AC_____
Item No. _____

UNIVERSITY OF MUMBAI

Syllabus for Approval

Sr. No.	Heading	Particulars
1	Title of the Course	**M. Sc. (Home Science)** **Branch IB: Food Processing and Preservation** **Semester III and IV**
2	Eligibility for Admission	• B.Sc. With Home Science (general or any specialization) • B.Sc. with Microbiology / Biochemistry / Life Sciences / Biotechnology—6 units or Combinations • B.Sc. with Chemistry along with Microbiology/ Biochemistry/Life Sciences– Combinations • PG Diploma in Dietetics and Applied Nutrition/ Clinical Nutrition • B.Sc. Human Science • Minimum 50% at T.Y.B.Sc. examination. • Learners of any gender are eligible to apply for admission to the course. • As the course is interdisciplinary course admission criteria will be based on merit cum qualifying entrance examination as per circular No/ICC/2014-15/13/II-K_pg2of4
3	Passing Marks	**40% (Theory) and (Practical)**
4	Ordinances / Regulations (if any)	**Eligibility- O.5088 from circular dated 10th December, 2015** **Attendance- O. 6086 with effect from 2014-15 and thereafter**
5	No. of Years / Semesters	**1 years/ 2 Semesters**
6	Level	**P.G. / ~~U.G./ Diploma / Certificate~~** **(Strike out which is not applicable)**
7	Pattern	**~~Yearly~~ / Semester** (Strike out which is not applicable)
8	Status	**~~New~~ / Revised** (Strike out which is not applicable)
9	To be implemented from Academic Year	From Academic Year **2017-18**

Date: 17.04.2017 Signature :

Name of BOS Chairperson / Dean : ___**Dr Geeta Ibrahim**_____

UNIVERSITY OF MUMBAI

Essentials Elements of the Syllabus

1	**Title of the Course**	**M. Sc. (Home Science)** **Branch IB: Food Processing and Preservation** **Semester III and IV**
2	**Course Code**	**PSHSIB**
3	**Preamble / Scope**	
	The Masters in Home Science specializing in Food Processing and Preservation Nutrition is designed to impart advanced knowledge and skills that is life oriented, career and community oriented. It has special relevance to food industries, entrepreneurship skills, marketing and management skills and research in food product development and related areas equipped with a 2 month hands on training/exposure in the industry in the form of internship.	
4	**Objective of Course / Course Outcome** 1. To equip students with the knowledge of basic chemistry of food components, the chemical and biochemical reactions in foods. 2. To impart students a systematic approach to basic and applied aspects of food processing and technology. 3. To familiarize students with the various theoretical and practical aspects of food quality and its control. 4. To encourage students to work in conjunction with relevant food industry to get a deeper insight into the subjects of Food Science and Technology. 5. To provide students with an opportunity to conduct independent research.	
	Eligibility • B.Sc. With Home Science (general or any specialization) • B.Sc. with Microbiology / Biochemistry / Life Sciences / Biotechnology—6 units or Combinations • B.Sc. with Chemistry along with Microbiology/ Biochemistry/Life Sciences– Combinations • PG Diploma in Dietetics and Applied Nutrition/ Clinical Nutrition • B.Sc. Human Science • Minimum 50% at T.Y.B.Sc. examination. • Learners of any gender are eligible to apply for admission to the course. • As the course is interdisciplinary course admission criteria will be based on merit cum qualifying entrance examination as per circular No/ICC/2014-15/13/II-K_pg2of4	

Fee Structure

M.Sc. (HOME SCIENCE)
BRANCH IB - FOOD PROCESSING AND PRESERVATION
SEMESTER III & IV

PROPOSED FEE STRUCTURE 2017-18

No.	*Particulars of fees for M.Sc. (Home Science) Semester III and IV	Amount
1	Tuition	25000.00
2	Laboratory	5000.00
3	Library Fees	2500.00
4	Gymkhana Fees	500.00
5	Identity Card	75.00
6	Examination Fees	3120.00
7	Magazine	100.00
8	Computer/Laptop	500.00
9	Convocation fee	250.00
10	University Share of Tuition Fees	800.00
11	Project Evaluation	1000.00
	TOTAL	**38845.00**

*** FEES ARE DUE TO BE REVISED**

7	**No. of Lectures**	12 periods per week
8	**No. of Practical**	12 periods per week
9	**Duration of the Course**	1 year
10	**Notional hours**	16 periods per week
11	**No. of Students per Batch:** 20	
12	**Selection**- Merit at qualifying T.Y.B.Sc. examination (Semester V and VI) and Entrance Examination	
13		
14	**Assessment**– included in the syllabus copy as Scheme of Examination	
15	**Syllabus Details** – included in the syllabus copy	
16	**Title of the Unit**– included in the syllabus copy	
17	**Title of the Sub-Unit** – included in the syllabus copy	
18	**Semester wise Theory** – included in the syllabus grid	
19	**Semester wise List of Practical** – included in the syllabus grid	
20	**Question Paper Pattern** – included in the syllabus copy as Scheme of Examination	
21	**Pattern of Practical Exam**– included in the syllabus copy as Scheme of Examination	
22	**Scheme of Evaluation of Project / Internship-** – included in the syllabus copy	
23	**List of Suggested Reading**– included in the syllabus copy	
24	**List of Websites** – included in the syllabus copy wherever applicable	
25	**List of You-Tube Videos –**Not Applicable **List of MOOCs–**Not Applicable	

M.Sc. (HOME SCIENCE)

BRANCH-IB: FOOD PROCESSING AND PRESERVATION

SEMESTER-III

(Revised w.e.f. June 2017)

*Course Code	Title	Internal Assessment Marks	Semester End Exam	Total Marks	Periods/Week/ Batch/ Division	Credits
PSHSIB301	Food Quality Assurance	40	60	100	3	4
PSHSIB302	Processing of Plant Foods	40	60	100	3	4
PSHSIB303	Nutraceuticals and Functional Foods	40	60	100	3	4
PSHSIB304	Nutrition Across Life Span	40	60	100	3	4
PSHSIBP301	Research Dissertation	50	50	100	8	4
PSHSIBP302	Food Safety, Quality Control and Shelf Life Studies	-	50	50	4	2
PSHSIBP303	Internship (2 months)	-	50	50	*	2
	Total			**600**	**24**	**24**

***40 Hours/week**

Course Code	Title	Periods/Week/Division	Marks	Credits
PSHSIB301	**Food Quality Assurance**	**3**	**100**	**4**

Objectives:

1. To guide the students in their quest for the scientific principles involved in the attainment of food quality.
2. To help students to learn the various ways of evaluating and controlling food quality.

