



Rayat Shikshan Sanstha's

Yashavantrao Chavan Institute of Science, Satara (Autonomous)

Under Choice Based Credit System (CBCS)

(July 2022-2023)

SYLLABUS

For

M. Sc. Food Processing and Packaging

(Semester Pattern)

M. Sc. II Sem. III to IV

Academic flexibility with credit system to be implemented

From

July, 2022 onwards

Rayat Shikshan Sanstha's
Yashavantrao Chavan Institute of Science, Satara
Syllabus for Master of Science Part II

1. Title: M.Sc. Food Processing and Packaging (Entire)

2. Year of Implementation: 2022-23

3. Preamble:

M. Sc. Food Processing and Packaging course under autonomy has been prepared keeping in view the unique requirements of M. Sc. Food Processing and Packaging students. The emphasis of the contents is to provide students the latest information along with due weightage to the concepts of classical trends in Processing and Packaging in food so that they are able to understand the recent and modernize technologies in the study of Snack Food and Extrusion Technology, Quality Evaluation of Processed Food, Technology of Meat, Fish and Milk. Recent Trends in Packaging like Advanced Food Packaging, Concepts and application of Computer in Packaging Design and applied subjects like Cold Storage and Refrigeration, Climate Change and Food Security, Marketing Management in Food Sector and Entrepreneurship in Food Processing. Also includes important topic like Waste Management and Renewable Energy in Food Processing.

The course content also lists new practical exercises so the students get hands on experience of the latest techniques that are currently used in Food industries. Project curriculum spanning over the one year of the course is designed in a way to give the students first hand research experience as it consists of writing of synopsis, literature review along with actual table work. Along with students are also provided with an opportunity to peruse internship in industry or research centers. The course will also inspire students to pursue higher studies and research in Food Processing and Packaging, for becoming an entrepreneur and enable students to get employed in Food, Nutraceutical and Agriculture Industries.

4. General Objectives:

- Construction and designing of the courses to suite industrial needs.
- More emphasis on applied aspects of Food Processing and Packaging.
- To develop aptitude of students in the field of research.
- Enrichment of basic knowledge in areas of Food Processing and Packaging.

5. Duration: One Year

6. Pattern: Semester wise

7. Medium of Instruction: English

8. Structure of Course:

a. Semester III:

Theory: 04 Papers

Practical's: 02 Papers

b. Semester IV:

Theory: 04 Papers

Practical's: 02 Paper

YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE, SATARA

COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)

M. Sc. Food Processing and Packaging (ENTIRE)

M. Sc. II SEMESTER– III (Duration – 6 Months)

Sr. No.	SUBJECT CODE	PAPER NO AND TITLE	TEACHING SCHEME						
			Theory			Practical			
			No. of lectures	Hours	Credits	Subject	No. of lectures	Hours	Credits
1	MFPT 301	Snack Food and Extrusion Technology	4	4	4	MFPP 305 : Snack Food, Extrusion Technology and Technology of Meat, Fish and Milk	8	8	4
2	MFPT 302	Technology of Meat, Fish and Milk	4	4	4				
3	MFPT 303	Advanced Food Packaging	4	4	4	MFPP 306 : Research Project	8	8	4
4	MFPT 304 A	Cold Storage and Refrigeration	4	4	4				
5	MFPT 304 B	Climate Change and FoodSecurity	4	4	4				
Total of SEM III			16	16	16		16	16	08

YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE ,SATARA

COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)

M. Sc. Food Processing and Packaging (ENTIRE)

M. Sc. II SEMESTER– IV (Duration – 6 Months)

Sr. No.	SUBJECTCODE	PAPER NO AND TITEL	TEACHING SCHEME						
			Theory			Practical			
			No. of lectures	Hours	Credits	Subject	No. of lectures	Hours	Credits
1	MFPT 401	Quality Evaluation of Processed Food	4	4	4	MFPP 405: Quality Evaluation of Processed Food and Concepts and Application of Computer in Packaging Design	8	8	4
2	MFPT 402	Waste Management and Renewable energy in Food Processing	4	4	4				
3	MFPT 403	Concepts and Application of Computer in Packaging Design	4	4	4	MFPP 406 : Internship	8	8	4
4	MFPT 404 A	Marketing Management in Food Sector	4	4	4				
5	MFPT 404 B	Entrepreneurship in Food Processing	4	4	4				
Total of SEM IV			16	16	16		16	16	8

Other Feature:

A) Library:

Reference and Textbooks, Journals and Periodicals

B) Specific Equipment's:

Computer, LCD Projector.

C) Laboratory Equipment's:

Sr.No.	Name of the Equipment's
1.	Tray Dryer
2.	Vacuum Packaging Machine
3.	Tearing Strength Tester
4.	Bursting Strength Tester
5.	Cooling Centrifuge
6.	Weighing Balance
7.	Hot Plate Round
8.	Muffle Furnace
9.	P ^H Meter
10.	Crown Corking Machine
11.	Refractometer
12.	Incubator
13.	Hot Air Oven
14.	Deep Freeze

15.	Chimney
16.	Centrifuge
17.	Food Processor
18.	Gas Stove
19.	Aluminum Foil Sealing Machine
20.	Water Bath
21.	Heating Mantle
22.	Colorimeter
23.	Compound Microscope
24.	Refrigerator
25.	Viscometer
26.	Lactometer
27.	Turbidometer

Semester III

SUBJECTCODE	PAPER NO AND TITLE
MFPT 301	Snack Food and Extrusion Technology
MFPT 302	Technology of Meat, Fish and Milk
MFPT 303	Advanced Food Packaging
MFPT 304 A	Cold Storage and Refrigeration
MFPT 304 B	Climate Smart and Food Security

