOPs in synchronization with rest of the plant/ unit by weighing, mixing, kneading, rolling, sheeting, cutting, moulding, baking, cooling etc. either manually or using machineries following the defines SOPs of the plant/ unit. **3. Craft baker: Reference ID: FIC/ Q5002** A craft baker produces baked products (breads, puffs, cookies, cakes/ pastries, desserts, specialty baked products etc.) in artisan bakeries and patisseries by measuring raw materials and ingredients, mixing, kneading, fermenting, shaping and baking in order to achieve the desired quality and quantity of products. **4. Plant baker: Reference ID: FIC/ Q5001** A plant baker produces or supervises the production of baked products (breads, biscuits, cakes etc.) in industrial unit by weighing, mixing, kneading, fermenting, shaping, rolling, sheeting, cutting, moulding, baking, cooling etc. using various industrial equipments. **5. Mixing technician: Reference ID: FIC/ Q5004** A mixing technician prepares different types of dough used in baking baked products by using various methods such as weighing, mixing, kneading, fermenting following the defined Sops of the plant or unit while maintaining food safety and hygiene in the work environment.

Semester /Year	NSQF Level
Second Semester	**<u>Level 5</u>** **1. Dairy Products Processor: Reference ID : FIC/ Q2001** A dairy products processor is responsible for processing milk to produce various types of dairy products. He / she is responsible for carrying out processes such as homogenizing, pasteurizing, cooling, mixing, curdling, foaming, cutting churning, fermenting, freezing, condensing, drying and flavouring of milk. **2. Dairy Processing Equipment Operator: Reference ID : FIC/ Q2002** A dairy processing equipment operator is responsible for operating various types of dairy processing machineries for producing dairy products such as filters, separators, homogenizers, pasteurizers, chiller, churner, clarifier, freezer to filter, separate, homogenize, pasteurize, cool, churn, clarify and freeze milk. **3. Ice Cream Processing Technician: Reference ID: FIC/Q2004** A Ice Cream Processing Technician is responsible for producing ice cream by operating various ice cream processing machineries. He or she is responsible for homogenizing, pasteurizing, freezing, cutting, hardening, storing, filling and packing following the specifications and standards of the organization. **4. Butter and Ghee processing operator: Reference ID: FIC/Q2004** A Butter and Ghee processing operator is responsible for operating various dairy processing machineries (filter, separator, pasteurizer etc.) to produce butter and ghee following specifications and standards of the organizations. **5. Food Products Packaging Technician: Reference ID: FIC/Q7001** A Food Products Packaging Technician performs various packaging functions and handles all categories of packaging such as primary, secondary and tertiary packaging for food products.

Semester /Year	NSQF Level
Second Year	**Level 6** **1. Fish and Sea food Processing Technician : Reference ID: FIC/ Q4001** A fish and seafood processing technician is responsible for processing fish and sea foods to achieve quality and quantity of products along with maintain food safety and hygiene in work environment. ‘ ;[P’ **2. Grain Mill Operator : Reference ID: FIC/Q1003** A grain mill operator carries out processes such as cleaning, de-stoning, hulling, polishing and grinding to produce milled grains and flour(s). **3. Chief Miller : Reference ID: FIC/Q1001** A chief miller manages a milling process for all types of grains overseeing activities such as handling of various milling machineries, maintenance of process parameters, inspection of raw materials and finished goods to achieve the desired quality and quality of products. **4. Pulse Processing Technician : Reference ID: FIC/Q1004** A pulse processing Technician is responsible for milling various types of pulses (Red gram, black gram, Bengal gram, green gram, green peas etc.) through processes such as cleaning, destining, conditioning, dehusking, splitting, sorting, polishing, grinding.

Semester /Year	NSQF Level
Third Year	**Level 7** **1. Fruit and vegetable selection in -charge : Reference ID: FIC/Q0108** A fruit and vegetable selection in-charge is responsible for sorting and grading produce such as fruits, vegetables, nuts etc. based on their colour, sixe, appearance, feel and smell. **2. Jam/Jelly/ Ketchup Processing Technician : Reference ID: FIC/Q0103** A jam, jelly, ketchup operating technician is responsible for processing fruits and vegetables to make jam/ jelly and ketchup by receiving, checking raw material quality, sorting, pulping, pasteurizing, cooking, juice extracting, clarifying, filtering, sampling for quality analysis, cooling, packing and storing. **3. Fruit ripening Technician : Reference ID: FIC/Q0104** A fruit ripening technician is responsible for ripening of all types of fruits in the ripening chamber and maintaining cleanliness, hygiene and safety of the fruit and ripening chamber. **4. Pickle making Technician : Reference ID: FIC/Q0102** A pickle making technician is responsible for preparation of all types of pickles from various fruits and vegetables through the process of washing, peeling, cutting, slicing, curing, brining, blending, filling, oil topping, packing and storage. **5. Fruit Pulp Processing Technician: Reference ID: FIC/Q0106** A Fruit Pulp Processing Technician is responsible for pulping/ producing fruit pulp through the process of receiving, ripening, checking raw material quality, sorting, washing, cutting/ slicing, deseeding/ destining, pulping, pre- cooking, sterilizing, aseptic packaging or canning, sampling for quality analysis and sorting. **6. Assistant Lab Technician – Food and Agricultural Commodities: Reference ID: FIC/Q7006** An Assistant Lab Technician – Food and Agricultural Commodities is responsible for ensuring quality products through sampling of raw materials, packaging material, finished products and shelf life samples for quantitative and qualitative analysis.

Scheme of Courses

Scheme of distribution of credits for courses

Sl. No.	Courses	No. of Papers	Credits
1.	General Education Components (+ English)	18	72
2.	Skill Components	22	93
3.	Project	1	10
4.	Internship	5	5
Total		**46**	**180**

Detailed Distribution of Courses
Semester I

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 101	Bakery and Confectionery Technology	**5**	5	70	30
2.	B.VFPM 102	Bakery and Confectionery Technology (Practical)	**2**	2	100	-
3.	B.VFPM 103	Principles of Food Preservation	**5**	5	70	30
4.	B.VFPM 104	Food Chemistry	**5**	5	70	30
5.	B.VFPM 105	Communication skills in English	**4**	4	70	30
6.	B.VFPM 106	Food Science and Nutrition I	**4**	4	70	30
7.	B.VFPM 107	Entrepreneurship Development and Project Management	**4**	4	70	30
8.	B.VFPM 108	Internship	**-**	1	100	-
		TOTAL	**29**	**30**		

Semester-II

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 201	Dairy Technology	**5**	5	70	30
2.	B.VFPM 202	Dairy Technology (Practical)	**2**	2	100	-
3.	B.VFPM 203	Packaging Technology	**5**	5	70	30
4.	B.VFPM 204	Sanitation and hygiene	**5**	5	70	30
5.	B.VFPM 205	Letter Writing and Presentation Skills	4	4	70	30
6.	B.VFPM 206	Food Science and Nutrition II	4	4	70	30
7.	B.VFPM 207	Business Communication	4	4	70	30
8.	B.VFPM 208	Internship	**-**	1	100	-
		TOTAL	**29**	**30**		

SEMESTER – III

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 301	Processing of Fish, Meat and Egg products.	**5**	5	70	30
2.	B.VFPM 302	Processing of plantation crop and Spices	**5**	5	70	30
3.	B.VFPM 303	Fermented Foods	**5**	5	70	30
4.	B.VFPM 304	Chemical and microbial analysis of food (Practical)	**2**	2	100	-
5.	B.VFPM 305	Food Microbiology	**4**	4	70	30
6.	B.VFPM 306	Food additives and flavour technology	**4**	4	70	30
7.	B.VFPM 307	Business Management	**4**	4	70	30
8.	B.VFPM 308	Internship	**-**	1	100	-
		TOTAL	**29**	**30**		

SEMESTER – IV

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 401	Processing of Cereal, Pulses and Oilseeds	**5**	5	70	30
2.	B.VFPM 402	Processing of Cereal, Pulses and Oilseeds Technology (Practical)	**2**	2	100	-
3.	B.VFPM 403	Beverage Technology	**5**	5	70	30
4.	B.VFPM 404	Food Product design and Development	**5**	5	70	30
5.	B.VFPM 405	Food Plant designing	**4**	4	70	30
6.	B.VFPM 406	By product utilization and Waste Management	**4**	4	70	30
7.	B.VFPM 407	Marketing Management	**4**	4	70	30
8.	B.VFPM 408	Internship	**-**	1	100	-
		TOTAL	**29**	**30**		

SEMESTER – V

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 501	Processing of Fruit and Vegetable Processing	**5**	5	70	30
2.	B.VFPM 502	Processing of fruits and vegetable (Practical)	**2**	2	100	-
3.	B.VFPM 503	Engineering properties of foods	**5**	5	70	30
4.	B.VFPM 504	Sensory Evaluation of foods	**5**	5	70	30
5.	B.VFPM 505	Food Processing equipments	**4**	4	70	30
6.	B.VFPM 506	Computer applications	**4**	4	70	30
7.	B.VFPM 507	Product and brand Management	**4**	4	70	30
8.	B.VFPM 508	Internship	**-**	1	100	-
		TOTAL	**29**	**30**		

SEMESTER – VI

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 601	Unit Operations in Food Industry	**5**	5	70	30
2.	B.VFPM 602	Food Quality Assurance	**3**	3	70	30
3.	B.VFPM 603	Emerging Technologies in food industry	**4**	4	70	30
4.	B.VFPM 604	Food service management	**4**	4	70	30
5.	B.VFPM 605	Personality Development	**4**	4	70	30
6.	B.VFPM 606	Project and Viva-voce	**--**	10	100	-
		TOTAL	**20**	**30**		

Syllabi of Skill and General Courses

Detailed Distribution of Courses
Semester I

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 101	Bakery and Confectionery Technology	**5**	5	70	30
2.	B.VFPM 102	Bakery and Confectionery Technology (Practical)	**2**	2	100	-
3.	B.VFPM 103	Principles of Food Preservation	**5**	5	70	30
4.	B.VFPM 104	Food Chemistry	**5**	5	70	30
5.	B.VFPM 105	Communication skills in English	**4**	4	70	30
6.	B.VFPM 106	Food Science and Nutrition I	**4**	4	70	30
7.	B.VFPM 107	Entrepreneurship Development and Project Management	**4**	4	70	30
8.	B.VFPM 108	Internship	**-**	1	100	-
		TOTAL	**29**	**30**		

B.VFPM 101 – Bakery and Confectionery Technology
(SKILL COURSE - 01)
Semester I

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To impart basic and applied technology of baking and confectionary and acquaint with the manufacturing technology of bakery and confectionary products.

