SNDT Women's University, Mumbai

Master of Science

(Home Science- Nutrition and Food Processing)

M.Sc. (NFP)

As per NEP 2020

Syllabus

(w.e.f. Academic Year 2023-24)

M.Sc. (Home Science- Nutrition and Food Processing)

Code	*Courses*	*Type of Course*	*Credits*	*Marks*	*Int.*	*Ext*
Semester I						
114511	Introduction to Food Biochemistry	Major (Core)	4	100	50	50
114512	Food Science and Chemistry	Major (Core)	4	100	50	50
114523	Food Science Pr	Major (Core)	4	100	50	50
114514	Human Nutrition I- Macronutrients	Major (Core)	2	50	50	0
124515/ 124516	Public Health and Epidemiology OR Entrepreneurship development	Major (Elective)	4	100	50	50
134511 134512	Research Methodology OR Methods of Investigation- Research in Food	Minor Stream (RM)	4	100	50	50
End of Semester 1			**22**	**550**	**300**	**250**
Semester II						
214511	Basic Food Microbiology and Safety (Th. and Pr.)	Major (Core)	4 (2+2)	100	50	50
214512	Principles of Food Preservation and Processing	Major (Core)	4	100	50	50
214523	Food Analysis and Quality Control (Pr.)	Major (Core)	4 (1+3)	100	50	50
214514	Human Nutrition II- Micronutrients	Major (Core)	2	50	50	0
224511 224512 224513	Food Packaging- I OR Food Waste Management OR Sustainability & ESG	Major (Elective)	4	100	50	50
244541	Internship	OJT	4	100	50	50
End of Semester 2			**22**	**550**	**300**	**250**

Exit option (44 credit):Post Graduate Diploma in Nutrition & Food Science

Year II

MSc (Nutrition and Food Processing)

Code	*Courses*	*Type of Course*	*Credits*	*Marks*	*Int*	*Ext*
Semester III						
314511	Advanced Food Microbiology and Safety (Th. and Pr.)	Major (Core)	4 (2+2)	100	50	50
314512	Statistical Applications in Research	Major (Core)	4	100	50	50
314513	Food Laws and Standards	Major (Core)	4	100	50	50
314524	Sensory evaluation (Pr.)	Major (Core)	2	50	50	0
324511/ 324512/ 324513	Functional Foods and Nutraceuticals OR Nutrition in Health and Fitness OR Food Packaging II	Major (Elective)	4	100	50	50
354531	Food Product Development	Research Project	4	100	50	50
End of Semester 3			**22**	**550**	**300**	**250**
Semester IV						
414511	Recent Methods in Food Processing, Preservation and Packaging	Major (Core)	4	100	50	50
414522	Food Processing Pr.	Major (Core)	4	100	50	50
414513	Research Applications in Nutrition and Food Processing	Major (Core)	4	100	50	50
424511/ 424512	Institutional Management OR Digital Marketing	Major (Elective)	4	100	50	50
454531	Dissertation	RP	6	150	100	50
End of Semester 4			**22**	**550**	**300**	**250**

3.1 Major (Core)

Course Title	**Advanced Food Microbiology and Safety (Th and Pr)**
Course Credits	4 (2+2)
Course Outcomes	After going through the course, learners will be able to
	1. Gain deeper knowledge of role of microorganisms in humans and environment.
	2. Understand the importance of microorganisms in food spoilage and to learn advanced techniques used in food preservation.
	3. Understand the recent procedures adopted in various food operations to prevent food- borne disorders and legal aspects involved in these areas.
	4. Gain the deeper knowledge about food safety
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Differentiate the roles of bacteria, mycotoxin, viruses, and parasites to foodborne diseases, and compare pathogens that cause infection and intoxication
	2. Determine and use different techniques to control microbial growth and improve food safety
Content Outline	1. Food borne infections and diseases: • Significance to public health • Food hazards and risk factors 2. Bacterial, and viral food-borne disorders, Food-borne important animal parasites, Mycotoxins. Bacillus, Campylobacter, Staphylococcus, Clostridium, E. coli, Aeromonas, Vibrio cholerae, Listeria, Mycobacterium, Salmonella 3. Introduction to food biotechnology; basic principles of genetic engineering; genetically modified plants and animals for enhanced food production; safety of GM food crops
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to