SEMESTER III

MFPT-301 Snack Food and Extrusion Technology

Course Objective: Students will able to-

1. understand the importance and scope of snack food
2. study and formulate the ingredients and current practices for preparation of snacks
3. understand extrusion & processing of snacks through extruders
4. understand packaging material required for snack foods & their quality control

Credits = 4	SEMESTER III MFPT-301 Snack Food and Extrusion Technology	No. of hours per unit / credits
UNIT I	Introduction & Snack Food Ingredients	15
	<p>a) Introduction to snacks, Domestic and Global status of Snack food Industry, Ingredients & additives commonly used in snack food, their attributes and functions.</p> <p>b) Starches for snack foods, Technology for grain-based snacks: whole grains – roasted, toasted, puffed, popped and flakes, coated grains-salted,spiced and sweetened; flour based – batter and dough based products papads.</p>	
UNIT II	Products and Processing	15
	<p>a) Potato Chips, Meat based snacks, Snacks based on popcorn, baked snacks, Nut based snacks (salted, spiced and sweetened), Savory and Farsans,</p> <p>b) Processing of Papad, Chips and Wafers, Corn Chips and Simulated Potato Chips, Application of seasonings, Indian Savory Sweets</p>	
UNIT III	Extrusion & Extrusion Methods of Snack Foods	15
	Extrusion: definition, introduction to extruders,	

	principles and types, Extruded products, Extruding Equipment, Uses of extruders in the snack food industry; Specialized Equipment for Popcorn Processing; Snack foods from formers & high shear extruders, Potato chip processing, Equipment for Frying, Baking, and Drying, Snack foods from cooking extruders	
UNIT IV	Packaging & Quality Control of Snack Foods	15
	<p>a) Product protection & packaging materials; Quality properties of snack foods, properties of snack food packaging materials, Packaging Materials & Packaging equipment's required for snack foods.</p> <p>b) Quality assurance and Quality control of snack foods; evaluation methods- process control and product attributes and safety, Oil Content and Shelf Stability.</p>	

Course Outcomes -Students should able to

1. analyze application of seasonings and Indian savory snacks
2. understand the type of packaging material required for snack foods
3. standardize quality control & quality assessment for snack foods & shelf life study
4. formulate the ingredients and current practices for preparation of snacks

Reference Books

1. Matza S ,Extruded foods. Springer, 2000
2. N.D. Frame,Technology of Extrusion Cooking Springer, (Springer New York, NY 2012) 1-51
3. Riaz M.N.,Extruders in Food Application CRC Press, 2000
4. Samuel A. Matz, Snack food technology 3rd edition AVI Publ.1993
5. Gordon BR,Snack Foods,AVI Publ. 1997
6. Maskan and Altan Advances in Food Extrusion Technology CRC Press, 2000
7. Edmund W.Lusas & Lloyd W.Rooney, Snack Foods Processing CRC Press 2000

MFPT 302 – Technology of Meat, Fish and Milk

Course Objective: student will able to

1. understand and remember the techniques used in meat and poultry processing.
2. Study of fish processing technology.
3. Study and learn milk processing technology.
4. understand the various milk products and technology in milk products.

Credits = 4	SEMESTER III MFPT 302 – Technology of Meat, Fish and Milk	No. of hours per unit / credits(60)
UNIT I	Meat And Poultry Technology	15
	Sources and development of meat and poultry industries in India, muscle structure and physio – chemical properties of meat muscle. Pre – slaughter transport and care, slaughtering of animals and poultry, post – mortem inspection and grading of meat, Egg structure: composition, quality characteristics, processing and preservation of egg, processing and preservation of meat and poultry: freezing, pickling, curing, cooking and smoking.	

UNIT II	Fish Technology	15
	Classification of fish (fresh water and marine), composition of fish, characteristics of fresh fish, Fish products: fish protein concentrate (FPC), fish protein extract (FPE), fish protein hydrolysate (FPH)	
UNIT III	Technology In Milk	15
	<p>a) Introduction – Status and scope of dairy industry in India, Definition of milk, composition, Physical and chemical properties of milk, factors affecting composition of milk, Physio – chemical properties of milk: Color, flavor, viscosity, acidity and PH.</p> <p>b) Quality control tests: Platform tests like – smell, appearance, temperature, lactometer reading. Chemical/ Laboratory test: Fat, SNF and Acidity. Fluid milk processing: Pasteurization: LTLT, HTST, UHT methods.</p>	
UNIT IV	Milk Products And Technology In Milk Products	15
	Coagulated milk products: Channa, paneer, classification and manufacturing process of cheese, Butter/ Ghee: Manufacture and storage of butter and ghee, Condensed milk: factors affecting the quality of condensed milk, storage of condensed milk, Dry milk products: methods of drying milk (Drum and Spray drying), factors affecting the quality of dry milk, Frozen products: Manufacturing of ice – cream factors affecting the quality of frozen products, Cleaning and sanitation of dairy plant and equipment	

Course Outcomes: Student should able to

1. standardize various quality control measures in milk processing.
2. characterize various milk products
3. understand the technology used for preparation on various milk products.
4. analyze and learn milk processing technology.

Reference Books:

1. Aberle, Elton David. Principles of meat science. Kendall Hunt, 2001.
2. Singh, V. P., and Neelam Sachan. Principles of meat technology. New India Publishing, 2011.
3. Hui, Yiu H., ed. Handbook of meat and meat processing. CRC press, 2012.
4. Sastry, N. S. R., C. K. Thomas, and R. A. Singh. Farm animal management and poultry production. Vikas Publishing House, 1982.
5. Hall, George M., ed. Fish processing technology. Springer Science & Business Media, 1997.
6. Nollet, Leo ML, Terri Boylston, Feng Chen, Patti Coggins, Grethe Hydlig, L. H. McKee, and Chris Kerth, eds. Handbook of meat, poultry and seafood quality. John Wiley & Sons, 2012.
7. Eckles, Clarence Henry, Willes Barnes Combs, and Harold Macy. "Milk and milk products." Milk and milk products. 4th edition (1951).
8. De, Sukumar. "Outlines of dairy technology." (1980).
9. Tamime, Adnan Y., ed. Milk processing and quality management. John Wiley & Sons, 2009.
10. Class, X. I. I. "CBSE Study Material for Student." PhD diss., Department of Commerce & Business Administration, Saurashtra University, Rajkot.
11. Rai, Bhole Shankar, Sangeeta Shukla, Kaushal Kishor, Himanshu Singh, and Swarnima Dey. "Sensory acceptability of value added multigrain biscuit with different levels of wheat flour, maize flour and sesame seed." The Pharma Innovation 6, no. 7, Part H (2017): 1015.