Course Overview and Context

- To highlight the processing methods used in baking and confectionery industries.
- To know about the various types of food products made using baking technology.
- To have a basic idea about baking and confectionery manufacture and quality control.
- To know about the importance of each ingredient in the bakery and how it effects the overall product and its sensory and quality parameters.
- To be able to start a small scale bakery and confectionery unit

Syllabus Content

Module I: Manufacture of Sugar

Sugarcane, jaggery, khandasari sugar, raw sugar, refined sugar, white sugar, beet sugar, manufacture of sugar from sugar cane, refining of sugar.

Module II: Classification of confectionery

Sugar boiled confectionery- crystalline and amorphous confectionery, rock candy, hard candy, lemon drop, china balls, soft candy, lollypop, marshmallows, fudge, cream, caramel, toffee, lozenges, gumdrops, honeycomb candy.

Module III: Properties of wheat Grain

Wheat – Properties, Quality – Hardness, Gluten strength, protein content, soundness. Methodology and approaches to evaluate wheat and wheat flour – quality, processing factors and product quality.

Module IV: Principles of baking and Bread manufacturing

Major baking ingredients and their functions, role of baking ingredients in improving the quality of bread. Characteristics of good flour used for making bread, biscuits and cakes. Ingredients used for bread manufacture, methods of mixing the ingredients, dough development methods - straight dough, sponge dough, moulding, proofing, baking, packing, spoilage of bread. Processing of cakes and biscuits- ingredients, development of batter, baking and packing, spoilage in cakes and biscuits.

Learning Resources

Reference books:

1. Zhou. W, Hui Y,H; (2014), "Bakery Products Science and Technology", 2nd Edition, Wiley Blackwell Publishers,
2. Pyler, E. J. and Gorton, L.A.(2009), "Baking Science & Technology" Vol.1 Fourth Edition,Sosland Publications.
3. Stanley P. Cauvain, Linda S. Young, (2008), "Baked Products: Science Technology and Practice". John Wiley & Sons Publishers.

B.VFPM 102 – Bakery and Confectionery Technology (Practical)

(SKILL COURSE - 04)

Semester I

Total Credits: 2

Total Laboratory Hours: 60 (3 Hours/ Week)

Aim of the course: To develop professional and practical knowledge in bakery and confectionary and make them competent as an entrepreneur.

Course Overview and Context

- To improve the culinary skills of the students
- To gain knowledge about the preparation of some basic food products
- To use the processes studied in food chemistry and food preservation papers to prepare different food products
- To understand how these can be utilized to start a small scale processing unit.
- It involves not only gaining knowledge on how to make a food product but also studies the principles behind them.
- It helps the students to gain not only theoretical but also practical knowledge

Syllabus Content

1. Preparation of ghee biscuits
2. Preparation of melting marvels
3. Preparation of sweet and salt biscuits
4. Preparation of bread
5. Preparation of pizza
6. Preparation of hot cross buns (sweet buns)
7. Preparation of jamnut cookies
8. Preparation of vanilla cake
9. Preparation of cake
10. Visit to production unit of a bakery

B.VFPM 103 – Principles of Food Preservation
(SKILL COURSE - 02)
Semester I

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To make students understand about the mechanism of spoilage and deterioration in foods, the basic food preservation principles, and methods to preserve foods.

Course Overview and Context

- To study the different ways in which food spoilage occurs and the techniques to prevent it.
- To know the different spoilage agents and the ways in which they act on food.
- To understand the principles behind the various methods of food preservation.
- To know how to use these principles to preserve different types of foods.
- To study the method of action of different preservatives.

Syllabus Content

Module I: Food Spoilage

Definition, types of spoilage - physical, enzymatic, chemical and biological spoilage. Mechanism of spoilage and its end products, shelf life determination.

Module II: **Preservation by using Preservatives**

Food preservation: Definition, principles, importance of food preservation, traditional and modern methods of food preservation. Food additives – definition, types, Class I and Class II preservatives.

Module III: **Preservation by use of high temperature**

Pasteurization: Definition, types, Sterilization, Canning - history and steps involved, spoilage encountered in canned foods, types of containers used for canning foods. Food irradiation – Principles, merits and demerits, effects of irradiation and photochemical methods.

Module IV: Preservation by use of Low Temperature

Refrigeration - advantages and disadvantages, freezing: Types of freezing, common spoilages occurring during freezing, difference between refrigeration and freezing.

Learning Resources

Reference Books

1. Gould, G. W. (2012), "New Methods of food preservation", Springer Science & Business Media.
2. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.
3. Srilakshmi, B.(2003), "Food Science", New Age International Publishers, New Delhi.
4. Subalakshmi, G and Udipi, S.A.(2001),"Food processing and preservation". New Age International Publishers, New Delhi.

B.VFPM 104 – Food Chemistry
(SKILL COURSE - 03)
Semester I

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To explain the chemical composition and functional properties of food.

Course Overview and Context

- To study about the major and minor components of food and their properties
- To know about the changes that occurs in foods during processing.
- To study the classification, structure and chemistry of the various food components.
- To understand the changes that occurs in the different constituents during storage and ways and means to prevent it.

Syllabus Content

Module I: Water

Introduction to food chemistry, structure of water molecule, hydrogen bonding, effect of hydrogen bonding on the properties of water, moisture in foods, free water, bound water, water activity, estimation of moisture in foods, determination of moisture and water activity.

Module II: Carbohydrates

Nomenclature, composition, sources, structure, reactions, functions, classification - monosaccharide, disaccharides, oligosaccharides and polysaccharides. Properties of Starch – gelatinisation, gel formation, syneresis**,** starch degradation, dextrinisation, retrogradation, Qualitative and quantitative tests of carbohydrates.

Module III: Proteins

Nomenclature, sources, structure, functions, classification - essential and non-essential amino acids, Physical and chemical properties of proteins and amino acids, functional properties - denaturation, hydrolysis, changes in proteins during processing. Enzymes - Specificity, mechanism of enzyme action, factors influencing enzymatic activity, controlling enzyme action, enzymes added to food during processing, enzymatic browning.

Module IV: Fats and oils

Nomenclature, composition, sources, structure, functions, classification, essential fatty acids. Physical and chemical properties - hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, smoke point.

Reference Books:

1. Yildiz, Fatih (2009), "Advances in Food Biochemistry", CRC Press, New York.
2. Damodaran,S., Parkin , K L.,Fennema, O R., (2008), "Fennema's Food Chemistry"- 4th edition, CRC press, New York
3. Campbell, M K and Farrell, S O (2006), "Biochemistry", 5th edition, Cengage LearningPublishers, USA.
4. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.
5. Meyer, L.H. (2002), "Food Chemistry". CBS publishers and Distributors, New Delhi.

B.VFPM 105– Communication Skills in English

(COMMON COURSE – 01)

Semester I

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To enhance LSWR skills so that students may effectively communicate in the English language

Course Overview and Context

- The course aims at training students in the usage of English Language in various contexts and enabling them to communicate effectively in English.

Competencies of the course

- To re-introduce students to the basics of English grammar so that they may comprehend, speak and write grammatical correct English.
- To enable the students to speak English confidently and effectively in a wide variety of situations.
- To help the students to improve their reading efficiency by refining their reading strategies.
- To develop the ability to compose pieces o literary writing.

Syllabus Content

Module I: Grammar

Articles, The Verb, Active and Passive Voice, Tenses, Concord, Modal Auxiliaries, The Adverb, The Preposition, Conjunction, Idioms, Phrasal Verbs, Direct and Indirect Speech.

Module II: Listening

Active listening, Barriers to listening, Listening and note taking, Listening to announcements, Listening to news on the radio and television.

Module III: Speaking

Brief introduction to the Phonetic script, Falling and rising tones, Participating in conversations, Small Talk, Making a short formal speech, telephone skills.

Module IV: Reading and Writing

Reading: theory and Practice, Scanning, Surveying a textbook using an index, Reading for information, Understanding text structure, Locating main points, Making inferences, Reading graphics, Reading for research. Describing people, place,

events and things, Short Stories, Vocabulary and Comprehension, Guide to letter writing.

Learning Resources
References

1. Sasikumar V, Kiranmai Dutt, P and Geetha Rajeevan (2007), "Communication Skills in English", Cambridge University Press, New Delhi.
2. Alec Fisher (2011), "Critical Thinking: An Introduction", Cambridge University Press, New Delhi.
3. Stephen Bailey, (2010), "Academic Writing: A Handbook for International Students", Routledge Publishers.
4. Ilona Leki (1998), "Academic Writing: Exploring Processes and Strategies", Cambridge University Press. New Delhi.
5. Patsy McCarthy, Caroline Hatcher (2002), "Presentation Skills: The Essential Guide for Students (StudySkills), SAGE Publishers.

B.VFPM 106 – Food Science and Nutrition I
(GENERAL COURSE - 01)
Semester I

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand the nutrient composition of foods, their functions, sources and to impart knowledge of concept of good health and its importance.

Course Overview and Context

- To know and understand the functions, importance of all nutrients present in foods.
- To know about the various types of nutrients and their functions in the body.
- To familiarize with the recent advances in field of nutrition
- To understand the different types of newly developed food products.

Syllabus Content

Module I: Introduction to Nutrition

Definition and inter-relationship between nutrition and health, Malnutrition: Definition and types. Reference man and reference women.

Module II: Food and water

Definition of food, classification of foods based on origin, pH, nutritive value. Basic five food groups, food guide pyramid. Functions of foods. Water: functions, sources, requirement, water balance, toxicity and deficiency.

Module III: Vitamins

Classification, structure, function, sources, general causes for loss in foods, bioavailability, enrichment, fortification and restoration. Units of measurement. Deficiency and toxicity disorders.

Module IV: Minerals

Classification of minerals. Functions, sources, bioavailability and deficiency of the following minerals- Calcium, Iron, Iodine, Fluorine, Sodium, Potassium.

Learning Resources

Reference Books

1. James L Groff and Sareen S Gropper, (2009) "Advanced Nutrition and Human Metabolism", Fourth Edition, Wadsworth Publishing Company.
2. Maurice B Shils, Moshe Shike A, Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006), "Modern Nutrition in Health and Disease", Lippincott Williams al Wilkins.
3. Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) "Nutrition and Metabolism", The Nutrition Society Textbook Series, Blackwell Publishing, First Edition.

B.VFPM 107 – Entrepreneurship Development and Project Management
(GENERAL COURSE - 02)
Semester I

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To develop Entrepreneurial culture and encourage the students to become entrepreneurs.