Course Content		Periods
Unit I	**Food quality** – Meanings and definition of food quality, Quality factors in foods, indicators of food quality. Meaning, importance and ways of food quality assessment – Sensory and objective evaluation of foods **– Sensory evaluation**, physiological bases, sensory characteristics of foods, types, selection and training of sensory panel, requirements of sensory evaluation tests, types of tests, analysis and interpretation of sensory evaluation tests. **Objective evaluation** – Basic guidelines, physical methods to evaluate volume, specific gravity, moisture, texture, rheological characteristics, chemical analysis methods, microscopic methods, indices of microbial quality.	**15**
Unit II	**Food Additives and Food Adulterants** – Brief overview, classification, guidelines for use, MAQ of food additives, toxicological studies, tests to determine safe level – acute test, prolonged test, chronic test. – Food Adulteration – Meaning, detection of common adulterants, PFA laws related to food adulteration. – Food safety, Hazards and risks – Meaning, definition, types of hazards: biological, physical and chemical hazards. Food borne infections and intoxicants – Natural toxicants in foods, pesticides residues in foods. Assessment and elimination investigation of food borne disease outbreak. – Food labeling and Nutrition labeling – Health claims, Nutrition Claims, Nutrition labels allowed on food labels, laws relating to food labeling	**15**
Unit III	**Hygiene, Sanitation and Control of Food quality** – Principles of food hygiene, personal hygiene, kitchen hygiene and sanitation. – Microbiology in food plant sanitation. Water quality assessment, insect and pest control, waste treatment and disposal, food vending and packaging standards, employee health and safety **Control of Food quality** – Principles of quality control. Government regulations (Food laws, orders) and amendments and national and international standards – ISI, AGMARK, FPO, Codex Alimentarius, ISO, FSSAI – Role of FDA and Consumer Guidance Society in India. **Management systems in food quality control. HACCP, TQM and Concept of food audits**	**15**

References:

Borvers, J. (1992). *Food Theory and Application* (2ndEd), New York: Maxwell MacMillan International Edition.
Manay, N. S. and Sharaswamy, S. M. (1997). *Foods: Facts and Principles* New Delhi: New Age International Publishers.
McWilliams, M (2007). *Foods:Experimental Perspectives* 5th Ed, New Jersey: Macmillar Publishing Co.
Potter, N. N. and Hutchkiss, J. H. (1997). *Food Science,* 5th Ed, New Delhi: CBS Publishers and Distributors.
Rick Parker (2003) *Introduction to Food Science,* New York: Delmar Thomson Learning.
Scottsmith and Hui Y.H (Editiors) (2004) *Food Processing – Principles and Applications* London Blackwell Publishing.
Subbulakshmi, G and Udipi, S. A. (2001). *Foods Processing and Preservation*, New Delhi: New Age International (P) Ltd. Publishing.
Swaminathan, M. (1995). *Food Science Chemistry and Experimental Food.* The Bangalore Printing and Publishing

Co. Ltd.
Vacklavick, V. and Christian, E. (2003). *Essentials of Food Science.* New York: Kluwer Academic/ Plenum Publisher.

Course Code	Title	Periods/Week/Division	Marks	Credits
PSHSIB302	**Processing of Plant Foods**	**3**	**100**	**4**

Objectives:

1. To understand the principles of processing plant foods.
2. To study the need for processing foods, composition and nutritive value of plant foods and storage practices.
3. To understand the present scenario in India with respect to processing of different plant foods.

Course Content		Periods
Unit I	**Food Processing- An Overview** **Cereals, Millets and Pseudo cereals** **Nutrititive value, Composition and structure of Cereals-an overview.** -Post Harvest Processing and Technological Aspects of Cereals - Milling and Processing of Cereals for Value Added Products (Puffs, Flakes, Extruded products, Pasta, Bakery items) -Quality and Grading of Grains -Recent Advances in Milling of Rice, Wheat and Millets -Flour Fortification to Improve Nutritive Value - Specialty Corn for Value Addition - Malting Technology- An Overview - Breakfast Cereals- An Overview **Pulses and Legumes** -Nutritive value and Composition of Pulses and Legumes-An overview. - Milling and Processing of Pulses for Value Added Products -Germination, Decortication and Splitting of pulses and legumes -Elimination of Toxic Factors -Fermented and Non-Fermented Soy Products --Current trends in plant based protein consumption,eg Pea Protein **Cereal-Pulse Combinations to enhance nutritive value**	**15**
Unit II	**Fruits and Vegetables** -Nutritive value, Composition and Classification of fruits and vegetables.-An overview**.** -Post Harvest Management Techniques, Processing and Preservation of Fruits of Himalayan Regions, Temperate Fruits and Tropical Fruits -Controlled Atmosphere Storage of Perishables - Packaging Requirements, Methods of Packaging and Quality Aspects of Minimally Processed Fruits and Vegetables -Modified Atmosphere Packaging of Fruits and Vegetables -Frozen, Canned, Dry Storage of Fruits and Vegetables _Ohmic Processing of Foods, Extrusion Technology, High Pressure Technology, Ozonation, Dehydration and Sun Drying -Effect of Gamma Radiation on Physio-chemical and Sensory Qualities of Fruits and vegetables -Innovative Techniques in Minimal Processing of Fruits and Vegetables. -Value Added Products (Jams, Jellies, Marmalades, Preserves, Purees, Powders, Drinks, Squash, Fruit Wine)	**15**
Unit III	**Nuts and Oil seeds** -Extraction and refining of oil -Hydrogenation, plasticizing, tempering of oils -Esterification, Structured Lipids -Raw pressed oils -Blending of oils -Value Added Products (Margarine, Vanaspati Ghee, Mayonnaise, Peanut butter, Almond Butter, Nut Milk, Coconut Products) **Plant based Beverages and Other Products**	**15**