MFPT 303 Advances in Food Packaging

Course Objectives: Students will able to-

1. understand the various designing & labeling parameters for food packaging.
2. study the packaging operations cost.
3. understand the new trends in food Packaging.
4. understand the recent technologies in food Packaging.

Credits = 4	SEMESTER III MFPT 303 Advances in Food Packaging	No. of hours per unit / credits(60)
UNIT I	Package Labelling and Designing	15
	Label, types of label, Importance of nutritional labelling package design consideration, cushioning materials and their properties, Testing and Identification of packaging materials.	
UNIT II	Packaging Economics	15
	a) Evaluation of packaging economics, Packaging operations cost consideration and disposability. b) Hazards in distribution & design of packages for various foods.	
UNIT III	Novel Techniques in Packaging I	15
	a) Smart Packaging, Active Packaging- Oxygen absorbers, Carbon dioxide absorbers, Ethylene absorbers, Humidity absorbers, Lactose remover, UV light absorbers and Cholesterol remover. b) Antimicrobial Food Packaging- Benzoic acids, Paraben, Benzoic & sorbic acids, Acetic, propionic acid, Lysozyme, nisin, EDTA, Allyl isothiocyanate.	

	Edible packaging- Edible coating and Edible films.	
UNIT IV	Novel Techniques in Packaging II	15
	<p>a) Active packaging systems- Self-heating cans and Self-cooling cans, Green Plastics for Food Packaging- Polylactic acid (PLA), Native starch, Thermoplastic starch, Chitin and chitosan, Cellulose and Shellac resins.</p> <p>b) Intelligent Packaging- Thermochromic inks, Microwave Doneness Indicators (MDIs), Radio Frequency Identification (RFID). Bioactive packing- Non-Migratory Bioactive Polymers (NMBP) In Food Packaging, Inherently bioactive synthetic polymers: Types and Applications- Chitosan, UV irradiated nylon.</p> <p>c) Nanotechnology in food packaging- Nano composite, Innovative packaging technologies- Functional barrier and High chemical barrier material innovations.</p>	

Course outcomes: Students should able to

1. perform the test of packaging material.
2. evaluate the packaging operations cost.
3. understand the various novel methods of packaging.
4. formulate the recent packaging technologies.

Reference Books:-

1. Paine, Frank A., and Heather Y. Paine. *A handbook of food packaging*. Springer Science & BusinessMedia, 2012.
2. Coles, Richard, Derek McDowell, and Mark J. Kirwan, eds. *Food packaging technology*. Vol. 5. CRCpress, 2003.
3. Sacharow, Stanley, and Roger C. Griffin. *Principles of food packaging*. AVI Pub. Co., 1980.
4. Kadoya, Takashi, ed. *Food packaging*. Academic Press, 2012.
5. Mahadeviah, M., and R. V. Gowramma. *Food packaging materials*. Tata McGraw-Hill, 1996.
6. Palling, S. J. *Developments in food packaging*. No. 664.09 P3. 1980.

7. Majid, Ishrat, Gulzar Ahmad Nayik, Shuaib Mohammad Dar, and Vikas Nanda. "Novel food packaging technologies: Innovations and future prospective." *Journal of the Saudi Society of Agricultural Sciences* 17, no. 4 (2018): 454-462.
8. Majid, Ishrat, Gulzar Ahmad Nayik, Shuaib Mohammad Dar, and Vikas Nanda. "Novel food packaging technologies: Innovations and future prospective." *Journal of the Saudi Society of Agricultural Sciences* 17, no. 4 (2018): 454-462.
9. Altaf, Uzma, Varsha Kanojia, and A. Rouf. "Novel packaging technology for food industry." *Journal of Pharmacognosy and Phytochemistry* 7, no. 1 (2018): 1618-1625.

MFPT 304 A Cold Storage Technology and Refrigeration

Course Objective: Students will able to-

1. understand the refrigeration and refrigeration system.
2. study best practices in cold Storage and freeze Storages.
3. understand controlled atmosphere and modified atmosphere storages.
4. understand chilling equipment and techniques for different food products.

Credits = 4	SEMESTER III MFPT 304 A Cold Storage Technology and Refrigeration	No. of hours per unit / credits(60)
UNIT I	Principles of Refrigeration	15
	Principles of Refrigeration, Refrigeration cycles, Vapour compression and vapour absorption cycles, refrigerants, characteristics of different refrigeration's, ozone-depletion potentials, green house potential refrigerants, use of non-polluting refrigerants, net refrigerating effect, ton of refrigeration - Components of a Refrigeration system: compressor, condenser, Evaporator, Expansion valves piping and different controls. Atmospheric air and its properties, Psychometrics.	