Course Overview and Context

- To know about the various procedures for starting a small scale unit of production.
- To have a basic idea about how to prepare a project to start a small scale industry.
- To know about various agencies that can provide assistance for starting a new project.

Syllabus Content

Module I: Introduction to Entrepreneurship

Meaning, definition and concepts, characteristics, functions, entrepreneurial traits and motivation, role of entrepreneur in economic development, factors affecting entrepreneurial growth. Types of entrepreneurs - Intrapreneurship, Women entrepreneurship, significance, problems, solutions to the problems

Module II: Entrepreneurial Development Programme

Objectives, Steps, Need for training- target group- Contents of the training programme-Special Agencies for Entrepreneurial Development and Training-DIC.

Module III: Project Identification

Meaning, Features, Classification, Project identification, Stages in project identification, Project Life Cycle, Project formulation- Elements, Feasibility Analysis-Network Analysis-Project Planning.

Module IV: Setting up of micro small and medium enterprises

Setting up of micro small and medium enterprises, location significance, Green channel, Bridge capital, Seed capital assistance, Margin money scheme, Sickness, Causes-Remedies.

Learning Resources

Reference Books

1. Drucker, Peter (2014), “Innovation and Entrepreneurship”, Routledge Publishers.
2. Abraham M.M, (2010), “Entrepreneurship Development and Project Management”, Prakash Publications and Printers.
3. Desai,Vasant (2001), “Dynamics of entrepreneurial development and management”. Himalaya Publishing House.

B.VFPM 108 – Internship
Semester I

Total Credits: 1

Total Lecture Hours:

Aim of the course: To develop Entrepreneurial culture and encourage the students to become entrepreneurs. Students were send to particular industries related to their semester to learn the inplant practical hands and to learn how to manufacture different products.

Semester II

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 201	Dairy Technology	**5**	5	70	30
2.	B.VFPM 202	Dairy Technology (Practical)	**2**	2	100	-
3.	B.VFPM 203	Packaging Technology	**5**	5	70	30
4.	B.VFPM 204	Sanitation and hygiene	**5**	5	70	30
5.	B.VFPM 205	Letter Writing and Presentation Skills	4	4	70	30
6.	B.VFPM 206	Food Science and Nutrition II	4	4	70	30
7.	B.VFPM 207	Business Communication	4	4	70	30
8.	B.VFPM 208	Internship	-	1	100	-
		TOTAL	**29**	**30**		

B.VFPM 201 - Dairy Technology
(SKILL COURSE - 05)
Semester II

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To inculcate the knowledge regarding various dairy products and its processing techniques.

Course Overview and Context

- To understand about the products that can be made from milk.
- To understand the processing and storage of dairy products.
- To know about the quality control measures applied in dairy industries.
- To have a basic idea about their processing and products which can be made at a small scale

Syllabus Content

Module I: Introduction
Milk - Definition, sources, and composition of milk, factors effecting composition of milk, physiochemical properties of milk, grading of milk-definition and types of grades, collection and transportation of milk.

Module II: Processing of market milk
Flowchart of milk processing, Reception, Different types of cooling systems. Clarification and filtration process, standardization- Pearson's square method, pasteurization-LTLT, HTST and UHT process- continuous pasteuriser, Sterilisation and Homogenisation, Cream separation- centrifugal cream separator, bactofugation.

Module III: Special milks
Skim milk, evaporated milk, condensed milk, standardized milk, toned milk, double toned milk, flavoured milk, reconstituted milk.

Module IV: Indigenous and Fermented milk products
Product description, methods for manufacture of butter, cheese, ice cream, khoa, channa, paneer, shrikhand, ghee. Spray drying system: dried milk- whole milk and skim milk powder. Instantization of milk.

Learning Resources
References

1. Joshi.V.K., (2015),"Indigenous Fermented Foods of South Asia", CRC Press.
2. Alan H. Varnam, (2012), "Milk and Milk Products: Technology, chemistry and microbiology", Springer Science & Business Media Publishers.
3. Robinson, R. K., (2012), "Modern Dairy Technology: Volume 2 Advances in Milk Products", Springer Science & Business Media Publishers.

B.VFPM 202 – Dairy Technology (Practical)
(SKILL COURSE - 08)
Semester II

Total Credits: 2

Total Laboratory Hours: 60 (3 Hours/ Week)

Aim of the course: To develop the skills in dairy product preparation and to familiarise with the dairy plant equipments.

Course Overview and Context

- To gain knowledge about preparation of some dairy products
- To perform chemical analysis of milk sample
- To understand different processing equipment in dairy plant

Syllabus Content

1. Milk Testing - Platform Tests
2. Determination of Activity (Titrable Acidity) of Milk
3. Determination of fat and SNF content in milk
4. Clot on boiling test for milk
5. Determination of specific gravity of milk
6. Detection of Addition of Starch in milk
7. Preparation of Lassi
8. Preparation of khoa
9. Preparation of Basundi
10. Preparation of chakka and shrikand
11. Preparation of kalakand
12. Preparation of cooking butter
13. Preparation of ghee
14. Preparation of flavoured milk
15. Visit to milk product development centre

B.VFPM 203 - Packaging Technology
(SKILL COURSE - 06)
Semester II

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To provide knowledge about trends and development in food packaging technologies and materials.

Course Overview and Context

- To familiarize with the different materials and methods used for packaging.
- To understand the technology behind packaging and packaging materials
- To have a basic idea about the materials used for food packaging and their testing.
- To know about the different forms in which a food can be packed.

Syllabus Content

Module I: Introduction to packaging
Definition, Functions of packaging – Containment, Protection, Preservation, Promotion, Convenience, Communication. Requirements of effective package, Types of food packaging- primary, secondary and tertiary packaging.

Module II: Deteriorative Reactions and shelf life of foods
Introduction, deteriorative Reactions in food- factors affecting deterioration of foods- physical changes, biological changes, chemical changes. Shelf life of foods – Definition, intrinsic and extrinsic factors controlling the rate of reactions. Shelf life determination tests.

Module III: Packaging Materials and their properties
Rigid containers- Glass, Wooden boxes, metal cans- Aluminium and tin plate containers, Semi rigid containers- paperboard cartons, Flexible packaging- paper, plastic pouches- Low density polyethylene, High density polyethylene and Polypropylene. Packaging materials for dairy products, bakery and confectionary, granular products, fruits and vegetables.

Module IV: Special Packaging, Labelling and Safety
Aseptic packaging, Active packaging, Intelligent packaging, Modified atmospheric packaging and controlled atmospheric packaging, Shrink packaging, stretch packaging, Biodegradable packaging, Edible packaging, Tetrapacks.

Printing process, inks, adhesives, labelling, coding- bar codes**,** Food packaging closures of glass and plastic containers, Legislative and safety aspects of food packaging, Machineries used in Food Packaging, Package testing-Thickness – Paper density - Basis weight – Grammage - Tensile Strength - Gas Transmission Rate (GTR) - Water Vapour Transmission Rate (WVTR).

Learning Resources

References

1. Gordon L. Robertson (2012), "Food Packaging: Principles and Practice", Third Edition, CRC Press.
2. Takashi Kadoya (2012), "Food Packaging", Academic press.
3. Richard Coles, Derek McDowell, Mark J. Kirwan (2003), "Food Packaging Technology", CRC Press.

B.VFPM 204 – Sanitation and Hygiene
(SKILL COURSE - 07)
Semester II

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the Course: To understand and impart knowledge of importance of food hygiene, sanitation, and safety during food processing unit.

Course Overview and Context

- To know the principles and applications of sanitation in food industry.
- To know about the various types of Sanitation techniques applicable in the food industry
- To gain an understanding of food hygiene, sanitation and safety during food processing unit operations.

Syllabus Content

Module I: Sanitation and Health

Definition, importance of sanitation, application of sanitation to food industry and food service establishments. Microorganisms and their characteristics, control of microbial growth in food. Food contamination and spoilage, food borne diseases.

Module II: Hygiene and food handling

Purchasing and receiving safe food, food storage, sanitary procedures in food preparation, serving and displaying of food, special food operations.

Module III: Environmental Sanitation

Location and layout of premises, constructional details, sanitary requirements for equipments, guidelines for cleaning equipments, cleaning procedures, pest control, water supply, storage and waste disposal, environmental pollution.

Module IV: Hygiene Practices and Sanitation regulations and Standards in food industry

Introduction, necessity, personnel hygiene, sanitary practices, management and sanitation, safety at work place. Regulatory agencies, control of food quality, local health authority. Food sanitation check lists**.**

Learning Resources

References

1. Marriott, Norman (2013), "Principles of Food Sanitation", Springer Science & Business Media Publishing.
2. Roday S, (2011) (2002), "Food Hygiene and Sanitation", McGraw Hill Publishing Company Limited.
3. H. L. M. Lelieveld, John Holah, David Napper**,** (2014), "Hygiene in Food Processing: Principles and Practice", Elsevier Publications.

B.VFPM 205– Letter Writing and Presentation Skills

(COMMON COURSE – 02)
Semester II

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the Course: To introduce students to the concept of critical thinking, help develop analytical skills and improve academic writing and presentation skills.

Course Overview

- The course seeks to introduce the students to the concept of critical thinking, enlighten students on academic writing and develop presentation skills.

Competencies of the course:

- To make the students aware of the fundamental concepts of critical reasoning and to enable them to read and respond critically, drawing conclusions, generalizing, differentiating fact from opinion and creating their own arguments.
- To enable students to structure arguments and develop research papers/assignments that is free from fallacies.
- To assist the students in developing appropriate and impressive writing styles for various contexts.
- To help students rectify structural imperfections and to edit what they have written.
- To equip students for making academic presentations effectively an impressively.

Syllabus Content

MODULE I: Critical Thinking
Introduction to critical thinking, Benefits, Barriers, Reasoning, Arguments, Deductive and inductive arguments, Fallacies, Inferential comprehension, Critical thinking in academic writing, Elements: Clarity, Accuracy, Precision and Relevance.