	-Tea, Coffee -Cocoa Processing	

References:

1. Khetarpaul N (2010) Emerging Trends in Post Harvest Processing and Utilization of Plant Foods. ATPA
2. P J Fellows (2009) Food Processing Technology: Principles and Practice. Woodhead Publishing Series in Food Science, Technology and Nutrition
3. Amalendu Chakraverty and Arun S. Mujumdar. (2003) Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices.
4. D. K. Salunkhe and S.S. (1995) Handbook of Fruit Science and Technology: Production, Composition, Storage, and Processing
5. Scottsmith and Hui Y.H (Editiors) (2004) *Food Processing – Principles and Applications* London Blackwell Publishing.
6. Subbulakshmi, G and Udipi, S. A. (2001).*Foods Processing and Preservation*, New Delhi: New Age International (P) Ltd. Publishing.

Course Code	Title	Periods/Week/Division	Marks	Credits
PSHSIB303	**Nutraceuticals and Functional Foods**	**3**	**100**	**4**

Objectives:

1. To study the role of functional foods and nutraceuticals in health and disease
2. To enable the students to apply knowledge of nutraceuticals and functional foods for the development of food products.
3. To enable students to assess the toxicity and safety aspects related to the use of functional foods and nutraceuticals.

Course Content		Periods
Unit I	A. **Introduction to Functional foods and Nutraceuticals**: Definitions, Current trends in the use of functional foods and nutraceuticals, Regulations and Health claims **B. Specific Functional Foods and their bioactive constituents** Role in health and disease- Cardiovascular disease, Obesity, Diabetes Mellitus, Cancer, Bone Health, Menopause, Cognitive function, Immune stimulation, Infection – Cereals grains (Fibre, Polyphenolic compounds) – Soybean (Oligosaccharides, Isoflavones, Phytosterols) – Fruits and vegetables (Fibre, Lycopene, Lutein, zeaxanthin, Isothiocyanates) – Fish/ Fish oils (PUFAs, Omega-3 fatty acids) – Flaxseeds (Lignans, phytosterols, Omega-3 fatty acids) – Tea (Polyphenolic compounds)	**15**
Unit II	**Prebiotics, Probiotics and synbiotics** – Definition – Food Sources- Prebiotics [Dietary fibre, Oligosaccharides (Galactooligosaccharides, Fructooligosaccharides), Resistant Starch, Sugar alcohols], Traditional Fermented Foods as sources of Probiotics – Strains of microorganisms used as probiotics – Substrate Utilization in the colon – Role in Health and Disease, Mechanism of Action, Levels of Probiotics required for therapeutic efficacy	**15**
Unit III	**Nutraceuticals** – Forms in which used – Major nutraceuticals and their health applications- Bioactive peptides, Curcumin, Resveratrol, Coenzyme Q10, Conjugated Linoleic acid, Chondroitin, Glucosamine, Carnitine, Creatine – Safety and adverse effects associated with the consumption of functional foods and nutraceuticals	**15**

References:

1. Goldberg, I 1994. Functional Foods: Designer Foods, Pharma foods, Nutraceuticals Chapman & Hall
2. Gibson, GR and William, CM. 2000. Functional foods - Concept to Product. Woodhead publishing.
3. Aluko, R.E. (2012). Functional Foods and Nutraceuticals. Springer

Course Code	Title	Periods/Week/Division	Marks	Credits
PSHSIB304	**Nutrition Across Life Span**	**3**	**100**	**4**

Objectives:

1. To understand the changes in human body composition during different stages of life.
2. To study the nutritional requirements during the different stages of life cycle.
3. To be able to apply this knowledge to new food product development.

Course Content		Periods
Unit I	**Nutrition during Pregnancy & lactation** **A. Pregnancy:** 1. Physiology of pregnancy 2. Effect of Nutritional Status on pregnancy outcome 3. Nutritional requirements and dietary guidelines 4. Nutrition related complications **B. Lactation**: – Physiology of Lactation – Human milk composition – Nutritional requirements & dietary guidelines – Benefits of Breast Feeding	**15**
Unit II	**A. Nutrition in infancy, Childhood & Adolescence** – Physiological development, Motor, Cognitive development. – Energy and nutrient needs – Common nutrition problems – Nutritional concerns (Deficiency disorders) – Malnutrition- undernutrition & Obesity – Eating disorders	**15**
Unit III	**A. Nutrition in the adulthood** – Physiological and Psychosocial changes in adults – Common nutritional concerns – Defensive Nutrition paradigm – Nutritional requirements and dietary recommendation – Nutrition in Lifestyle and Metabolic Diseases **B. Nutrition in aging** – Theories of Aging, Physiological and Psychosocial changes in the elderly – The Aging Process – Nutritional requirements of the Elderly – Nutrition care in geriatrics	**15**

References:

1. Brown, J. E. (1998). *Nutrition Now,* West/Wadsworth: International Thomson Pub. Co.
2. Brown, J. E., Sugarman, I. J. (2002). *Nutrition through the Life Cycle*, Wadsworth Thomson Learning.
3. Bernstein M and McMahon K (2017) *Nutrition Across Life Stages:* Jones and Bartlett Learning
4. Bennion, H. (1979) *Clinical Nutrition*, New York Harper and Raw Publishers
5. Donald, B., MCColmick,.Bier, D. M. (1997).*Annual Review of Nutrition* (vol. 19)
6. Goodhart, R. S. S. and Shils, M. E. (1998).*Modern Nutrition in Health and Disease*. Philadelphia: Lea and Febiger.
7. Groff, J. L and Gropper, S. S. (1999). *Advanced Nutrition and Human Metabolism*, Belmount CA: Wadsworth/Thomson Learning.
8. Jackson, M. S., Rees, Jane, M., Golden, Neville, H.; Irwin Charles, E. (ed) (1997). *Adolescent Nutritional Disorders*.New York:The New York Academy of Science.