UNIT II	Cold Storage Design and Construction	15
	<p>a) Cold Storage Design and Construction, Small and large commercial storages, Cold Room temperatures, Insulation, Properties of insulating materials, Air diffusion equipment, Doors and other openings.</p> <p>b) Cold load estimation; prefabricated systems, walk-in coolers and refrigerated container truck: Freezer Storages, Freezer room temperatures, insulation of freezer rooms: Pre-cooling and pre freezing.</p> <p>c) Cold storage practice, Stacking and handling of material in and around cold rooms, Optimum temperatures of storage for different food materials.</p>	
UNIT III	Controlled atmosphere and modified atmosphere storages	15
	Controlled atmosphere and modified atmosphere storages: Principles and basics of their construction, Operation and maintenance, cleanliness, defrosting practices, preventive maintenance and safety measures.	
UNIT IV	Chilling of Foods	15
	Chilling of Foods: Chilling equipment for liquid foods. Secondary refrigerants and direct expansion techniques in chilling. Chilled foods transport and display cabinets – Basics of Chilled foods microbiology – Hygienic design considerations for chillers and chilled storages Cool storage and their applications. Evaporative cooling and its applications.	

Course outcomes: Student should able to

1. Understand the refrigeration system.
2. evaluate the Cold Storage and its construction.
3. characterize the technologies of Chilling
4. analyze the modified atmosphere storages for food products.

Reference Books:

1. Raymond R. Gunther: Refrigeration, Air Conditioning and Cold Storage Chiltan Company, Philadelphia, USA 1957
2. Clive D.J. Dellino: Cold and Chilled Storage Technology Publisher: Kluwer Academic Publisher (1997)
3. S. Domkundwar and Subhash Arora: A Course in Refrigeration and Air Conditioning: DhanpatRai and Sons, Publishers, New Delhi (1994)
4. Andrew D Althouse and others: Refrigeration and Air Conditioning Goodheart – Willcox CompanyInc. 1982
5. E.R. Hollowell: Cold Storage and Freezer Storage Manual AVI Publishing Co. (1980)
6. Ed. C.P. Mallet: Frozen Food Technology Balckie Academic and Professional, (1993)
7. Aurel Gobaneu and Gabrila Lasessa and others (1976) Cooling Technology in the Food Industry:Abacus Press, Tunbridge Wells, U.K

Additional Learning Source

1. <https://nptel.ac.in/courses/103107088/module11/lecture2/lecture2.pdf>
2. <https://swayam.gov.in/course/3687-refrigeration-and-air-conditioning>

MFPT-304 B Climate Change and Food Security

Course Objectives: Students will able to-

1. understand the climate and agriculture.
2. Study of Mitigation and Adaptations.
3. study about the food security and nutrition security.
4. understand the methods used to measure level of food security.

Credits = 4	SEMESTER III MFPT-304 B Climate Change and Food Security	No. of hours per unit / credits
UNIT I	Climate Change and Agriculture	15
	Climate change and agriculture, impact of temperature and changed climate on crop productivity, climate change and food availability, climate change and	

	stability of food production, climate change and access to food, climate change and food utilization, government of India policies and programs for food Security	
UNIT II	Mitigation and Adaptations.	15
	Sustainable integrated agricultural systems, Climate-Smart agriculture, Conservation agriculture, Sustainable intensification, Urban agriculture, Food supply management, Demand changes - diet changes, food waste	
UNIT III	Food security and Nutrition security.	15
	Definition, introduction, concept and principles of food security, climate change and food insecurity: response measures, accessibility, utilization, stability of food supply, challenges and current situation in food security, basic principles of nutrition security, community nutrition, nutritional ecology, nutrition programs and policies.	
UNIT IV	Methods Used to Measure the Level of Food and Nutrition Security	15
	The food and agricultural organization (FAO) method, household expenditure survey method (HESM), dietary intake assessment (DIA), integrated child development services, rapid rural appraisal, anthropometry	

Course outcomes: students should able to:

1. analyze the impact of climate change on food.
2. understand the policies and programs for food Security
3. characterize the need of food and nutrition security
4. understand the current situation in food security and nutrition programs and policies

Reference Books:-

2. Zhou, Zhang-Yue. Global Food Security: What Matters?. Routledge, 2019.
3. Swaminathan, Monkombu Sambasivan. Combating hunger and achieving food security. Cambridge University Press, 2016.
4. Assessment, Millennium Ecosystem. "Climate Change: Observed Impacts on PlanetEarth." CHEMISTRY International (2009).
5. Chinnala, Bala Ramulu. Marginalized Communities and Decentralized Institutions in India: An Exclusion and Inclusion Perspective. Routledge India, 2020.
6. Ramesh, Mridula. The Climate Solution: India's Climate-Change Crisis and What We Can Do about It. Hachette UK, 2018.
7. Weingärtner, Lioba. "The concept of food and nutrition security." Achieving food and nutrition security 3 (2009).

MFPP 305 : Snack Food, Extrusion Technology and Technology of Meat, Fish and Milk**Course Objective: Students will able to-**

1. Study of snack food, extrusion technology and technology of meat, fish and milk
2. study shelf life studies and quality evaluation for each snack
3. understand various quality parameters in meat and poultry products
4. Study of methods used to prepare milk products and learn quality parameters.

Credits = 4	SEMESTER III MFPP 305 : Snack Food, Extrusion Technology and Technology of Meat, Fish and Milk	No. of hours per unit / credits (60)
	Section A	
	1. Preparation of Chips and its quality evaluation 2. Preparation of extruded snack food and its quality evaluation 3. Preparation of Wafers and its quality evaluation 4. Preparation of Flaked cereals (Poha) and its quality evaluation 5. Preparation of Puffed cereals (Churmura) and its quality	