MODULE II: Research for Academic writing

Data collection, Use of print, electronic sources and digital sources. Selecting key points, Note making, paraphrasing, summary

MODULE III: Writing Process and Writing Models

Documentation, Plagiarism. Structure and Content: Title, Body paragraphs, Introduction and conclusion. Revising, Proof-reading. Letters, Letters to the editor, Resume and covering letters, e-mail, Seminar papers, Project reports, Notices, Filling application forms, Minutes, agenda, Essays

MODULE IV: Presentation Skills

Soft skills for academic presentations, Effective communication skills, Structuring the presentation, Choosing appropriate medium, Flip charts, OHP, PowerPoint presentation, Clarity and brevity, Interaction and persuasion, Interview skills, Group Discussions

Learning Resources

Reference

1. Anderson Marilyn, (2010), "Critical Thinking, Academic, Writing and Presentation Skills", Pearson Education and Mahatma Gandhi University.
2. Alec Fisher (2011), "Critical Thinking: An Introduction", Cambridge University Press, New Delhi.
3. Stephen Bailey, (2010), "Academic Writing: A Handbook for International Students", Routledge Publishers.
4. Ilona Leki (1998), "Academic Writing: Exploring Processes and Strategies", Cambridge University Press. New Delhi.
5. Patsy McCarthy, Caroline Hatcher (2002), "Presentation Skills: The Essential Guide for Students (StudySkills), SAGE Publishers.

B.VFPM 206 – Food Science and Nutrition II
(GENERAL COURSE - 03)
Semester II

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand about the macronutrients their functions, digest, absorption and storage mechanisms and their relationship with good health and sustenance of life.

Course Overview and Context

- To know and understand the functions, importance of all nutrients present in foods.
- To know about the various types of nutrients and their functions in the body.
- To familiarize with the recent advances in field of nutrition
- To gain knowledge about the latest laws relevant to the food industry

Syllabus Content

Module I: Carbohydrates
Definition, classification and structure. Source of carbohydrates in agricultural produce. Fibre – Types, Source and characteristics, Nutritional and health significance, requirements. Resistant starch – factors influencing resistant starch content in foods and potential health benefits. Fructooligosaccharides and High Fructose Corn Syrup. Physicochemical changes during processing.

Module II: Proteins
Definition, classification of amino acids – Essential and non essential, structure of protein. Source of protein, Protein deficiency diseases and their control. Physicochemical changes during processing.

Module III: **Lipids**
Definition, classification, structure, physical and chemical properties. Deficiency and disease, Source. Physicochemical changes during processing.

Module IV: **Vitamins and minerals**
Definition, Classification, Source and deficiency diseases. Effect of processing methods on vitamins and their control measures.

Learning Resources
References

1. James L Groff and Sareen S Gropper, (2009) “Advanced Nutrition and Human Metabolism”, Fourth Edition, Wadsworth Publishing Company.
2. Hui,Y H, (2007), “ Handbook of Food Products Manufacturing” Vol. I , Wiley-Interscience, New Jersey Publishers.
3. Maurice B Shils, Moshe Shike A, Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006), “Modern Nutrition in Health and Disease”, Lippincott Williams al Wilkins.
4. Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) “Nutrition and Metabolism”, TheNutrition Society Textbook Series, Blackwell Publishing, First Edition.

B.VFPM 207 – Business Communication
(GENERAL COURSE - 04)
Semester II

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To develop basic communication skills to communicate interpersonally and to study about to tools to overcome the barriers of communication.

Course Overview and Context

- To understand the basics of finance and marketing.
- To have a basic idea about mobilization of human and financial resources
- To know about the various consumer protection laws.
- To understand the legal, social, psychological factors that affect starting up a business venture

Course Content

Module I: Basis of Communication

Meaning, importance and process, need and objectives of communication, 7Cs of communication, barriers of communication, How to overcome communication barrier.

Module II: Means/Media of Communication

Verbal and nonverbal communication channel of formal and informal communication. Types of communication. downward, upward, Horizontal or lateral, Diagonal or cross. E mail, teleconferencing, video conferencing, SMS.

Module III: Listening as a communication tool

Importance types of listening, Barriers to effective listening. How to make listening effective. Speeches and presentation – characteristics of a good speech. How to make effective presentation- planning, preparation, organizing, rehearing and delivery.

Module IV: Groups

Importance of features, advantage and disadvantages techniques of group decision making-Brain storming sessions, Nominal group technique, Delphian Technique, solving problems in groups.

Learning Resources
References

1. Mary Ellen Guffey, Dana Loewy, (2015), "Essentials of Business Communication", Cengage Learning.
2. Carol M. Lehman, Debbie D. DuFrene, (2010), "Business Communication", Cengage Learning.
3. Peter Hartley, Clive Bruckmann, (2008), "Business Communication", Routledge Publishers.

B.VFPM 208 – Internship
Semester II

Total Credits: 1

Total Lecture Hours:

Aim of the course: To develop Entrepreneurial culture and encourage the students to become entrepreneurs. Students were send to particular industries related to their semester to learn the inplant practical hands and to learn how to manufacture different products.

Semester III

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 301	Processing of Fish, Meat and Poultry	**5**	5	70	30
2.	B.VFPM 302	Processing of plantation crop and Spices	**5**	5	70	30
3.	B.VFPM 303	Fermented Foods	**5**	5	70	30
4.	B.VFPM 304	Chemical and microbial analysis of food (Practical)	**2**	2	100	-
5.	B.VFPM 305	Food Microbiology	**4**	4	70	30
6.	B.VFPM 306	Food additives	**4**	4	70	30
7.	B.VFPM 307	Business Management	**4**	4	70	30
8.	B.VFPM 308	Internship	**-**	1	100	-
		TOTAL	**29**	**30**		

B.VFPM 301 – Processing of Fish, Meat and Poultry Products
(SKILL COURSE - 09)
Semester III

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To understand the technology for handling, processing, preservation of meat, poultry and fish products.

Course Overview and Context

- To understand need and importance of livestock, egg and poultry industry
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.
- To understand technology behind preparation of various animal food products and by product utilization

Syllabus Content

Module I: Compositional and Nutritional aspect of Animal foods

Meat - Definition, classification, compositional structure of meat. Nutritional properties of meat. Preservation and Spoilage of meat. **Fish** - Classification of fish (fresh water and marine), composition, Nutritional properties of fish, Preservation and Spoilage of fish. **Poultry**- composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality.

Module III: Meat processing

Meat Quality - colour, flavour, texture, Water Holding Capacity (WHC), Emulsification capacity of meat. Tests for assessment of raw meat - TVN, FFA, PV, Nitrate and nitrite in cured meat. **Preservation of meat -**Refrigeration and freezing, thermal processing - canning of meat, dehydration, meat curing. Physicochemical changes during processing and their control. Various meat products and their packaging.

Module II: Fish Processing
Processing of fish - Chilling, Freezing, curing, drying, salting - salting methods: brining, pickling, curing and canning of fish. Smoking - smoke production, smoke components, quality, safety and nutritive value of smoked fish, pre - smoking processes, smoking process control. Various fish products and their packaging.

Module IV: Poultry and egg processing

Poultry processing – method and steps. Egg-Composition and nutritive value. Factors affecting egg quality. Preservation of eggs - Refrigeration and freezing, thermal processing, dehydration, coating

Learning Resources

Reference

1. George M. Hall (2012), "Fish Processing Technology", Springer Science & Business Media Publication.
2. Fidel Toldra (2010), "Handbook of Meat Processing", John Wiley & Sons Publication.
3. Rao D.G. (2010), "Fundamentals of food engineering". PHI Learning Pvt. Ltd.
4. Isabel Guerrero-Legarreta (2010), "Handbook of Poultry Science and Technology, Secondary Processing", John Wiley and Sons Publication.
5. Casey M. Owens. (2010), "Poultry Meat Processing", Second Edition, CRC Press.
6. Leo M.L. Nollet and Fidel Toldra (2006), "Advanced Technologies For Meat Processing", CRC Press.

B.VFPM 302 – Processing of Plantation Crops and Spices
(SKILL COURSE - 10)
Semester III

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To impart basic knowledge about the importance and production technology of spices and plantation crops.

Course Overview and Context

- To know about the importance of various types of spices which are used in the food industry and their applications
- To understand the processing steps involved in spice processing
- To know about value added products from spices
- To know various processing steps involved in plantation crop processing

Syllabus Content

Module I: Plantation crops
Tea- introduction, Classification, Nutritional properties and processing, Tea products and packaging. Coffee- Classification, Nutritional properties and processing, Tea products and packaging. Cocoa- Classification, Nutritional properties and processing, Tea products and packaging. Active components present in Tea, Coffee and cocoa.

Module II: Spice processing
Current scenario of Spices in India, classification of spices, composition and functions. Major international quality specifications of spices. Spice processing- spice reconditioning, spice grinding, post- processing treatments.

Module III: Processing of Major Spices
Major spices: Pepper, coriander, cardamom, ginger, garlic, clove, nutmeg, vanilla, cinnamon, chilli and turmeric – method of manufacture; chemistry of the volatiles. Physicochemical changes during processing.

Module IV: Spice extractives
Value added spice products: Spice volatile oils, spice oleoresins, Use of spice extractives, replacement of spices with oils and oleoresins, alternative products, Ground spices, processed spices, organic spices, curry powders.

Learning Resources

References

1. J.S.Purthi, (2003) (2001), “Minor Spices and Condiments: Crop Management and Post Harvest Technology”, ICAR publication, 1st Edition,
2. Handbook of Fruit Science and Technology: Production, Composition, Storage, and Processing. D. K. Salunkhe, S. S. Kadam, CRC Press, 1st Edition, 1995.
3. N.K.Jain,(1989), “Global Advances in Tea Science”, Aravali Books International, 1st Edition

B.VFPM 303 – Fermented Foods
(SKILL COURSE - 11)
Semester III

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To impart thorough knowledge about various aspects of food fermentation process and technologies involved.

Course Overview and Context

- To make students acquainted with principles of using of microorganisms in fermentation process.
- Attain knowledge of production equipment in fermentation industry, substrate preparation and control of fermentative process and isolation of products
- Substantial time is devoted to particular fermented products -- spirits industry, yeast industry, brewing industry, production of microbial biomass and selected organic acids.

Syllabus Content

Module I: Introduction of fermented food

Definition of fermented food, fermentation process, types of fermentation, factor affecting of fermentation, fermentor or bioreactor, Types of fermentor, fermentation method- small scale and industrial.

Module II: Cereal based fermented food and beverages

Introduction, Biochemical changes during cereal fermentation, Indigenous rice-based fermented foods, Traditional corn-based fermented foods, Traditional sorghum-based fermented foods, Traditional cereal-based fermented beverages, New cereal-based probiotic foods.

Module III: Dairy based fermented food products

Introduction, Biochemical changes during dairy fermentation, Butter, Cheese, Curd, Shrikhand, Kefir, Cultured sour cream, Yogurt, Kumis, Cultured buttermilk, Acidophilus milk

Module IV: Miscellaneous fermented food products

Fermented meat products – Cured- raw meat, semidry fermented sausages, dry – fermented sausages, mold ripened sausages. Fermented soy products – Soy sauce, fermented whole soy beans, fermented tofu, Tempeh. **Fermented vegetables** – Chinese pickles, Kimchi, Sauerkraut.