Course Code	Title	Periods/Week/Division	Marks	Credits
PSHSIBP301	**Research Dissertation**	**8**	**100**	**4**

Objectives

1. To guide students in developing general research skills as well as research skills specific to their specialization.
2. To encourage students to work in conjunction with relevant industries, institutes, hospitals, NGOs and schools.
3. To encourage students to adopt best practices in research.
4. To facilitate students in accomplishing the beginning steps of the research process, formulate and defend a research proposal, begin data collection, and write the first two chapters of the dissertation (Introduction and Review of Literature; Proposed Methodology).

Course Content		**Periods**
Unit I	**Understanding tools for review of literature** -Metanalaysis and Literature review- differences -PubMed, Cochrane Databases, Research Gate, Google Scholar -RefWorks, Citethisforme, -Understanding various referencing styles AMA, Vancouver, APA (6th Ed) -Plagiarism Check Softwares	**15**
Unit II	**Review of Literature** -Explore and finalize the area of interest for research with guidance from experts for feasibility, relevance and significance. -Refer national and international journals and other relevant literature like dissertations, thesis, books. -Contacting and communicating with experts (locally, nationally, and internationally) initially and periodically throughout the research process -Identifying possible focus areas with regard to one topic; specifying one such focus area (using relevant reading and communication with experts); writing research objectives/ questions/ hypotheses; conducting a thorough literature review; presenting a clear and convincing argument in support of the study; writing the first chapter of the dissertation, namely, the *Introduction and Review of Literature*, with due acknowledgement of source of ideas.	**15**
Unit III	**Proposed Methodology** -Specifying variables; defining variables (citing relevant literature) -Selecting an appropriate research design -Writing the second chapter of the dissertation, namely, the *Method*, with due acknowledgement of source of ideas; orally defending a research proposal; integrating feedback. -Obtaining consent from participants and relevant agencies/authorities; starting data collection; integrating changes if any; scheduling remaining data collection; starting data entry; revising the first two chapters of the dissertation.	**15**

Course Code	Title	Periods/Week/Division	Marks	Credits
PSHSIBP302	**Food Safety, Quality Control and Shelf Life Studies**	**4**	**100**	**2**

Objectives:

1. To learn the biochemical and microbiological techniques involved in food safety and quality control.

Course Content		Periods
Unit I	**Techniques of sampling and grading of foods as per BIS, AGMARK and International standards (FAO, FSSAI).** -Study the factors affecting food spoilage- pH, Sugar, temperature, moisture, fomites -Analysis of acids in canned foods -Analysis of water from at least five different sources as per BIS standards, its hardness and safety (Coliforms). -Analysis of rancidity of oils/fats	**15**
Unit II	**Microbiological Analysis in the Food Control Laboratory** -Food Sampling, media preparation -Conventional Methods and Rapid Screening for Enumerating Coliforms, Salmonella, Bacillus cereus - Enumeration of *Staphylococcus aureus* - Most probable number method -Enumeration of yeast and molds -Enumeration of spoilage organisms (yeast and mold, coliforms, S. aureus, B. cereus) in various food samples (roadside foods). -Gram staining and biochemical tests for identification of microorganisms from the spoiled food samples	**15**
Unit III	**Shelf Life Studies** -Stability and Shelf Life Studies- Definitions -Designing a shelf life study, Selecting characteristics to be studied in shelf life studies -Types of Shelf Life Studies- Simple, Comparative, Accelerated shelf life studies, Spiking of samples -Shelf life study of a developed product	**15**

References:

1. W. Andrews. (1992) Manuals of Food Quality Control- FAO Food and Nutrition Paper 14/4 Rev. 1 FAO.
2. Bureau of Indian standards: specifications and standard methods volume I to XII.
3. Food and Agriculture organization (1980) Manual of food quality control 2. Additives contaminants Techniques, Rome.
4. Kirk, B.S, and Sawyer, R. (1991) Pearson's composition and analysis of foods, (9th ed.) Longmans scientific and Technical England.
5. Mahindru, S.N. (2000). Food safety - a techno legal analysis Tata McGraw Hill Publishing Co. Ltd New Delhi.
6. Nielson, S.S. (1994) Introduction to the chemical analysis of foods Jones and Bartlet Publishers Boston.

Course Code	Title	Periods/Week/Division	Marks	Credits
PSHSIBP303	**Internship**	**40 hours/ week for 2 months**	**50**	**2**

Internship Protocol

-Students are required to take up an internship of minimum of 8 weeks with 40 hours per week in any food industry, quality control department, quality control laboratories, research and development department, NGO's, Nutraceutical industry, Marketing department, Production unit.

- At the end of internship students are required to submit a hard-bound report to the college.

-Internship will be graded by the supervisor at the place of internship.

- Students can also take up an entrepreneurial activity or term paper with equal weightage

M.Sc. (HOME SCIENCE)

BRANCH-IB: FOOD PROCESSING AND PRESERVATION

SEMESTER-IV

(Revised w.e.f. June 2017)

Course Code	Title	Internal Assessment Marks	Semester End Exam	Total Marks	Periods/ Week/ Batch/ Division	Credits
PSHSIB401	Food Biotechnology	40	60	100	3	4
PSHSIB402	Processing of Animal Foods	40	60	100	3	4
PSHSIB403	Entrepreneurship in Food Industries	40	60	100	3	4
PSHSIB404	Food Psychology	40	60	100	3	4
PSHSIBP401	Research Dissertation	-	100	100	8	4
PSHSIBP402	Food Product Development and Analysis	-	50	50	4	2
PSHSIBP403	Market Research and Consumer Behaviour	-	50	50	4	2
	Total			**600**	**28**	**24**

Course Code	Title	Periods/ Week/ Division	Marks	Credits
PSHSIB401	**Food Biotechnology**	**3**	**100**	**4**

Objectives

1. To understand the role of biotechnology in Food processing and preservation
2. To provide knowledge about techniques used in plant, animal and microbial biotechnology
3. To introduce students to new developments in the field of food biotechnology