	1. Analyse the relationship between microorganisms and the production, quality and safety of foods
	2. Understand the use of internal quality and safety programs in food establishments
Content Outline	1. Quality Control/Quality Assurance • Regulations for food safety - National and International criteria, sampling methods, records, risk analysis • Microbial source, Indicators of food safety and quality • Introduction to food toxicology, classification, dose, determination toxins in food, naturally occurring toxins from animals, bacterial and fungal and sea food sources. • Agricultural and industrial contaminants in foods- pesticides residues in fruits and vegetables, metal contaminants in foods and their toxicity in human body; animal drug residues in food and water, dioxins, and related compounds in food; metals such as lead, arsenic and mercury.
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Acquire knowledge and skills to isolate bacteria in foods
	2. Explore microbial detection methods using detection kits
Content Outline	1. Various biochemical tests used in identification of commonly found bacteria in foods: IMVIC urease, HS, Catalase, coagulase, gelatin and fermentation (Acid/gas) 2. Demonstration of available rapid methods and diagnostic kits used in identification of microorganisms or their products. 3. HACCP (ELISA), HACCP system and food safety used in controlling microbiological hazards.
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Identify the important pathogens and spoilage microorganisms in foods
	2. Evaluate the microbiological quality of foods by qualitative and quantitative microbiological analyses

Content Outline	1. Enumeration of Aerobic mesophilic count, E Coli, Yeast and Mold, Staphylococci 2. Phosphatase test for determination of efficiency of pasteurization

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Elaborate on food safety
2. What are different types of food hazards?
3. Explain HAACP with suitable example.
4. Write a note on Food-borne illness.
5. Project on HACCP in food industry.

References

- Adams, M.R and M.G. Moss (1995): Food Microbiology, 1st Edition, New Age International (P) Ltd.
- Atlas, M. Ronald (1995) Principles of Microbiology, 1st Edition, Mosby-Year Book, Inc, Missouri, U.S.A.
- Block, J.G. (1999) Microbiology Principles and Explorations, 4th Edition John Wiley and Sons Inc.
- Bensaon, H.J. (1990) Microbiological applications, C. Brown Publishers U.S.A.
- Banwart, G. (1989) Basic Food Microbiology. 2nd Edition. CBS Publisher.
- Doyle, P. Benehat, L.R. and Mantville, T.J. (1997): Food Microbiology, Fundamentals and Frontiers, ASM Press, Washington DC.
- Frazier, W.C. (1988) Food Microbiology, Mc Graw Hill Inc. 4th Edition,
- Garbutt, J. (1997) Essentials of Food Microbiology, 1 Edition, Arnold International Students Edition.
- Jay, James, M. (2000) Modern Food Microbiology, 6th Edition. Aspen publishers, Inc., Maryland.
- Pelezar, M.L and Reid, R.D. (1993) Microbiology McGraw Hill Book Company, New York, 5th Edition.
- Roday, S. (1999) Food Hygiene and sanitation, 1st Edition. Tata McGraw Hill, New Delhi.
- Topley and Wilson's (1983) Principles of Bacteriology., Virology and Immunity, Edited by S.G. Wilson, A. Miles and M.T. Parkar, Vol. I: General Microbiology and Immunity, I: Systematic Bacteriology. 7th Edition. Edward Amold Publisher.
- Venderzant, C. and DF. Splitts Toesser (1992): Compendium of Methods for the Microbiological Examination of Foods 3rd Edition. American Public Health Association, Washington D.C.

Journals:

- Journal of Food Science Published by the Institute of Food Technologists, Chicago, U.S.A.
- Journal of Food Science and Technology published by Association of Food Scientists and
- Technologists (India) CFTRI - MYSORE.
- Food Technology published by the Institute of Food Technologists, Chicago, U.S.A.

3.2 Major (Core)

Course Title	**Statistical Applications in Research**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Discriminate between parametric and non-parametric tests
	2. Learn to apply statistical tests for data analysis for both large and small samples
	3. Interpret the results of statistical analysis of data
	4. Summarize data and present it using tables and graphs
	5. Develop skills for preparation of research proposals and understand the components of a research report
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Concepts of statistics and its application in study
	2. Understand data management and data analysis
Content Outline	**1. Introduction to Statistics** a. Definition, conceptual understanding of statistical measures, popular concepts, and misuse of statistics 2. Normal Distribution and its Properties a. Normal distribution b. Binomial distribution c. Probability, use of normal probability tables, area under normal distribution curve d. Parametric and non-parametric tests 3. Data Management a. Planning for data analysis – coding of responses, preparation of code book b. Coding of data c. Use of statistical programs- MS Excel, SPSS
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand data analysis using various methods