References

1. Deirdre Rawlings, (2013), "Fermented Foods for Health", Fair Winds Press.
2. Robert W. Hutkins, (2008), "Microbiology and Technology of Fermented Foods", John Wiley & Sons.
3. Stanburry P.P. and Whitaker, A. (1984), "Principles of Fermentation Technology". Pergamon Press, Oxford UK.
4. Steinkraus, K.H. (1983). "Handbook of Indigenous Fermented Foods", Marcel Dekker, New York.

B.VFPM 304 – Chemical and Microbial Analysis of Foods (Practical) (SKILL COURSE - 12)
Semester III

Total Credits: 2

Total Laboratory Hours: 60 (3 Hours/ Week)

Aim of the course: To analyse the chemical constituents in food and to understand the basic concepts of food microbiology.

Course Overview and Context

- To analyze the spices its oleoresin and oil extraction
- To gain knowledge in the preparation of fermented foods
- To introduce basics of food microbiology.

Syllabus Content

1. Demonstrations of process of essential oil extraction and oleoresin of different spice
2. Detection of papaya seeds in black pepper.
3. Detection of powdered bran and sawdust in spices
4. Preparation of fermented foods
5. Introduction to the Basic Microbiology Laboratory Practices and Equipments
6. Functioning and use of compound microscope
7. Cleaning and sterilization of glassware
8. Preparation and sterilization of nutrient broth.
9. Preparation of slant, stab and plates using nutrient agar.
10. Standard Plate Count Method.
11. Visit to Meat Products of India

B.VFPM 305 – Food Microbiology
(GENERAL COURSE - 05)
Semester III

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the Course: To make students understand the food and industrial microbiology and to make them aware about the importance of food quality control by avoiding pathogenic microbial attack.

Course Overview and Context

- Recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods.
- Understand the role and significance of intrinsic and extrinsic factors on growth and response of microorganisms in foods.
- Identify ways to control microorganisms in foods.
- Describe the beneficial role of microorganisms

Syllabus Content

Module I: Introduction to food microbiology

Discovery, current status, role of food microbiology, sources of micro organisms in food, changes caused by microorganisms - food fermentation, putrefaction, lipolysis. Growth and survival of microorganisms in foods, biological, chemical and physical changes caused by microorganisms, physical and chemical methods to control microorganisms.

Module II: **Characteristics of microorganisms**

Classification of microorganisms, nomenclature, morphology – yeast and moulds, bacterial cells, viruses. Important microbes in food, Food hygiene and sanitation: Contamination during handling and processing and its control; indicator organisms.

Module III: Spoilage and Food preservation

Food spoilage – Introduction, spoilage in cereals, vegetables and fruits, meat, eggs, poultry, fish, milk and milk products, canned foods, nuts and oil seeds, fats and oil seeds. Definition - food infection and food intoxication.
Factors influencing microbial growth in food: Intrinsic and extrinsic factor - Hydrogen ion concentration, Moisture requirement, concept of water activity, temperature, oxidation reduction potential, inhibitory substances and biological structure. Principles of different food preservation methods.

Module IV: Beneficial uses of microorganisms

Microorganisms used in food fermentation, Food bio preservatives of bacterial origin, food ingredients and enzymes of microbial origin. Economic importance of microorganisms.

References

1. Ray , Bibek; Arun Bhunia,(2013), "Fundamental Food Microbiology", CRC Press.
2. Adams ,Martin R, Maurice O Moss, Peter McClure (2015), "Food Microbiology", Royal Society of Chemistry, Cambridge.
3. Jay, James M.(2012), "Modern Food Microbiology", Springer Science & Business Media., Maryland.

B.VFPM 306 – Food Additives
(GENERAL COURSE - 06)
Semester III

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand the importance of food additives in food processing technology also to study the merits and demerits of addition of food additives.

Course Overview and Context

- To get an insight in to the additives that are relevant to food industry
- To gain knowledge on shelf life extension, processing aids and sensory appeal of additives.
- To develop an understanding of isolation of various biopolymers from food resources and their relevant applications.

Syllabus Content

Module I: Introduction to Food Additives
Role of Food Additives in Food Processing, functions -Classification -Intentional & Unintentional Food Additives. Safety Evaluation of Food Additives, Beneficial and Toxic Effects. Food Additives - Generally recognized as safe (GRAS), Tolerance levels &Toxic levels in Foods.

Module II: **Classification of food additives**
Preservatives, antioxidants, colours and flavours (synthetic and natural), sequesterants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anticaking agents – uses and functions in formulations; indirect food additives.

Module III: Derived food additives
Proteins, starches and lipids as functional ingredient; isolation, modification, specifications, functional properties and applications in foods and as neutraceuticals. Manufacturing and applications of fibres from food sources, fructooligosaccharides.

Module IV: Food additives as toxicants
Artificial colours, preservatives, sweeteners; toxicants formed during food processing such as nitrosamines, maillard reaction products acrylamide, benzene, heterocyclic amines and aromatic hydrocarbons; risk of genetically modified food, food

supplements, persistent organic pollutants, toxicity implications of nanotechnology in food**.**

Learning Resources

Reference Books

1. Titus A. M. Msagati, (2012), "The Chemistry of Food Additives and Preservatives", John Wiley & Sons Publishers.
2. Jim Smith, Lily Hong-Shum (2011), "Food Additives Data Book", John Wiley & Sons Publishers.
3. Deshpande, S.S. (2002). "Handbook of Food Toxicology", Marcel Dekker Publishers.

B.VFPM 307- Business Management
(GENERAL COURSE - 07)
Semester III

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Overview and Context

- To familiarise the students with concepts and principles of Management

Syllabus Content

Module I: Management

Introduction, Meaning, nature and characteristics of Management - Scope and functional areas of management - Management as a science art or profession - Management &Administration – Principles of management - Social responsibility of management.-Contributions of F. W. Taylor and Henry Fayol - Emergence of Japan as an industrial giant.

Module II: Planning &

Nature, importance and purpose of planning - Planning process, objectives - Types of plans MBO-Features-steps.

Module III: Organising and Staffing

Nature and purpose of organisation, Principles of organisation - Types of organization, Organisation Chart- Organisation manual-Departmentation, Committees Authority-Deligation of Authority- Responsibility and accountability-Centralisation Vs decentralisation of authority - Nature and importance of staffing - Process of selection & recruitment.

Module IV: Directing & Controlling

Meaning and nature of directing - Motivation- meaning - importance-Theories of Motivation (Maslow s,Herzberg, McGregor s, X & Y theory) Leadership-Meaning-Styles Managerial Grid by Blake and Mounton - Likert s Four level model-Coordination-Meaning and importance.

Meaning and steps in controlling - Essentials of a sound control system - Methods of establishing control-Control by Exception.

Learning Resources

References

1. Koontz & O Donnell, Management.
2. Appaniah & Reddy, Essentials of Management.
3. L M Prasad, Principles of management.
4. Rustum & Davan, Principles and practice of Management.

B.VFPM 308 – Internship
Semester III

Total Credits: 1

Total Lecture Hours:

Aim of the course: To develop Entrepreneurial culture and encourage the students to become entrepreneurs. Students were send to particular industries related to their semester to learn the inplant practical hands and to learn how to manufacture different products.

Semester IV

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 401	Processing of Cereal, Pulses and Oilseeds	**5**	5	70	30
2.	B.VFPM 402	Processing of Cereal, Pulses and Oilseeds (Practical)	**2**	2	100	-
3.	B.VFPM 403	Beverage Technology	**5**	5	70	30
4.	B.VFPM 404	Food Product design and Development	**5**	5	70	30
5.	B.VFPM 405	Food Plant designing	**4**	4	70	30
6.	B.VFPM 406	By product utilization and Waste Management	**4**	4	70	30
7.	B.VFPM 407	Marketing Management	**4**	4	70	30
8.	B.VFPM 408	Internship	**-**	1	100	-
		TOTAL	**29**	**30**		

B.VFPM 401 – Processing of Cereals, Pulses and Oilseeds
(SKILL COURSE - 13)
Semester IV

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals, pulses and oilseeds.

Course Overview and Context

- To create awareness about the processing of major cereals like paddy, maize.
- To study the storage and handling techniques of cereals, oilseed and pulses.
- To gain knowledge on processing and milling of pulses and extraction of oil.

Syllabus Content

Module I : Paddy Processing

Composition and Quality characteristics. Curing of Paddy. Parboiling Processes- soaking, steaming, drying, CFTRI and pressure parboiling process, Paddy Dryer - LSU Dryer. Production of Flattened Rice and Puffed Rice from Paddy.

Module II: Rice and Wheat Milling

Paddy Dehusking Processes. Rice Mill Flow Chart. Engelberg Huller Mills. Modern Rice Mills – Their Components - Pre Cleaners, rubber roll Shellers, Paddy Separators – Satake type, Polishers - Cone polishers, glazing, Extraction of rice bran oil and uses of rice bran in food industry.
Wheat - composition and nutritional value, wheat milling process - cleaning-conditioning/hydrothermal treatment, milling-break roll and reduction rolls.

Module III: Pulses Milling

Varieties-chemical composition and structure-dry milling and wet milling process of pulses, processed products of pulses.

Module V: Oil seed processing

Introduction- methods- hydraulic press- screw press – principle and working, solvent extraction methods, Clarification, degumming, neutralization, bleaching, deodorization techniques/process, blending of oils. Hydrogenation, Fractionation, Winterization.

Learning Resources

References

1. Dendy DAV & Dobraszczyk BJ. (2001), “Cereal and Cereal Products”, Aspen Publications.
2. Chakraverty, A. (1995), “Post Harvest Technology of Cereals, Pulses and Oilseeds”. Oxford and IBH Publishing Co, Calcutta
3. N.L.Kent and A.D.Evans: (1994) “Technology of Cereals” (4th Edition), Elsevier Science (Pergaman), Oxford, UK,
4. Samuel Matz: (1992), “The Chemistry and Technology of Cereals as Food and Feed, Chapman & Hall

B.VFPM 402 – Processing of Cereals, Pulses and Oilseeds (Practical)
(SKILL COURSE - 16)
Semester IV

Total Credits: 2
Total Laboratory Hours: 60 (3 Hours/ Week)

Course Overview and Context:

- To understand the physical properties of cereal flours.
- To impart knowledge on working of a rice milling station.
- To impart knowledge on working of a oil expelling unit station.