	<p>evaluation</p> <p>6. Preparation of Expanded snack and its quality evaluation</p> <p>7. Preparation of noodles/ vermicelli and its quality evaluation</p> <p>8. Preparation of Coated grains or nuts and its quality evaluation</p> <p>9. Preparation of instant food premixes and its quality evaluation</p> <p>10. Determination of Shelf-Life and Quality Characteristics of Snack Foods</p> <p>11. Preparation of savory snack product and its quality evaluation.</p> <p>12. Preparation of popcorn and its quality evaluation.</p>	
	Section B	
	<ol style="list-style-type: none"> 1. Slaughtering and dressing of poultry bird 2. Determination of meat PH 3. Preparation of meat products 4. Composition and structure of egg 5. Determination of egg quality 6. Determination of moisture content in milk powder 7. Determination of fat content in milk powder 8. Preparation of ice cream 9. Determination of titrable acidity of milk 10. Determination of fat in milk 11. Preparation of paneer 	

Course Outcomes-

Students are able to:

1. preparation methods of different snacks like potato chips, flaked cereals, popcon, expanded snacks, coated grains.
2. formulate the shelf life studies and quality evaluation for each snack.
3. characterize different methods used for the preparation of milk products.
4. Understand various quality control measures in meat, fish and poultry products

Reference books

1. Riaz M.N., Extruders in Food Application CRC Press, 2000
2. Samuel A. Matz, Snack food technology 3rd edition AVI Publ. 1993
3. Gordon BR, Snack Foods, AVI Publ. 1997
4. Maskan and Altan Advances in Food Extrusion Technology CRC Press, 2000
5. Edmund W. Lusas & Lloyd W. Rooney, Snack Foods Processing CRC Press 2000
6. Hui, Yiu H., ed. Handbook of meat and meat processing. CRC press, 2012.
7. Sastry, N. S. R., C. K. Thomas, and R. A. Singh. Farm animal management and poultry production. Vikas Publishing House, 1982.
8. Hall, George M., ed. Fish processing technology. Springer Science & Business Media, 1997.

MFPP 306: Research Project

Credit 04

SEMESTER IV

SUBJECTCODE	PAPER NO AND TITEL
MFPT 401	Quality Evaluation of Processed Food
MFPT 402	Waste Management and Renewable energy in Food Processing
MFPT 403	Concepts and application of Computer in Packaging Design
MFPT 404 A	Marketing Management in Food Sector
MFPT 404 B	Entrepreneurship in Food Processing
MFPT 405	Quality Evaluation of Processed Food and Concepts and Application of Computer in Packaging Design
MFPT 406	Internship

MFPT-401 Quality Evaluation of Processed Food

Course Objective: Students will be able to-

1. understand and the quality evaluation in dairy industries
2. study about quality evaluation in bakery and confectionary industries
3. study quality evaluation in Meat, Poultry and Sea food industries
4. understand sensory analysis of food and its methods

Credits = 4	SEMESTER IV MFPT-401 Quality Evaluation of Processed Food	No. of hours per unit / credits
UNIT I	Quality Evaluation in Dairy Industries	15
	Milk Composition, Major and minor milk constituents, Nutritional Importance - Milk reception operations - Unloading-Conveying - Examiner of raw milk-weighing sampling of Milk - Quality control lists for milk and their significance. Introduction - Preservatives – Neutralizer - Adulterants - Detection methods - Standard specification of Milk and Milk products - Dairy product certification and licensing.	
UNIT II	Quality Evaluation in Bakery and Confectionary Industries	15
	a) Quality of raw materials, quality checks on flours, building inspection and routine cleaning programs, process control- microbial and fungal contaminants. b) Ingredients, equipments, bakery quality assurance, ingredient inspection, process control, assessing products for quality.	
UNIT III	Quality Evaluation in Meat, Poultry and Sea Food Industries	15
	a) Poultry processing, Nutritive value of egg, Microorganisms associated with egg, Measurement of egg shell, albumin and yolk quality - Determination of interior quality, defects-grading of egg-quality assurance-Test methods. Egg powder and products. MPL of contaminants for egg products.	

	b) Sea foods - nutritional composition- microbial, non - microbial and metal contaminants in sea foods- transportation of fish - grading - sea food products and processing - preservation methods - freezing – IQF - canning - salting - surumi process. Maximum Permissible Limit for sea foods.	
UNIT IV	Sensory Analysis of Food and its Methods	15
	Definition of Sensory Analysis , Sensory characteristic of food, Requirements of conducting Sensory Analysis Sensory panel-Types, Training of sensory panel, Reason for testing food Quality, Methods of Sensory Evaluation and sensory card.	

Course outcomes: Student should be able to

1. evaluate the quality of Dairy products
2. characterize the quality evaluation of Confectionary products
3. understand the quality evaluation of Bakery products
4. formulate the Supply Chain Management in dairy and Poultry

Reference Books:

1. Pearson, A.M and Dutson, T.R..HACCP in meat, poultry and fish processing, Advances in meatresearch series, Volume 10, Chapman & Hall Publisher, New York. 1995
2. Shai Barbut.. Poultry Products Processing An industry Guide, CRC Press, Florida, 2002
3. Assuring food safety and quality.. FAO Food and Nutrition Manual., FAO publications, Rome. 2012
4. FSMS Manual for bakery and confectionery industry. 2014.
5. Jenness, R and Patton, S. Principles of Dairy Chemistry, John Wiley and Sons. Inc. New York, International Dairy Federation (IDF): www.idf.org (1959).
6. Food Safety and Standards Act (No.34 of 2006),: Ministry of Food Processing Industries, 2006<http://www.mofpi.nic.in>
10. Sensory Evaluation Technique, Civillie andCarr, CRCPress, 2015
11. Food Standards and Safety in a GlobalisedWorld:The Impact of WTO and Codex, Saxena Madhu andKhanna Sri Ram, New century Publications, New Delhi.2003.
12. Sensory Evaluation Technique, Civillie andCarr, CRCPress, 2015.
13. Food Standards and Safety in a GlobalisedWorld:The Impact of WTO and Codex, Saxena Madhu andKhanna Sri Ram, New century Publications, New Delhi.2003.