Course Content		Periods
Unit I	**Importance of Biotechnology in food processing and preservation** -Recombinant DNA Techniques -Plant and Animal Biotechnology -Cell and Tissue culture, Plant Breeding -Genetically modified plants and animals- Applications in Food Production	**15**
Unit II	**Microbial biotechnology** -Genetically modified microorganisms -Fermentation Technology- Use of microbes in the production of alcohols (Beer, Wine), bread, Yogurt, Organic acids (Acetic acid, Lactic acid, Citric acid), Vitamins -Pigments, Bacteriocins, Amino acids, Flavors, sweeteners **Enzyme Technology** -Use of Biotechnology for the production of enzymes- Amylases, Proteases, Lipases, Cellulases, Pectinases. Applications of these enzymes in food processing **Applications of Biotechnology in food waste management and development of value added products**	**15**
Unit III	**Nanobiotechnology** -Use of nanoparticles for delivery of bioactive constituents, nanoencapsulation, nanopackaging, nanosensors for detection of pesticides & pathogens -Applications of Nutrigenomics in the food industry -Ethical Concerns, Safety and Regulatory Issues of biotechnological products	**15**

References:

1. Anthony Pometto (2005). Food Biotechnology, 2nd Edition. CRC Press
2. Byong H Lee (2014). Fundamentals of Food Biotechnology, 2nd Edition, Wiley- Blackwell

Course Code	Title	Periods/ Week/ Division	Marks	Credits
PSHSIB402	**Processing of Animal Foods**	**3**	**100**	**4**

Objectives:

1. To understand the principles of processing animal foods.
2. To study the need for processing foods, composition and nutritive value of animal foods and storage.
3. To understand the present scenario in India with respect to processing of different animal and flesh foods.

Course Content		Periods
Unit I	**Meat, Poultry and Eggs.** **Classification,Nutritive Value and Composition-An Overview.** **Meat** - Meat industries in India -Slaughtering technique of animal and slaughtering practices -Meat cuts and portions of meat. -Post mortem changes in meat (Rigor Mortis) -Color of meat -Meat processing- Smoking and Curing, Prepared meat products including fermented meats, sausages, bacon, salami, kebabs. -Frozen meat and meat storage -Packaging of meat products. -Meat microbiology and safety -Meat plant hygiene – GMP and HACCP - By-products from meat industries and their utilization **Poultry** -Processing of poultry meat and eggs. -Spoilage and control. -By-product utilization -Value Added Products (Frozen chicken, dehydrated powders, Salami, Sausages) **Eggs** -Egg Types, Composition -Quality check and grading of eggs -Value added products (Frozen eggs, canned egg whites/yolks, pasteurized egg products, dried eggs, pickled eggs)	**15**
Unit II	**Seafood** -Fish processing industries in India. -Classification of fresh water fish and marine seafood -Commercial handling, storage and transport of raw seafood. -Average composition of seafood. - Freshness criteria and quality assessment of fish and seafood -Spoilage of fish and seafood. -Methods of processing and preservation of fish- Canning, Freezing, Drying, Smoking and Curing. - Value Added Seafood products – fish meal, fish protein concentrate, fish liver oil, fish sauce and surimi -Seaweed, Algal products	**15**

Unit III	**Milk and Milk Products** -Pasteurization, Homogenization and Standardization -Manufacture of condensed milk, milk powder, cheese, ice-cream,cream, butter, ghee Khoa,Curd,Paneer,,Lactone, malted and flavoured beverages, lactose, evaporated and dried products, their evaluation and quality parameters, defects encountered during production, packaging and storage. -Substitutes for milk and milk products. - Casein and caseinates, lactose, whey protein concentrates and isolates, milk coprecipitates, and other by-products. -Technology of baby foods, weaning foods, therapeutic foods. -Fortification and enrichment. - - Probiotic milk product -Lactose free Milk Products -TQM in Food Industry. Technology of milk and dairy products.	**15**

References:

1. Processed Meats, Pearson AM and Gillett TA, 3rd edition, 1999, An Aspen publication.
2. Development in Meat Science (Development series 3, Lawrie RA, 1981, Applied Sciences.
3. Egg and Poultry Meat Processing – Stadelman WJ, Olson VM, Shemwell GA and Pasch S, 1988, Ellis Horwood Ltd.
4. Fish as Food – Vol 1 & 2 – Borgstrom G, 1988, Academic Press.
5. Advances in Fish Processing technology, Sen DP, 2005, Allied Publishers Pvt. Ltd.

6. Aneja et al. 2002. Technology of Indian Milk Products. Dairy India Publ. De S.1980. Outlines of Dairy Technology. Oxford Univ. Press.

7. Rathore,NS et al. 2008.Fundamentals of Dairy Technology- Theory & Practices. Himanshu Publ
8. Walstra et al. 2006. Dairy Science and Technology. 2nd Ed. Taylor & Francis.
9. Web BH. et al. 1987. Fundamental of Dairy Chemistry. 3rd Ed. AVI Publ.
10. Walstra et al. 1999. Dairy Technology. Marcel Dekker.

Course Code	Title	Periods/ Week/ Division	Marks	Credits
PSHSIB403	**Entrepreneurship in Food Industries**	**3**	**100**	**4**

Objectives:

1. To imbibe entrepreneurial skills in the students.
2. To assist students develop multi-management skills to either start their own business or manage an existing food service institution/ organization.