Syllabus Content

1. Physical characteristics of Wheat.
2. Estimation of Gluten Content of flour.
3. Estimation of Polanski Value of flour.
4. Estimation of Potassium Bromate in flour.
5. Fermenting power of yeast.
6. Physical Characteristics of Rice and paddy.
7. Cooking characteristics of rice.
8. Determination of sedimentation power of flour.
9. Visit to rice mill station.
10. Visit to oil expelling unit.

B.VFPM 403 – Beverages Technology
(SKILL COURSE - 14)
Semester IV

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: The aim of the course is to provide the students with general scientific knowledge about processing of alcoholic and non- alcoholic beverages.

Course Overview and Context

- To study about the various beverages.
- To study about the products made out of them.
- To provide a technical view of beverages.
- To understand the manufacturing processes in the context of technology.

Syllabus content

Module I: Introduction to beverages

Types of beverages and their importance, status of beverage industry in India, Manufacturing technology for juice-based beverages, synthetic beverages; technology of still, carbonated, low-calorie and dry beverages, isotonic and sports drinks; role of various ingredients of soft drinks, carbonation of soft drinks.

Module II: **Manufacturing process of beverages**
Beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, Dairy-based beverages.

Module III: Alcoholic and Non- alcoholic beverages

Types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, ale type beer, lager type beer, technology of brewing process, equipments used for brewing and distillation, wine and related beverages, distilled spirits. **Non- alcoholic beverages** - Cold drinks, soft drinks, mocktails.

Module IV: Beverages packaging

Introduction, types of packaging including bottle, can, pouches, cartons. Cold packaging and hot packaging, packaging defects, packaging rules and regulations.

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Learning Resources

Reference Books

1. Manay, N.S, Shandaksharaswamy, M., (2004), "Foods- Facts and Principles", New Age International Publishers, New Delhi,
2. Potter, N.N, Hotchkiss, J.H.(2000), "Food Science". CBS Publishers, New Delhi.
3. Srilakshmi, B. Food Science (3rd Edition) (2003), New Age International (p) Limited Publishers, New Delhi,
4. Nicholas Dege. (2011), "Technology of Bottled water". Blackwell publishing Ltd, UK.

B.VFPM 404 – Food Product Design and Development
(SKILL COURSE - 15)
Semester IV

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To demonstrate a theoretical knowledge of the basic concepts of new food product development, and to understand the process involved in the production of a new product.

Course Overview and Context

- To understand the concept of a new product development.
- To understand the processing of a new product.
- To know the knowledge base required for accomplishing a product development.
- To know the ways to introduce a new product in the market.

Syllabus content

Module I: Concept of product development

Need, importance and objectives of formulation for new product development. Product success and failure, factors for success, process of product development, managing for product's success. Innovation strategy - possibilities for innovation, building up strategy, product development programme.

Module II: Product development process

Ideas, Formulation based on sources availability and cost competitiveness for concept developments of new products, Product strategy, product design and process development, product commercialization, product launch and evaluation.

Module III: Knowledge base for product development technology

Adaptable technology and sustainable technology for standardized formulation for process development. Knowledge and the food system, knowledge management, knowledge for conversion of product concept to new product, technological knowledge - product qualities, raw material properties, processing, packaging requirement, distribution and marketing. Process control parameters and scale up, production trials for new product development at lab and pilot scale

Module IV: Role of consumers in product development

Consumer behaviour, food preferences, avoiding acceptance, integration of consumer needs in product development and sensory needs.

Learning Resources
References

1. Howard R. Moskowitz, Jacqueline H. Beckley, Anna V. A. Resurreccion, (2012), "Sensory and Consumer Research in Food Product Design and Development", John Wiley & Sons Publishers.

2. Kenneth B. Kahn, (2012), "The PDMA Handbook of New Product Development", John Wiley & Sons Publishers.

3. Jacqueline H. Beckley, M. Michele Foley, Elizabeth J. Topp, Jack C. Huang, Witoon Prinyawiwatkul, (2008), "Accelerating New Food Product Design and Development", John Wiley & Sons Publishers.

B.VFPM 405 – Food Plant Designing
(GENERAL COURSE - 08)
Semester IV

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To study design of plant and processing unit and to get a thorough knowledge about the importance of a good food plant design.

Course Overview and Context

- To understand concepts of plant layout.
- To have knowledge on building, utilities in the plant.
- To know the importance of proper food plant design and safety.

Syllabus Content

Module I: Introduction
Definition, Basic concepts of plant layout and design with special reference to food process industries. Application of HACCP concept, ISO, FPO & MPO requirements in food plant layout and design.

Module II: Plant Location
Influence of location on plant layout, location factors, location theory and models, Economic plant size, types of manufacturing processes like continuous, repetitive and intermittent processes.

Module III: Plant Building
Considerations in building design, type of factory buildings, choice of building construction, material for floors, foundation, walls, doors, windows, drains etc, ventilation, fly control, mold prevention and illumination in food processing industries.

Module IV: Plant layout & Equipment Layout
Plant layout and design of bakery and biscuit industries; fruits and vegetables processing industries including beverages; milk and milk products; meat, poultry and fish processing industries.

Learning Resources

Reference Books

1. John Holah, H. L. M. Lelieveld, (2011), "Hygienic Design of Food Factories", Elsevier Publication.
2. J. Peter Clark, (2008), "Practical Design, Construction and Operation of Food Facilities", Academic Press Publishers.
3. Zacharias B. Maroulis, George D. Saravacos, (2007), "Food Plant Economics", CRC Press Publishers.
4. Antonio Lopez-Gomez, Gustavo V. Barbosa-Canovas, (2005), "Food Plant Design", CRC Press Publishers.

B.VFPM 406 – Byproduct utilization and Waste management
(GENERAL COURSE - 09)
Semester IV

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand about the ways for effective utilisation of the byproducts obtained after food processing and also to gain knowledge about characterisation of waste products and effluent treatment methods.

Course Overview and Context

- To identify types of wastes in food industry
- To gain knowledge in different effluent treatment methods
- To utilize the byproduct in the food industry

Syllabus Content

Module I: Introduction
Types of waste and magnitude of waste generation in different food processing industries, concept, scope and importance of waste management and effluent treatment.

Module II: Effluent Treatment
Pretreatment of waste: sedimentation, coagulation, flocculation and floatation Secondary treatments: Biological oxidation trickling filters, activated sludge process), industrial wastewater treatment: characteristics of industrial wastewater, treatment levels

Module III: Waste utilization of agro industries
Characterization and utilization of byproducts from cereals (breweries), pulses, oilseeds, fruits & vegetables (wineries) and plantation crops (sugar industries).

Module IV: Waste utilization of animal and marine product industries
Characterization and utilization of byproducts from dairy, eggs, meat, fish and poultry

Learning Resources
Reference

1. Abbas Kazmi, Peter Shuttleworth, (2013), "The Economic Utilisation of Food Co-Products", Royal Society of Chemistry Publishing.

2. A.M. Martin, (2012), "Bioconversion of Waste Materials to Industrial Products", Springer Science & Business Media Publishing.

3. Marcos von Sperling,(2007), "Basic Principles of Wastewater Treatment", IWA Publishing.

B.VFPM 407 – Marketing Management
(GENERAL COURSE - 10)
Semester IV

Total Credits: 4
Total Lecture Hours: 60 (4 Hours/ Week)

Course Overview and Context

- To know about the various types marketing strategy involved in generating sales for a new product food products'
- To have a basic idea about different marketing skills,
- To know the different ways in which a food can be marketed to give optimum visibility,
- To understand the importance of packaging in improving sales and the latest marketing trends

Syllabus Content

Module I: Marketing management

Introduction- Definition of marketing and marketing management- Marketing concepts and functions-Marketing research – marketing mix.

Module II: Market segmentation

Concept-Need- Basis-Market targeting-Market Positioning -Understanding consumer behaviour- Buying motives- Factors influencing consumer buying decisions

Module III: Marketing of products

Product- Meaning- Product development- Product mix- PLC- Branding- brand equity-Brand loyalty-Trade mark. Packaging and labelling - Pricing of products-Factors influencing pricing- Pricing policies and Strategies-Types of pricing.

Module IV: Logistic and supply chain management

Its elements-Channel of distribution types- Factors affecting the choice of a channel of distribution.

Module V: Emerging trends in marketing

Modern marketing- Direct marketing- E Marketing- Tele marketing-Viral marketing - Relationship marketing-Social marketing-Demarketing - Remarketing- Synchro marketing-Service marketing.

B.VFPM 408 – Internship
Semester IV

Total Credits: 1

Total Lecture Hours:

Aim of the course: To develop Entrepreneurial culture and encourage the students to become entrepreneurs. Students were send to particular industries related to their semester to learn the inplant practical hands and to learn how to manufacture different products.

SEMESTER – V

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 501	Processing of Fruit and Vegetable Processing	**5**	5	70	30
2.	B.VFPM 502	Processing of fruits and vegetable (Practical)	**2**	2	100	-
3.	B.VFPM 503	Engineering properties of foods	**5**	5	70	30
4.	B.VFPM 504	Sensory Evaluation of foods	**5**	5	70	30
5.	B.VFPM 505	Food Processing equipments	**4**	4	70	30
6.	B.VFPM 506	Computer applications	**4**	4	70	30
7.	B.VFPM 507	Product and brand Management	**4**	4	70	30
8.	B.VFPM 508	Internship	**-**	1	100	-
		TOTAL	**29**	**30**		

B.VFPM 501 - Processing of Fruits and Vegetables
(SKILL COURSE - 17)
Semester V

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To understand about the proper post harvest handling technologies of fruits and vegetables and to know the process of development of fruit and vegetable processing products.

Course Overview and Context

- To know about the status of fruit and vegetable production in India with importance to losses.
- To study about the processing of fruits and vegetables.
- To impart knowledge about the various products from them.
- To study the various methods of drying of fruits and vegetables

Syllabus Content

Module I: Introduction

Composition and nutritive value of fruits and vegetable. Factors effecting composition and quality of fruits and vegetables. Quality requirements of raw materials for processing; sourcing and receiving at processing plants, primary processing: grading, sorting, cleaning, washing, peeling, slicing and blanching

Module II: Spoilage of fruits and vegetables

Different types of spoilages in fruits and vegetables. Spoilage during storage of fruits and vegetables and their prevention. General methods of preservation of whole fruits/vegetables and processed fruits and vegetables. Spoilage of pickles. Methods of preparation, curing techniques, defects and remedies. Types of preservatives commonly used in Fruits and vegetables processing industry, limits of usage of preservatives.