	2. Apply t test and measure central tendency, dispersion
Content Outline	1. Data Analysis a. Quantitative analysis, descriptive statistics, inferential statistics: Uses and limitations, Summation sign and its properties b. Proportions, percentages, ratios c. Measures of central tendency-mean, median, mode-arithmetic mean and its uses, mid – range, geometric mean, weighted mean d. Measures of dispersion /variability- range, variance, standard deviation, standard error, coefficient of variation, Kurtosis, skewness e. Grouped data-frequency distribution, histogram, frequency polygons, percentiles, quartiles, tertiles, ogive f. Large and Small Sample tests and interpretation- Z-test for single proportions and difference between proportions g. Large sample test for single mean and difference between means h. Small sample tests- 't'-test, paired 't'-test, 'F' Test
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Perform correlation, regression analysis and appropriate statistical tests
	2. Demonstrate an understanding of ANOVA and Chi square in research analysis
Content Outline	1. Chi square test and its interpretation a. General features, goodness of fit b. Independence of Attributes 2. Correlation and Regression and its interpretation a. Basic concepts b. Linear regression and correlation coefficient. Regression and prediction c. Rank correlation, Product-moment method 3. Analysis of Variance and its interpretation a. One-factor analysis of variance b. Two-factor analysis of variance 4. Design of Experiments a. Completely randomized design b. Randomized block design c. Latin square design d. Factorial design
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to

	1. Interpret and conclude the statistical analysis scientifically using various data presentation tools
	2. Understand how to design research, writing report proposal
Content Outline	1. Presentation of Data a. Tabulation and Organization of data- frequency distributions, cumulative frequency distribution, contingency tables b. Graphical presentation of data- histogram, frequency polygon, ogive, stem and leaf plot, box and whiskers plot, Graphs for nominal and ordinal data- pie diagram, bar graphs of different types, graphs for relation between two variables, line diagram. c. Use of illustrations d. Cautions in visual display of data 2. The Research Report a. Basic components of a research report- prefatory material, introduction and Review of Related Literature, Methodology, Results, Discussion, Conclusion, Summary, Abstract, Bibliography and Appendices 3. Students to design a research study on a topic- - specify type of research - sample selection - protocol/operationalization - tools - tests for statistical analysis 4. Preparation of a Research Proposal
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE) 1. Assignment on a standard normal curve 2. Assignment on calculation of descriptive statistics 3. Assignment to test the hypothesis 4. Assignment on sample size calculation	

References

- Alan Bryman and Emma Bell, (2019), Business Research Methods, Oxford University Press.
- Agarwal B L, (2022), Basic Statistics, New Age International Publisher.
- C. R. Kothari, (2016), Research Methodology, New Age International Pvt Ltd Publishers
- Cochran, W.G, (1977), Sampling Techniques, Wiley Eastern Ltd., New Delhi.
- Donald Cooper and Pamela Schindler, (2006), Business Research Methods, TMGH, 9th edition.
- Daroga Singh and Choudhary F.S., (1989), Theory and Analysis of Sample Survey Designs, Wiley Eastern Ltd., New Delhi.
- Goon, A.M., Gupta, M.K. and Dasgupta, B. (2001): Fundamentals of Statistics (V-2), World Press.

- Lehmann E.L. and Romano J.P. (2005): Testing Statistical Hypotheses, Springer.
- Murthy, M.N, (1967), Sampling Methods, Indian Statistical Institute, Kolkata.
- Mukhopadhay, Parimal, (2008), Theory and Methods of Survey Sampling, Prentice Hall.
- Sukhatme, P.V., Sukhatme, B.V. and Ashok A., (1984), Sampling Theory of Surveys with Applications, Indian Society of Agricultural Statistics, New Delhi.
- Sansanwal D N, (2020), Research Methodology, and applied statistics, Delhi Shipra publication.

3.3 Major (Core)

Course Title	**Food Laws and Standards**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Know and understand various national and international standards
	2. Understand Indian food regulatory mechanism
	3. Familiarize with quality and safety management systems, and quality audits in food industries
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Elaborate on Indian Food Laws and Regulations
	2. Summarize voluntary and mandatory standards
Content Outline	1. Indian Food Regulatory Regime- (existing and new) a. Introduction - Need for food standards and their enforcement b. History of food regulations in India– • PFA Act and Rules, 1954 • Food Safety and Standards Act, 2006 • Essential Commodities Act, 1955
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Elaborate on global laws and regulations
	2. Gain knowledge about various accreditation bodies