Course Content		Periods
Unit I	**Marketing and Marketing Management process** -Concepts of marketing -Channels of distribution -Market Research and Marketing strategies -Market segmentation, targeting and positioning -Novel and innovative product /service development -Brand development and promotion **Concepts of Human Resource Management** -Recruitment and selection -Training and development -Performance appraisal -Personnel action, retention and productivity improvement -Overview of Labour management and relations. -Supply Chain Management	**15**
Unit II	**Entrepreneurship in food service** -Definition and meaning of entrepreneurship -Types, Classification and trends of Entrepreneurial ventures in foods and nutrition -Qualities and skills of an entrepreneur -Resources required for a business -Project formulation, evaluation and feasibility analysis -Idea generation -Market research -Project selection -Project evaluation using appropriate industry standards -Business planning -Importance, purpose and efficiency of a plan -Business acquisition, franchising and outsourcing -Legal, ethical and environmental considerations of the entrepreneurial venture -Overview of business regulation by the government -Inspection, Licensing -Patent, trademark and intellectual property rights registration and accreditations.	**15**
Unit III	**Financial considerations of entrepreneurship** **Funding for the business proposal** – Government and non-government opportunities for funds and resources. – Franchising opportunities **Product pricing and profit generation** – Tools of analysis of costing, cost control and budgeting **Accounting procedures and financial statements.** **Investing resources into the business** **Corporate Social Responsibility**	**15**

References:

1. Kotler, P. (2003) Marketing management 11th ed. Pearson Education (Singapore) Pte. Ltd. Delhi.
2. Agarwal, T. (2007) Strategic human resource management Oxford University Press – New Delhi.
3. Aswathappa, K. (2005). Human resource and personnel management – Text and Cases Tata McGraw – Hill Publishing Co. Ltd. New Delhi.
4. Boyd, H.W., Walker, O.C. and Larreche, J. (1995) Marketing management – A strategic approach with a global orientation 2nd ed. Irwin Chicago.
5. Cartwright, R., Collins, M., Green, G. and Candy, A. (2001). The handbook for managing resources and information Infinity books, New Delhi.

6. Ivancevich, J.M., Donnelly, J.H. and Gibson, J.L. (1996). Management – principles and functions (4th ed.) All India Traveller Bookseller. Delhi.
7. Kale, N.G. (2003) Principles and practice of marketing. Vipul prakashan – Mumbai.
8. Rao, V.S.P. (2005) Human resource management – text and cases (2nd ed.) Excel Books. New Delhi.
9. Shookla, M.S. (2004). A handbook of human relations (with structured experiences and instruments). Macmillan India Ltd. Delhi.
10. Singh, P.N. (1998). Developing and managing human resources (3rd ed.) Suchandra Publications. Mumbai.

Course Code	Title	Periods/ Week/ Division	Marks	Credits
PSHSIB404	**Food Psychology**	**3**	**100**	**4**

Objectives:

1. To understand the relevance and applications of models and influencing factors of food choices and eating behavior.
2. To understand the applications of food psychology for health, disease prevention and product development.
3. To study perceptions and factors influencing food choices from the point of view of the food consumer.

Course Content		Periods
Unit I	**The psychology of food choices and eating behavior** **-Models of food choice** **-Influences on food choice** -Biological, -Genetic influences on energy and nutrient intake, Neurobiology of food intake Social and psychological models of food choice -Role of family and peers -Food and Culture -Mood, emotions and food choice -Food cravings and addiction -Food Rewards -Influences of Media on food choice -Food choices across the life span. -Food product development and marketing ideas based on factors affecting choice of foods.	**15**
Unit II	**Applications of food psychology for health maintenance and disease prevention** **Strategies to change dietary behavior** -Optimism and intention -Strategic automisation -Using stages of change model to change dietary behavior **Applications of food psychology in pediatric population** -Ingestive homeostasis -Early and conditioned food preferences -Development of human flavor preferences -Taste aversion -Role of experience in in the development of child's eating behavior. -Alcohol and tobacco use and abuse **Role of stress in choosing foods** **Behavior modification strategies to influence food and nutrition choices in disease conditions.** -Obesity - Behavioural phenotype in obesity, mindful eating -Diabetes -Allergies -Cancer -Theory of planned behavior and healthy eating -Food product development and marketing ideas based on applications of food psychology for health maintenance and disease prevention.	**15**
Unit III	**Psychology of the food and nutrition consumer** -The psychology of the food shopper -Cues in consumer perception and acceptance of food product -Factors affecting food purchase -Food quality and consumer expectations -Packaging and labeling based on the psychology of the consumer -Ethnic, religious and economic influences on food choice of the consumer -Consumer perception of processed foods, supplements, organic and genetically modified foods -Food trends and the changing consumer -Consumer attitudes to health -Factors affecting the consumer's healthy food choices -Ecological consciousness and sustainability with regard food consumption -Environmental influences in food purchase.	**15**

	-Encouraging ethical and sustainable food consumption. -Food product development and marketing to positively impact nutrition status.	

References:

1. Booth D.A.(1994).The Psychology of Nutrition, Taylor and Francis, UK.
2. Committee on Examination of the Adequacy of Food Resources and SNAP Allotments; Food and Nutrition Board; Committee on National Statistics; Institute of Medicine; National Research Council. Editors: Caswell J. and Yaktine a..(2013).Supplemental Nutrition Assistance Program-Examining the Evidence to Define Benefit Adequacy, National Academies Press (US); Washington (DC).
3. Conner M and Armitage J.(2002).The social psychology of food, Open University Press, Mc –Graw Hill Education, UK.
4. Institute of Medicine; Food and Nutrition Board; Board on Children, Youth, and Families; Committee on Food Marketing and the Diets of Children and Youth; McGinnis M, Gootman J., and Kraak V. Editors.(2006). Food Marketing to Children and Youth- Threat or Opportunity? National Academic Press.DOI: https://doi.org/10.17226/11514. https://www.nap.edu/read/11514
5. Layman B.(2012),A Psychology of Food-More Than a Matter of Tastes, Springer,Kindle Edition.
6. Mayer E.(2016).The Mind-Gut Connection: How the Hidden Conversation Within Our Bodies Impacts Our Mood, Our Choices, and Our Overall Health,Harper Collins Publishers.
7. Mendes R. and Dias E.(2011).Health Protection, Health Promotion, and Disease Prevention at the Workplace, Oxford University Press. DOI:10.1093/acprof:oso/9780195380002.003.0018
8. Ogden J.(2011).The Psychology of Eating: From Healthy to Disordered Behavior. John Wiley & Sons Stuckey B.(2012). Taste What You're Missing: The Passionate Eater's Guide to Why Good Food Tastes Good, Simon and Schuster Inc, New york.
9. Rankin S.H., Stallings K.D. and London F.(2005) Patient Education in Health and Illness, Lippincott Williams & Wilkins, Philadelphia.
10. Shepherd R. and Raats M. (2010).The Psychology of Food Choice, The Centre for Agriculture and Bioscience International (CABI), Wallingford, England.
11. www.newbooks-services.de/MediaFiles/Texts/7/9781107011007_Intro_001.pdf
12. www.jblearning.com/samples/0763743828/43828_CH05_LO_5183.pdf
13. www.eolss.net/sample-chapters/c04/e6- 27-01- 02.pdf
14. www.emro.who.int/dsaf/EMRPUB_2012_EN_1362.pdf