Module III: Processing of fruits and vegetables

Dehydration of fruits and vegetables using various drying technologies like sun drying, solar drying (natural and forced convection), osmotic, tunnel drying, fluidized bed drying, freeze drying, convectional and adiabatic drying; applications to raisins, dried figs, vegetables, intermediate moisture fruits and vegetables. Fruit powders using spray drying. Technology of extraction of juices from different types of fruits.

Module IV: Manufacture of Fruit products & Vegetable products

Manufacturing process of juice, soup, puree, and paste.Jams, Jellies and marmalades: selection, preparation, production. Difference between jam and jelly. Theory of jell formation, failure and remedies in jam and jelly making. General principles and manufacturing processes of preserves, candied fruits, glazed fruits, crystallized fruits

Learning Resources

Reference Books

1. Nirmal Sinha, Y. H. Hui, et al; (2010), "Handbook of Vegetables and Vegetable Processing", John Wiley & Sons.
2. Olga Martin-Belloso, Robert Soliva Fortuny**,** (2010), **"**Advances in Fresh-Cut Fruits and Vegetables Processing". CRC Press.
3. W Jongen (2002), "Fruit and Vegetable Processing: Improving Quality", Elsevier Publications.

B.VFPM 502 – Processing of Fruits and Vegetables (Practical) (SKILL COURSE - 20)
Semester V

Total Credits: 2

Total Laboratory Hours: 60 (3 Hours/ Week)

Aim of the course: To study the principles and methods of preservation of fruits and vegetables into various products and to practically gain skill in development of these products.

Course Overview and Context

- To understand the Handling and operating of food processing equipments and Instruments.
- To acquire knowledge about Quality analysis and quality testing of fruit and vegetable products.
- To prepare different fruit and vegetables products.

Syllabus Content

1. **Handling and operating of food processing equipments and Instruments**
    - Pulper
    - Sealers
    - Juice extracting machines
    - Autoclaves
    - Corking machines
    - Refractometer
    - Salinometer
    - Hydrometers
    - Jelmeter
    - Thermometer
    - Vacuum gauge, pressure gauge, seam checking gauge
    - Electronic weighing balance

2. **Quality analysis**
    - Quality evaluation of fruits and vegetables.
    - Quantitative analysis of cut fruits and vegetable yield.
    - Effects of pretreatment on quality of cut fruits and vegetables.
    - Refrigeration storage of fruits and vegetables
    - Determination of Maturity indices of fruits & vegetables.

3. Quality Testing

- Determination of Degree Brix (TSS), pH and % acidity in fruits and vegetable products.
- Estimation of benzoic acid, sulphur dioxide and KMS in terms of ppm present in fruits and vegetable products.
- Estimation of reducing and non reducing sugars in fruit and vegetable products
- Estimation of chloride content in food products.

4. Preservation techniques

- Extraction of juice by different methods.
- Preservation of fruits juices with addition of preservative.
- Preparation of fruit and synthetic beverages.
- Preparation of carbonated beverages.

5. Product Preparation

- Preparation of tomato juices, puree, sauces, ketchups, soup, paste.
- Comparison of juice/pulp extraction methods on quality and yield of tomato pulp.
- Preparation of jam, jelly and marmalades.
- End point determination in preparation of high sugar product.
- Preparation of preserves, candies, crystallized and glazed fruits and fruit bars.
- Effects of pre- treatment and process variables on quality of preserve and candied fruits.
- Preparation of chutney
- Preparation of sauerkraut, gherkins, cauliflower, lime, mango and mixed pickles.

B.VFPM 503 – Engineering Properties of Foods
(SKILL COURSE - 18)
Semester V

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To understand the concept of rheological and thermal properties of foods on measuring the various engineering properties of food products.

Course Overview and Context

- To study the various engineering properties of food materials under different condition
- To study about the different methods of determining the quality and properties of different foods

Syllabus Content

Module I: Physical Properties of Foods

Methods of estimation of – Shape- roundness, sphericity, roundness ratio, size, volume- platform scale method, density, specific gravity-apparatus, porosity and surface area.

Module II: Thermal Properties of Foods

Definitions - specific heat, enthalpy, conductivity and diffusivity, surface heat transfer coefficient. Measurement of thermal properties like specific heat, thermal conductivity and thermal diffusivity

Module III: Aerodynamic properties and frictional properties of Foods

Aerodynamic property-definition-drag coefficient, terminal velocity - application in handling and separation of food materials. Frictional property-coefficient of friction, angle of repose, angle of internal friction, application in food handling and storage

Module IV: Rheology and texture of foods

Rheology- rheological classification-viscoelasticity-viscometers. Hookean body, St Venant body and Newtonian body. Texture of foods- methods of textural evaluation-subjective and objective method- texture profile method

Learning Resources

References

4. M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta, Jasim Ahmed, (2014), "Engineering Properties of Foods", Fourth Edition, CRC Press.

5. M. Anandha Rao, (2010), "Rheology of Fluid and Semisolid Foods: Principles and Applications: Principles and Applications", Springer Science & Business Media Publishing.

6. Zeki Berk, (2008), "Food Process Engineering and Technology", Academic Press Publishers.

B.VFPM 504 – Sensory Evaluation of foods
(SKILL COURSE - 19)
Semester V

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: The course provides knowledge about Sensory test methods and procedures used to evaluate the flavor, color and texture of foods which helps to enhance acceptance of a product.

Course Overview and Context

- To study the appropriate sensory evaluation tests related to the sensory quality of foods.
- To understand the relationship between sensory and instrumental methods for the evaluation of food quality.
- To acquire knowledge on statistical methods for sensory evaluation.

Syllabus Content

Module I: Introduction

Definition of sensory evaluation; basic tastes; human senses and sensory perception; threshold; psychophysics, Tongue surface

Module II: Arrangements for Sensory Evaluation Test controls

Environment and test room design; product controls: sample preparation and presentation; panelist controls; factors influencing measurements: psychological and physiological errors

Module III: Statistical Methods for Sensory Evaluation

Classification of test methods; discrimination tests: paired-comparison, duo-trio and triangle tests; affective tests: qualitative (interview and focus group) and quantitative tests (paired preference and acceptance tests); Two sample test, Ranking test, Two sample difference test, numeric scoring test, hedonic ranking test

Module IV: Subjective and objective methods

Texture analyser- mechanical characteristics- chewiness, brittleness, and geometric characteristics, Sensory panel-types-criteria for panel selection

Learning Resources

References

1. Herbert Stone, Joel L. Sidel, (2012), “Sensory Evaluation Practices”, Academic Press Publishers.

2. Maynard A. Amerine, Rose Marie Pangborn, Edward B. Roessler, (2013), “Principles of Sensory Evaluation of Food”, Elsevier Publications.

3. Harry T. Lawless, Hildegarde Heymann, (2010), “Sensory Evaluation of Food: Principles and Practices”, Springer Science & Business Media.

B.VFPM 505 – Food Processing Equipments
(GENERAL COURSE - 11) Semester V

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To introduce basic equipment design and various control mechanisms.

Course Overview and Context

- To enable the student to design and develop equipments used in Food Processing operations.
- To identify and discuss critical design of typical processing equipment.
- To Understand the relationship between process design and Safety

Syllabus Content

Module I: Introduction to equipments used in food industry

Equipments: Types, planning, factors affecting selection and purchase

Module II: Mechanical Equipments

Transport equipments: Fluid food transport equipment, mechanical conveyors. Storage equipments: Solid and liquid food storage equipments. Processing equipments: Size reduction, homogenization, mixing and foaming equipments. Separation equipments: Grading and sorting equipments.

Module III: Heat exchangers, dryers and evaporators

Heat transfer equipments: Heat exchangers. Food evaporation equipments: food evaporators, evaporator components. Food dehydration equipments – Food dehydration principle, food dryers, hygiene and safety considerations.

Module IV: Refrigeration and thermal processing equipments

Refrigeration and freezing equipments: Refrigerants, freezers, chillers. Thermal processing equipments: sterilizers, pasteurizers, blanchers.

Learning Resources

Reference Books

1. Saravacos, George, (2015), "Handbook of Food Processing Equipment",Springer Publishing.
2. H. L. M. Lelieveld, John Holah, David Napper**,** (2014), "Hygiene in Food Processing: Principles and Practice", Elsevier Publications.
3. Sue Azam-Ali, (2003), "Small-scale Food Processing: A Directory of Equipment and Methods", ITDG Publishing.

B.VFPM 506 – Computer Applications
(GENERAL COURSE - 12)
Semester V

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Overview and Context

- To understand the operations of windows operating system, desktop, text editing and printouts in word pad
- To understand the operations of MS WORD-(Editing , Formatting, inserting)
- To understand the various operations in MS-Excel

Syllabus Content

Module I: Office Automation

Introduction-Tools, Windows 7, desktop, files and folders, printers, Microsoft Office button, Quick access tool bar

Module II: MS Word 7

Introduction- Typing text, Saving, opening, Closing, common edit functions (cut copy paste, change case). Text Editing - Inserting text, spell check, correcting mistakes, common formatting functions. Formatting paragraph, tables, bullets & numbering, inserting clipart & word art, picture & Drawing tool bar, Header & footer.

Module III: MS Excel 7

Introduction- Parts of MS Excel windows, opening, saving and closing, workbook, entering data and numbers, Texts, date & time, formatting data, tool bar, drawing in MS Excel, Drawing tool bar, formatting & editing worksheet. Format cells, row , column, work sheet (Inserting, deleting, renaming) Formulas, functions, charts.

Module IV: MS Power Point 7

Introduction- Parts of power point windows. Features, background design, word art, clipart, 3D settings. Animations, sound views, types of views, inserting, deleting , arranging slides, slide shows

Module V: DBMS, Internet & Email

DBMS Intro & basic concepts, Internet introduction, Creating Email- Inbox, compose, draft, attachments.

Learning Resource

References

1. Study material for Diploma in Computer Application, Centre for continuing Education, Kerala.
2. Tom Bunzel, MS Office Research Guide; Information IT.com.

B.VFPM 507 – Product and Brand Management
(GENERAL COURSE - 13)
Semester V

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Overview and Context

- To know about the various factors to be kept in mind while managing a new product
- To know about the various types marketing strategy involved in generating sales for a new product food products'
- To have a basic idea about different marketing skills, the different ways in which a food can be marketed to give optimum visibility.
- To understand the importance of packaging in improving sales and the latest marketing trends.