MFPT 402 Waste Management and Renewable Energy in Food Processing

Course Objective: Students will able to-

1. understand various sources of energy and pretreatment of wastes.
2. Study the utilization of wastes produced by various food industries
3. understand energy and application of solar energy in food processing.
4. study the biofuel production and utilization modern applications of biomass.

Credits = 4	SEMESTER IV MFPT 402 Waste Management and Renewable Energy in Food Processing	No. of hours per unit / credits(60)
UNIT I	Sources and Pretreatment of Wastes	15
	Sources of waste and pollutants, Classification, and characterization of Solid, Liquid and Gaseous wastes from food industry. (Dairy industry, agro processing industry, meat industry, bakery industry), Pretreatment of waste, Secondary treatments, and Tertiary treatments, Measurement of levels of pollution.	
UNIT II	Utilization of Waste and Effluent Treatment	15
	Utilization of waste from: Fruit and Vegetable processing, Fish, Meat and Poultry industry, oil milling, and pulses milling, and utilization of by-products of dairy industry, microbiology of effluent and treated water. Identification of insecticide, pesticides, and fungicides in effluent water.	
UNIT III	Solar Energy and its Applications	15
	<p>a) Solar Energy - Biomass Energy - Wind Energy and other Renewable Sources of Energy - Economics of Waste - Heat Recovery and Cogeneration - Energy Conservation Economics.</p> <p>b) Solar Thermal Energy: Solar radiation, flat plate</p>	

	collectors and their materials, Solar furnaces, Solar operated refrigeration systems, Solar Thermal Energy Storage, Solar still; Solar cooker: Solar pond.	
UNIT IV	Biofuels and Biomass Applications	15
	Bio ethanol – production from conventional as well as unconventional sources. - Bio diesel – Technology for production of bio diesel. Rural applications of biomass –Combustion - Chulas - improved Chulas- Biomass – Physical - Chemical composition – properties of biomass, Recovery from the in industrial waste water – Case Studies in sugar, distillery, dairy, pulp and paper mill, etc.	

Course outcomes: Student should be able to-

1. Understand the pretreatment of wastes, secondary and tertiary treatments.
2. Understand utilization of waste products produced by food industries.
3. Understand the applications of solar energy in food processing.
4. evaluate the production of various biofuels.

Reference Books:

- 1.Garg H P., Prakash J., Solar Energy: Fundamentals & Applications, Tata McGraw Hill, New Delhi, 1997
- 2.Koushika M.D., "Solar Energy Principles and Applications", IBT publications, 1988. 2. Mital K.M, "Biogas systems: Principles and Applications", New Age International Publishers (P) Ltd.,1996
- 3.John Twideu and Tony Weir, „Renewal Energy Resources“ BSP Publications, 2006.
- 4.Larry D Partain (ed.), Solar Cells and their Applications,John Wiley and Sons, Inc, New York, 1995
- 5.Manoj Datta, Waste Disposal in Engineered Landfills, Narosa Publishing House, 1997
- 6.D.S. Chauhan,“Non-conventional Energy Resources“ New Age International.
- 7.Parker, Colin, & Roberts, Energy from Waste - An Evaluation of Conversion Technologies,

Elsevier Applied Science, London, 1985

8. Shah, Kanti L., Basics of Solid & Hazardous Waste Management Technology, Prentice Hall, 2000

9. Manoj Datta, Waste Disposal in Engineered Landfills, Narosa Publishing House, 1997

10. Rich, Gerald et.al., Hazardous Waste Management Technology, Podvan Publishers, 1987

11. Bhide AD., Sundaresan BB, Solid Waste Management in Developing Countries, INSDOC, New Delhi, 1983.

MFPT-403 Concepts and application of Computer in Packaging Design

Course Objective: Student will able to-

1. understand the design of molds for packaging.
2. study the packaging design concepts.
3. Understand the application of computers in packaging design.
4. study the package printing technology

Credits = 4	SEMESTER IV MFPT-403 Concepts and application of Computer in Packaging Design	No. of hours per unit / credits(60)
UNIT I	Design of packaging molds for packaging	15
	Injection Molds, Blow Molds and its principle of working, Extrusion Dies, Product Design, Designing for Packaging Application, Equipment's for canning, paper / board carton, Flexible packaging, Application of various molds	
UNIT II	Packaging Design Concepts	15
	Introduction to design, 2D & 3D Design principle and applications, Study of Visual Elements, Principles of Typography, Introduction to visual ergonomics, Understanding the relationship between consumer & communication Design.	

UNIT III	Application of Computers in Packaging Design	15
	Setting drawing requirement, Commands and systems variables, To co-ordinate a system, Creating objects, Introduction to Editing methods, Layers and object properties and components, Creating 3D objects	
UNIT IV	Package Printing Technology	15
	Process of Communication, Printing Processes and Methods, Layout & Paste-up, Composition for Printing, Theory of Full Color Graphic Arts, Photography, Printing Image, Carriers, Printing Presses, Paper and other Printing Stocks, Printing Inks.	

Course outcomes: Student should be able to

1. formulate the Design of molds for packaging
2. characterize the Layers and object properties.
3. Understand the Package Printing Technology
4. Design Packaging Concepts.

Reference Books :

1. Athavale, Shrikant P. *Hand Book of Printing, Packaging and Lamination: Packaging Technology*. Notion Press, 2018.
2. Agazzi, Alban, Vincent Sobotka, Ronan LeGoff, and Yvon Jarny. "Optimal cooling design in injection moulding process–A new approach based on morphological surfaces." *Applied Thermal Engineering* 52, no. 1 (2013): 170-178.
3. Klimchuk, Marianne R., and Sandra A. Krasovec. *Packaging design: Successful product branding from concept to shelf*. John Wiley & Sons, 2013.
4. Pemble, Anne, ed. *Packaging technology: Fundamentals, materials and processes*. Elsevier, 2012.