Course Code	Title	Periods/ Week/ Division	Marks	Credits
PSHSIBP401	**Research Dissertation**	**8**	**100**	**4**

Objectives:

1. To encourage students to work in conjunction with relevant industries, institutes, hospitals, schools, etc.
2. To assist students in developing general research skills as well as research skills specific to their specialization.
3. To encourage students to adopt best practices in research.
4. To facilitate students in completing laboratory work/product development/data collection/data entry/data analysis, and writing the remaining three chapters of the dissertation (Results, Discussion, Summary).
5. To support students to complete and submit the dissertation for the viva voce examination, integrate feedback, submit the final copy of the dissertation, and write a research paper using the findings of their research**.**

Course Content		Periods
Unit I	**Completing Laboratory Work/Product Development/ Data Collection** **Completing Data Entry and Preliminary Analyses** -Entering all data; checking for data entry errors; running preliminary analyses. **Analyzing Data and Reporting Results** -Analyzing data; interpreting findings; reporting results in figures/tables and text using scientific protocol; writing the third chapter of the dissertation, namely, the *Results*, by research objectives/ questions/hypotheses; orally presenting the results and integrating feedback.	**15**
Unit II	**Discussing Findings and Write Results and Discussions** Corroborating own findings with those in previous research and theory -Explaining findings using relevant literature and communication with experts -Discussing implications of findings for practice/ industry/family/society Suggesting recommendations for future research; writing the fourth chapter of the dissertation, namely, the *Discussion*, using appropriate scientific protocol	**15**
Unit III	**Summarizing Findings and Completing the Writing of the Dissertation** Writing the fifth chapter of the dissertation, namely, the *Summary*; writing the abstract; revising previous chapters as necessary; completing all other relevant work for the dissertation (e.g., reference list, appendices, table of contents, and list of figures/tables); submitting the dissertation for the viva voce examination. **Submission and Oral Defense; Writing of the Research Paper** Orally defending the dissertation; integrating feedback into the final document; submitting the completed dissertation (hard copy and soft copy). Using the dissertation to write a research paper; submitting the research paper (hard copy and soft copy)/ Present the findings at Avishkar/Indian Science Congress or any other Conference	**15**

* At the end of the term, students are required to submit a soft copy and hard bound copy to the library.

* In addition to this, students are encouraged to publish research papers as an outcome of the study as per the discretion of the guide/co-guide. All publications must bear the name of the college i.e. College of Home Science, Nirmala Niketan, University of Mumbai.

* All publications will bear name of the student and guide along with co-guides/experts if applicable.

Course Code	Title	Periods/ Week/ Division	Marks	Credits
PSHSIBP402	**Food Product Development and Analysis**	**4**	**50**	**2**

Objectives:

1. Take the students thru the methods of writing a Feasibility study for the development of a food product for lifecycle stage/value addition/ disease state
2. Supervise the students in developing and producing a well packaged food product of good chemical, microbiological and sensory qualities with good and stable shelf life;
3. Understand and be able to make appropriate packaging and labelling designs.
4. Develop ability for appropriate pricing and marketing of the developed food product.
5. Carry out nutritional analysis and shelf life studies of the product

Course Content		Periods
Unit I	**Food Product Development** -Hypothetical proposal for new product development using the concepts of Enrichment, Fortification Waste Utilisation, Cost Effectiveness or Value Addition -Categories Lifecycle Stage (Childhood, Adolescence, Pregnancy, Lactation, Adulthood, Old Age)/ Low Cost Products/ Therapeutic Products (Osteoporosis, Anemia, Constipation, Diabetes) -Market Survey/Research -Consumer Focus Groups -Devise a product and carry out preliminary standardization **Sensory evaluation of foods** a) Threshold concentrations of primary tastes. b) Effect of Temperature on taste. c) Identification of samples through Difference, Descriptive and Affective testing d) Determination of sensory evaluation methods for evaluating quality e) Developing score card as an evaluation tool	**15**
Unit II	**Food Product Development laboratory trials** -Development of the product and modifications for innnovation -Preparing a flow chart indicative of the operational processes -Understanding the concept of scale up; bulk cookery -Identifying suitable packaging material - Developing score card as an evaluation tool	**15**
Unit III	Nutritive value estimation by biochemical methods (Protein, Fat, Crude Fibre, Iron, Calcium, Vitamin C, Potassium and other relevant micronutrients. Microbial Shelf Life Studies at various altered conditions Estimation of physiochemical changes pH, acidity, color, odour etc	15

References:

1. Jameson K. (1998). Food Science – A Laboratory Manual, New Jersey:Prentice Hall Inc.
2. Lawless, H. and Heymann, H. (1998).Sensory Evaluation of Food – Principles and Practices, Kluwer Academic/Plemer Publishers.
3. McWilliam, M.(2001). Foods – Experimental Perspectives (4th Ed.), New Jersey: Prentice Hall Inc. USA: CRC Press Inc..
4. Weaver, C. (1996), Food Chemistry Laboratory – A manual for Experiemental Foods

Course Code	Title	Periods/ Week/ Division	Marks	Credits
PSHSIBP403	**Market Research and Consumer Behaviour**	**4**	**50**	**2**

Objectives:

1. To introduce students to the fundamentals of market and consumer research practices;
2. develop skills in designing market and consumer research studies, and collecting and analyzing market and consumer data
3. Allow students to display their research skills through engagement in an applied market research project