Syllabus Content

Module I: Product management

Introduction and importance- role of product manger product plan and its components, product line-additions, alterations and its deletions.

Module II: Product positioning

Kinds-organizing the product teams-product policy-new product demand forecasting models-product portfolio model-perceptual mapping.

Module III: New product development

Stages-new product launch-strategies-mistakes success and failures.

Module IV: Brand management & Co-branding

Strategic issues in brand management-concepts principles-brand extension-brand stretching-brand equity and its components- its measurement.
Brand positioning- product management audit-multi branding-Re-branding-packaging methods and strategies.

B.VFPM 508 – Internship
Semester V

Total Credits: 1

Total Lecture Hours:

Aim of the course: To develop Entrepreneurial culture and encourage the students to become entrepreneurs. Students were send to particular industries related to their semester to learn the inplant practical hands and to learn how to manufacture different products.

SEMESTER – VI

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	B.VFPM 601	Unit Operations in Food Industry	**5**	5	70	30
2.	B.VFPM 602	Food Quality Assurance	**3**	3	70	30
3.	B.VFPM 603	Emerging Technologies in food industry	**4**	4	70	30
4.	B.VFPM 604	Food service management	**4**	4	70	30
5.	B.VFPM 605	Personality Development	**4**	4	70	30
6.	B.VFPM 606	Project and Viva-voce	**--**	10	100	-
		TOTAL	**20**	**30**		

B.VFPM 601 - Unit Operations in Food Industry
(SKILL COURSE - 21)
Semester VI

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: To provide in-depth knowledge in basic concepts of various unit operations in a food industry.

Course Overview and Context

- To understand the different operations performed in food industry
- To know details of working of different equipments

Course Outline

Module I: Heat Transfer in Food Processing

Modes of heat transfer-conduction, convection and radiation- heat exchangers- plate heat exchanger-tubular heat-scraped surface heat exchanger.

Module II: Evaporation

Basic principle, need for evaporation, single effect, multiple effect, heat economy, type of evaporator-long tube, short tube, agitated film evaporator.

Module III: Distillation and crystallization

Simple distillation, flash distillation, steam distillation, fractional distillation Crystallisation -theory, tank crystallizer and scraped surface crystallizer.

Module IV: Extraction and extrusion

Solid Liquid extraction-leaching, Liquid-Liquid extraction, Super critical fluid extraction, single screw extruder, twin screw extruder

Module V: Mechanical separation and material handling

Sedimentation, Centrifugal separation, filtration, Mixing, Material handling-Belt conveyor, Screw Conveyor, bucket elevator and pneumatic conveyor.

Learning Resources

References

1. Y.H.Hui, (2005), "Handbook of Food Science, Technology and Engineering" (vol.1-4), Marcel Dekker Publishers.
2. M.A.Rao, S.S.H.Rizvi and A.K.Dutta, (2005), "Engineering properties of Foods", 3rd ed., Marcel Dekker Publishers.
3. H.Pandey, H.K. Sharma, R.C.Chouhan, B.C. Sarkar and M.C. Bera, (2004), "Experiments in Food Process Engineering", CBS Publishers and Distributors.
4. R.P.Singh and D.R.Heldman, (2001), "Introduction to Food Engineering", 3rd ed., Academic Press.
5. S.K.Sharma, S.J.Mulvaney and S.S.H.Rizvi, (2000), "Food Process Engineering: Theory and Laboratory Experiments", Wiley and Sons Publishers.

B.VFPM 602 - Food Quality Assurance
(SKILL COURSE - 22)
Semester VI

Total Credits: 3

Total Lecture Hours: 45 (3 Hours/ Week)

Aim of the course: To acquaint with food quality parameters and control systems, food standards, regulations, specifications.

Course Overview and Context

- To understand the principles and framework of food safety.
- To understand food laws and regulations governing the quality of foods.
- To apply preventive measures and control methods to minimize microbiological hazards and maintain quality of foods.
- To identify the wide variety of parameters affecting food quality.
- To understand about Intellectual property rights.

Syllabus Content

Module I: Concept of quality

Quality attributes- physical, chemical, nutritional, microbial, and sensory; their measurement and evaluation; Sensory *vis-àvis* instrumental methods for testing quality.

Module II: **Concepts of quality management**

Objectives, importance and functions of quality control, Quality management systems in India, Sampling procedures and plans, Food Safety and Standards Act, 2006, Domestic regulations, Global Food safety Initiative, Various organizations dealing with inspection, traceability and authentication, certification and quality assurance - PFA, FPO, MMPO, MPO, AGMARK, BIS; Labeling issues, International food standards.

Module III: HACCP system

Hazard analysis Critical Control Point: Definition, principles, Guidelines for the application of HACCP system.

Module IV: Food Quality Laws and Regulations

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

Reference Books

1. Yong-Jin Cho, Sukwon Kang.(2011), "Emerging Technologies for Food Quality and Food Safety Evaluation" ,CRC Press.
2. Alli Inteaz, (2003), "Food Quality Assurance: Princ0iples and Practices", CRC Press.
3. Vasconcellos J. Andres, (2003), "Quality Assurance for the Food Industry: A Practical Approach",CRC Press.

B.VFPM 603 - Emerging Technologies in Food Industry
(GENERAL COURSE - 14)
Semester VI

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand about new developments in food industry and to impart knowledge about the importance and applications of the technology.

Course Overview and Context

- To enable the student to understand: Emerging / alternative technologies applied to food processing.
- Relative advantages / disadvantages over existing technologies.
- Economics and commercialization of newer technologies.

Syllabus Content

Module I: Membrane separation process

Membrane Technology-process- Micro-filtration, Ultra-filtration, Nano-filtration and Reverse Osmosis-advantages-equipment

Module II: High pressure processing and microwave heating

Microwave heating of foods- Mechanism of Heat Generation-Working of microwave oven,High Pressure processing: Concept-Equipment for HPP Treatment-Mechanism of Microbial Inactivation and its Application in Food , dielectric heating of foods

Module III: Irradiation and PEF and ohmic heating

Pulsed electric field – equipment –mechanism of PEF-advantages, Ohmic heating of foods- mechanism- principle-advantages, applications. Irradiation- principle- types of irradiation-advantages-applications

Module IV: Osmotic dehydration of foods and minimal processing

Principle – Mechanism of osmotic dehydration – Effect of process parameters on mass transfer – Methods to increase the rate of mass transfer – Applications – Limitations of osmotic dehydration – Management of osmotic solutions. Minimal proceesing-principle- methods- advantages

Module V: Nanotechnology and antimicrobial technology

Role of Antimicrobial agents in food –Plant and animal derived antimicrobials – Antimicrobial enzymes, antimicrobial food packaging, nanotechnology-application of nanotechnology in food industry.

Learning Resources

Reference Books

1. Leistner L. and Gould G. Hurdle Technologies – Combination treatments for food stability safety and quality, Kluwer Academics / Plenum Publishers, New York (2002)
2. Novel Food Processing Technologies(Food Science and Technology Series) by Gustavo V. Barbosa-Canovas, Maria S. Tapia, M. Soledad Tapia, M. Pilar Cano, Publisher: CRC Press, November 2004, ISBN-13: 9780824753337,

3. P Richardson (2001), "Thermal Technologies in Food Processing", Campden and Chorleywood Food Research Association, UK, Woodhead Publishing Limited.

B.VFPM 604 – Food Service Management
(GENERAL COURSE - 15)
Semester VI

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand the functioning of food service establishments. And to acquire knowledge about the services that should be given by a food service establishment.

Course Overview and Context

- To understand the organisation of food service establishments
- To understand the management of human, material and financial resources.
- To be familiar with various concepts involved in quantity and quality food production and service.
- To understand the need for efficient personnel management in the food industry.

Syllabus Content

Module I: Introduction to Food Service Establishments

Types of food service establishments. Planning for a food service unit- Planning, investment, Project report, Registration (License and Inspection).

Module II: **Menu Planning and table setting**

Menu Planning- importance, types, steps in planning. Requisites in designing a menu card, Methods of purchase, delivery, receiving, storage types. Table Setting and Arrangement - Indian and Western Styles of Table Setting, Table Appointments, Napkin folding styles, Flower arrangement, Table Etiquettes.

Module III: Food Service and Delivery system

Centralized and decentralized delivery systems, types of food service systems conventional, commissary, ready prepared, assembly, service styles - table, counter, tray, silver, plate, cafeteria, buffet. Specialized forms of food service - hospitals, airline, rail, homedelivery, catering and banquet, room and lounge service.

Module IV: Food Service Management

Managing an organization, Process involved, Principles of management, Functions of management- planning, organizing, directing, co-ordinating, evaluating, and

controlling. Total quality management, Management by objectives. Work design, job design, work study and simplification.

Module V: Accounting

Book keeping, books of accounts, Journal, Ledger, trial balance, balance sheet. profit analysis, food cost control.

Learning Resources

Reference Books

1. Arora, (2007), "Food Service And Catering Management" APH Publishing.
2. Wentz Bill, (2007), "Food Service Management", Atlantic Publishing Company.
3. Malhotra, R. K.(2002), "Food Service and catering Management" ,Anmol Publication Pvt Ltd.

B.VFPM 605 – Personality Development
(GENERAL COURSE - 16)
Semester VI

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand the strategies for the personality development and to improve the personality of the employees upon organizational effectiveness.

Course Overview and Context

- To bring about personality development with regard to the different behavioural dimensions.

Syllabus Content

Module I: Leadership

Introduction to Leadership, Leadership Power, Leadership Styles, Leadership in administration

Module II: Interpersonal Relations

Introduction to Interpersonal Relations, Analysis of different ego states, Analysis of Transactions, Analysis of Strokes, Analysis of Life position

Module III: Stress and Conflict Management

Introduction to Stress, Causes of Stress, Impact Stress, Managing Stress. Conflict: Introduction to Conflict, Causes of Conflict

Module IV: Time Management

Time as a Resource, Identify Important Time Management Wasters, Individual Time Management Styles, Techniques for better Time Management.

Module V: Motivation

Introduction to Motivation, Relevance and types of Motivation, Motivating the subordinates, Analysis of Motivation.

B.VFPM 606 – Project and Viva-voce
Semester VI

Total Credits: 10
Total Lecture Hours:

Aim of the course: To develop Entrepreneurial culture and encourage the students to become entrepreneurs. Students were allotted a supervisor under the guidance of whom they have to do some research and submit a thesis report and have to defend the viva voce in front of external examiner. This thesis could be also in form of a project in industries as well, where students were send to some industries where they were allotted with some project topic related to industries and have to defend a viva voce just as same as in thesis.