5. Board, N. I. I. R. *Screen Printing Technology Hand Book*. Asia Pacific Business Press Inc., 2003.
6. Paine, Frank A., and Heather Y. Paine. *A handbook of food packaging*. Springer Science & Business Media, 2012.
7. Rees, Herbert. *Understanding injection mold design*. Hanser Verlag, 2001.
8. Mohebbi, Behzad. "The art of packaging: An investigation into the role of color in packaging, marketing, and branding." *International Journal of Organizational Leadership* 3 (2014): 92-102.
9. Ellicott, Candace, and Sarah Roncarelli. *Packaging essentials: 100 design principles for creating packages*. Rockport Publishers, 2010.
10. Zhang, Yue Ping, M. Sun, Kai Meng Chua, L. L. Wai, and Duixian Liu. "Antenna-in-package design for wirebond interconnection to highly integrated 60-GHz radios." *IEEE Transactions on Antennas and Propagation* 57, no. 10 (2009): 2842-2852.

MFPT 404 A: Marketing Management in Food Sector

Course Objective: Students will able to-

1. understand the concepts of marketing management
2. study about marketing theories, principles, strategies and process of marketing planning
3. study about marketing process for different types of products and services
4. understand branding and packaging, benefits of advertising.

Credits = 4	SEMESTER IV MFPT 404 A: Marketing Management in Food Sector	No. of hours per unit / credits(60)
UNIT I	Concept of Marketing Management	15
	Concept of Marketing Management; Marketing Environment; Marketing Mix, Strategic Marketing, Market Segmentation, Targeting, and Positioning; Buyer Behavior, Marketing Information System, Marketing Organization and Control	
UNIT II	Marketing Strategy, Planning and Control	15

	Introductory strategy, policy and planning, Strategic business units, The need for marketing planning, The process of marketing planning, Contents of the marketing plan, Monitoring, evaluating and controlling the marketing planning, Marketing controls, Marketing plan control, Efficiency control. Digital and Non- digital marketing.	
UNIT III	Marketing channel decisions	15
	Retailing, wholesaling and distribution; Pricing decisions, Pricing objectives, The laws of supply and demand, Elasticity of demand, Cross-price elasticity of demand, Practical problems of price theory, Cost - revenue - supply relationships, The meaning of price to consumers, Price as an indicator of quality, Pricing strategies.	
UNIT IV	Product Policy and Advertising	15
	Product and product line, Product classification, product mix strategy, Product life cycle, New product development, Branding and packaging, Benefits of advertising, Developing and advertising program, Sales promotion, public relation, personal selling, Pricing, significance of pricing, Price adjustments, Effect of price change	

Course outcomes : Student should be able to

1. evaluate the Marketing Organization and Control
2. formulate the need for marketing planning.
3. analyze the marketing strategy for an existing product and/or services.
4. Understand the basic marketing concepts and theories.

Reference Books:

2. Brassington, Marketing Management. Pitman Publ. House, 1997
3. Kotler P., Marketing Management – Analysis, Planning, Implementation and Control. PearsonEdu.,2002.
4. McCarthy., Marketing Management. Tata McGraw-Hill., 2003.
5. Saxena R. Marketing Management. Mc Graw Hill., 2002.
6. Stanton WJ, Etzel MJ & Walker BJ., Fundamentals of Marketing. McGraw-Hill. 1996.
7. Philip Kotler, Keller, Koshy and Jha, Marketing Management: A South Asian Perspective, 14thEd. Pearson Education.,2013.
8. William J. Stanton, Fundamentals of Marketing, Tata McGraw-Hill Publication, New Delhi.,1984.
9. Kotler, Philip., Marketing Management, Millennium Edition. Intl ed. US: Prentice Hall, 2002.
10. Kotler and Armstrong, Principles of Marketing, 12th edition., Pearson, 2008.

MFPT 404B - Entrepreneurship in Food Processing**Course Objective: student will able to**

1. understand the entrepreneurial skills.
2. Study about food business management.
3. Understand the different governmental policies and get knowledge about export business.
4. Study of environmental factor, and business policies in food business.

Credits = 4	SEMESTER IV MFPT 404 B - Entrepreneurship in Food Processing	No. of hours per unit / credits(60)
UNIT I	Entrepreneurial Development	15
	Case studies of successful entrepreneurs, Exercises on ways of sensing opportunities – sources of idea, creating efforts, Entrepreneurial skill assessment test , Techniques of development of entrepreneurial skills, positive self-image and locus of control, incubation and	

	commercialization of business ideas Source of finance – Micro, Small, Medium entrepreneurship.	
UNIT II	Food Business Management	15
	Case studies of Food Processing Business and its aspects, Business opportunity Identification and Assessment techniques, Business Idea Generation and evaluation exercise, Market Assessment study Analysis of competitive situation, SWOT Analysis for business and for competitors, Preparation of business plan, Preparation of project report, Methods of Arrangement of inputs – finance and material	
UNIT III	Government Policies and Export Business.	15
	Government schemes and incentives for promotion of entrepreneurship, Government policy on small and medium enterprises (SMEs)/SSIs, Export and import policies relevant to food processing sector, Venture capital, Contract farming and joint ventures, public-private partnerships, Overview of food industry inputs, Characteristics of Indian food processing industries policy, programmes and agencies promoting entrepreneurship –KVIC, NABARD, NSIC, SIDBI, EDII, NIESBUD, DIC etc.	
UNIT IV	Environment and Business Policies.	15
	Environmental factors affecting success of a new business; reasons for the failure and problems for new business. Legal issues, environmental clearance, quality standards, government stores purchase schemes (e-tender process), exemption from income tax, industrial parks & food park.	

Course Outcomes:

1. understand to develop positive self-image and understand the business idea commercialization
- 2 understand the market analysis, SWOT analysis, preparation of business report.
- 3 evaluate environmental factor, and business policies in food business.
- 4 understand the concept of Industrial park, Food Park, legal issues.