Course Content		Periods
Unit I	**Consumer Behavioral Fundamentals** -Tools and Methods to Conduct and Interpret a Market Research -Consumer behavior and the consumer decision-making process **Consumer Decision Process** -Factors affecting the consume buying behaviour	**15**
Unit II	**Introduction to market research** **Marketing Research Fundamentals** -Importance of Market Research -How to acquire data? -Different types of experimental research and design.	**15**
Unit III	**Marketing Research Data Collection & Analysis** -Questionnaire and Sampling Design -Tools to collect, analyze and present the data **Hypothetical Group Project on Consumer Research** -Prepare a hypothesis based on current trends in consumer buying -Devise the tool, inclusion/exclusion criteria -Collect Data and present a report	**15**

References:

1. Morris B. Holbrook and Morris Holbrook (2002) Consumer Value: A Framework for Analysis and Research. Routledge Interpretive Market Research Series.
2. Russell W. Belk (2013) Qualitative Consumer and Marketing Research.Eileen Fischer and Robert Kozinets.
3. Kotler (2016) Marketing Management Colour 15/Ed
4. Leon G. Schiffman and Leslie Kanuk (2011) Consumer Behaviour: A European Outlook.

Examination Scheme for MSc Home Science:

Part A: Theory Papers

All theory papers of 100 marks are to be evaluated in two parts.

INTERNALS: **40 marks**. This comprises 30 marks for a project, 5 marks for class participation, and 5 marks for the extent to which the student was a responsible learner. See Table below:

• One seminar presentation based on the curriculum in the college, assessed by the teacher of the institution teaching PG learners / Publication of a research paper/ Presentation of a research paper in seminar or conference. A. Selection of the topic, introduction, write up, references- 15 marks. B. Presentation with the use of ICT- 15 marks. • Other exercises of equal weightage can also constitute the project: For example, conducting interviews or assessments based on the topics in the curriculum; or reflective writing exercises on topics relevant to the curriculum; or product designing.	30 Marks
• Active participation in routine class instructional deliveries	05 Marks
• Overall conduct as a responsible learner, communication and leadership qualities in organizing related academic activities	05 Marks

SEMESTER-END EXAMINATION: **60 marks.** The semester-end question paper is for 2 ½ hours. The semester-end examination question paper has to be set with limited choice within each set of questions.

For all four unit syllabi, the question paper must have five sets of questions of 12 marks each; each of the five questions is compulsory, with options within each question:

- Question 1, carrying 12 marks, has a set of sub-questions from Unit I. Possible sub-questions include the following formats: Answer any 2 sub-questions out of 3, or any 3 out of 5, or any 4 out of 6.
- Question 2, carrying 12 marks, has a set of sub-questions from Unit II. Possible sub-questions include the following formats: Answer any 2 sub-questions out of 3, or any 3 out of 5, or any 4 out of 6.
- Question 3, carrying 12 marks, has a set of sub-questions from Unit III. Possible sub-questions include the following formats: Answer any 2 sub-questions out of 3, or any 3 out of 5, or any 4 out of 6. (Format may be modified for a lengthier statistics sum.)

- Question 4, carrying 12 marks, has a set of sub-questions from Unit IV. Possible sub-questions include the following formats: Answer any 2 sub-questions out of 3, or any 3 out of 5, or any 4 out of 6. (Format may be modified for a lengthier statistics sum.)

- Question 5, carrying 12 marks, has a set of sub-questions from Units I, II, III, and IV. Possible sub-questions include the following formats: Answer any 2 sub-questions out of 3, or any 3 out of 5, or any 4 out of 6.

	Total Marks/ Duration	**Internal Assessment**	**Semester End Exams**	**Pattern**
Theory Papers	100 marks/ 2 and ½ hours	40	60	Q 1.(12 marks)- Unit 1 Q 2.(12 marks)- Unit 2 Q 3.(12 marks)- Unit 3 Q 4.(12 marks)- Unit 4 Q 5.(12 marks)- Units 1, 2, 3, 4, & 5

For all three unit syllabi, the question paper must have four sets of questions of 15 marks each; each of the four questions is compulsory, with options within each question:

- Question 1, carrying 15 marks, has a set of sub-questions from Unit I. Possible sub-questions include the following formats: Answer any 2 sub-questions out of 3, or any 3 out of 5, or any 5 out of 8.
- Question 2, carrying 15 marks, has a set of sub-questions from Unit II. Possible sub-questions include the following formats: Answer any 2 sub-questions out of 3, or any 3 out of 5, or any 5 out of 8. (Format may be modified for a lengthier statistics sum.)
- Question 3, carrying 15 marks, has a set of sub-questions from Unit III. Possible sub-questions include the following formats: Answer any 2 sub-questions out of 3, or any 3 out of 5, or any 5 out of 8. (Format may be modified for a lengthier statistics sum.)
- Question 4, carrying 15 marks, has a set of sub-questions from Units I, II, & III. Possible sub-questions include the following formats: Answer any 2 sub-questions out of 3, or any 3 out of 5, or any 5 out of 8.

	Total Marks/ Duration	**Internal Assessment**	**Semester End Exams**	**Pattern**
Theory Papers	100 marks/ 2 ½ hours	40	60	Q 1.(15 marks)- Unit 1 Q 2.(15 marks)- Unit 2 Q 3.(15 marks)- Unit 3 Q 4.(15 marks)- Units 1, 2 and 3

Part B: Practical Papers

Each Practical Paper of 50 marks will be evaluated in a semester-end examination of 50 marks. There are no internal marks for these practical papers. The semester-end examination is of 3 ½ hours.

	Total Marks/ Duration	Internal Assessment	Semester End Exams	Pattern
Practical Paper	50 marks/ 3 ½ hours	-	50	-

Dissertation carries 100 marks in each of Semesters III and IV. Of these 100 marks, 50 marks are to be scored by the guide (25 marks for execution of the project/process & 25 marks for the final outcome of the project), and 50 marks by the referee(s) on the day of the viva-voce examination (25 marks for the written submission & 25 marks for the viva).