Reference books:

1. Acharya S. S. and Agarwal N L Agricultural Marketing in India, Oxford & ISH Publishing Co., New Delhi. 1987
2. Chandra, Prasanna Projects, Planning, Analysis, Selection, Implementation and Review, Tata McGraw-Hill Publishing Company Limited, New Delhi. 1996
3. D. David and S Erickson Principles of Agri Business Management, McGraw Hill Book Co., New Delhi. 1987
4. David H. Holt Entrepreneurship – Anew Venture Creation, Prentice Hall of India, New Delhi. 2002
5. Phillip Kotler Marketing Management, Prentice Hall of India Private Limited, New Delhi. 1994
6. Vasant Desai, The Dynamics of Entrepreneurial Development and Management, Himalya Publishing House Pvt. Ltd., Mumbai .2011
7. Vasant Desai, Fundamentals of Entrepreneurship and Small Business Management, Himalya Publishing House Pvt. Ltd., Mumbai. 2012.

MFPP 405: Quality Evaluation of Processed Food and Concepts and Application of Computer in Packaging Design

Credits: 04

Course Objectives: Student will able to

- study about preparation of dairy product
- understand the designing concept of packaging material
- understand the formulation of bakery product
- study application of computer in packaging

Credits = 4	SEMESTER IV MFPP 405: Quality Evaluation of Processed Food and Concepts and Application of Computer in Packaging Design	No. of hours per unit / credits (60)
	<ol style="list-style-type: none"> 1. Preparation of milk based product 2. Characterize the methods of sensory analysis 3. Prepare sugar based confectionary product 4. Formulate and prepare baked product incorporated with vegetable pomace 5. Preparation of flour based confectionary product 6. Standardization and preparation of product incorporated with egg 7. Preparation of bakery product 8. Characterize and study shelf life of meat 9. Preparation of rasgulla and its sensory analysis 10. Experiment of sealing of plastic packaging material 11. Design of mold for snacks food product 12. Experiment connected with metal packaging 	

Course outcomes: Student will able to

- understand about preparation of dairy product
- understand the formulation of bakery product
- understand application of computer in packaging
- understand the designing concept of packaging material

Reference Books:

1. Pearson, A.M and Dutson, T.R..HACCP in meat, poultry and fish processing, Advances in meatresearch series, Volume 10, Chapman & Hall Publisher, New York. 1995
2. Shai Barbut.. Poultry Products Processing An industry Guide, CRC Press, Florida, 2002
3. Assuring food safety and quality.. FAO Food and Nutrition Manual., FAO publications, Rome. 2012
4. FSMS Manual for bakery and confectionery industry. 2014.
5. Jenness, R and Patton, S. Principles of Dairy Chemistry, John Wiley and Sons. Inc. New York, International Dairy Federation (IDF): www.idf.org (1959).
6. Food Safety and Standards Act (No.34 of 2006).: Ministry of Food Processing Industries, 2006<http://www.mofpi.nic.in>
7. Athavale, Shrikant P. *Hand Book of Printing, Packaging and Lamination: Packaging Technology*. Notion Press, 2018.
8. Paine, Frank A., and Heather Y. Paine. *A handbook of food packaging*. Springer Science & Business Media, 2012.

MFPP 406: Internship**Credits :04****Course Objectives:**

- Expose Technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
- Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
- Exposure to the current technological developments relevant to the subject area of training.

Guidelines:

Internships may be full-time or part-time; they are full-time in the summer vacation and part-time

during the academic session. Curriculum is flexible to adjust internship duration. Therefore, opportunities must be provided for experiences that cannot be anticipated when planning the course. The institutes have the flexibility to schedule internship, Project work, Seminar etc. according to the availability of the opportunities. However, minimum requirement regarding Internship duration is three weeks.

During the vacation after 2nd and/or 3rd semester, students are ready for industrial experience. Therefore, they may choose to undergo Internship / Innovation / Entrepreneurship related activities. Students may choose either to work on innovation or entrepreneurial activities resulting in start-up or undergo internship with industry/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises to make themselves ready for the industry.

Every student is required to prepare a file containing documentary proofs of the activities done by him. The evaluation of these activities will be done by Programmed Head/Cell In-charge/ Project Head/ faculty mentor or Industry Supervisor as specified in evaluation scheme.

General Procedure:

Step 1: Upon request of student, request Letter/ Email from the department should go to industry to allot various slots of 3-6 weeks during vacation as internship periods for the students. Students request letter/profile/ interest areas may be submitted to industries for their willingness for providing the training.

Step 2: Industry will confirm the training slots and the number of seats allocated for internships via Confirmation Letter/ Email. In case the students arrange the training themselves the confirmation letter will be submitted by the students in the department. Based on the number of slots agreed to by the industry, department will allocate the students to the industry. In addition, the internship slots may be conveyed through Telephonic or Written Communication (by Fax, Email, etc.) by Faculty members who are particularly looking after the Internship of the students.

Step 3: Students on joining Training at the concerned Industry / Organization, submit the Joining Report/ Letters / Email.

Step 4: Students undergo industrial training at the concerned Industry / Organization. In between Faculty Member(s) evaluate(s) the performance of students once/twice by visiting/ coordination with the Industry/Organization and Evaluation Report of the students is submitted in department

office.

Step 5: Students will submit training report after completion of internship.

Step 6: Training Certificate to be obtained from industry.

Step 7: Presentation along with brief report on training to be given at the time of examination for final evaluation.

Course outcomes:

- Students will get exposure to the industrial environment becoming competent professionals for the industry.
- Students will learn, understand and sharpen the real time technical / managerial skills required at the job.
- Student will be exposed to the current technological developments relevant to the subject area of training.