Content Outline	1. Global Scenario- • Codex Alimentarius Commission (CAC) • Other International Standards Setting Bodies (e.g. ISO, OIE, IPPC) 2. Voluntary National Standards: BIS and AGMARK 3. Export and Import Laws and Regulations 4. Global GAP and India GAP 5. National Agencies for Implementation of International Food Laws and Standards 6. Accreditation System for Conformity Assessment Bodies
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Elaborate on food safety and quality management system
	2. Identify hazards and apply HACCP principles in food production area
Content Outline	1. Food Safety and Quality Management Systems- • Introduction to Food Safety • Food Safety System • Total Quality Management • HACCP- History, Background and Structure, Pre-requisites, principles • Food Product certification for food industries and MSME
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Elaborate on GMP, GHP and GAP
	2. Understand role of International Organization for Standardization.
Content Outline	1. Other Food Safety Practices- • Good Manufacturing Practices/ GHP 2. Management Systems, Auditing and Accreditation- • Introduction to Management Systems and Auditing, Standard and Accreditation 3. ISO 9001:2000: An overview and structure, Case Studies 4. ISO 22000: 2005: An overview, Case Studies 5. Lab Quality Management System- ISO 17025: An Overview and Requirements
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE) 1. Case studies on ISO 9001, ISO 22000	

2. What is meant by QC? What is the main drawback of QC (in comparison to QA)?
3. What is meant by control points and critical control points ? Explain with suitable examples.
4. What is meant by EOU ? What is the advantage of securing the EOU status to a food factory?
5. What is meant by hazards in food processing ? What are its different types?
6. Write a note on TQM and its applications in food industry?

References:

- Early, R,. (1995), Guide to Quality Management Systems for the Food Industry, Blackie, Academic and Professional, London.
- Gould, W.A. and Gould, R.W., (1988), Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
- Food Safety and Standards Act 2006, Rules 2011, Regulations 2011, International Law Book Company.
- Patricia and Curtis A, (2005), An operational Text Book, Guide to Food Laws and Regulations, Willey Blackwell.
- Prevention of Food Adulteration Act, 1954, Professional Book Pub.
- Marth, E.H. (1978), Standard Methods for the Examination of Dairy Products 14th edition. Interdisciplinary Books and Periodicals, Washington, D.C.
- Ranganna, S. ,(1986), Handbook of Analysis and Quality Control for Fruit and Vegetable Products, 2nd edition, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
- https://www.fssai.gov.in/home

3.4 Major

Course Title	**Sensory Evaluation (Pr.)**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Understand concepts about sensory evaluation of food.
	2. Use different sensory methods for evaluating the quality of foods.
	3. Understand preparation and presentation of samples
	4. Conduct shelf-life studies of new developed product
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Learn the basic principles and techniques in sensory analysis of food
	2. Apply sensory evaluation principles.

Content Outline	1. Introduction to sensory analysis and uses of sensory tests. 2. General testing conditions. 3. Establishing sensory panels- • Selecting and recruiting panellists, orienting, screen for trained panels, training panellists, monitoring performance. • Recognition tests for 4 basic tastes, odour and aroma. • Tests with other senses. 4. Threshold tests.
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Learn about types of different sensory tests used in sensory analysis of food
	2. Plan and design sensory tasting experiments
Content Outline	1. Analytical tests- a. Difference b. Ranking c. Descriptive d. Scoring e. Rating 2. Planning an Experiment for Sensory Evaluation- a. Designing the questionnaire and score card b. Identifying descriptors. 3. Designing Sensory Testing Facilities- Permanent and Temporary
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand basic techniques used for conducting sensory analysis
	2. Design and conduct sensory tests required for different food products
Content Outline	1. Conducting the Test • Preparing samples • Presenting samples • Using reference samples • Reducing panel response error 2. Consumer oriented tests 3. Product oriented tests 4. Shelf-life studies 5. Product matching 6. Product mapping

	7. Taint Investigation and Prevention
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Process and analyse the data
	2. Learn analytical and effective methods of assessing sensory properties of food utilizing statistical methods.
Content Outline	1. Collecting and analysing sensory data generated in above tests. 2. Application of appropriate statistical methods for analysis like concept of mean, mode, median and Standard Deviation, response surface methodology on sensory property 3. Interpretation of data results. 4. Report Writing
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE) a. Plan recipe and design score card for following tests- 1. Pair difference test 2. Duo trio test 3. Hedonic test 4. Ranking test 5. Triangle test b. Conduct a test for Recognition of Four Basic Taste and draw the Score Card. c. Conduct a test for Threshold test and design the score card.	

References:

- Askar, A. and Treptow (1993): Quality Assurance in Tropical Fruit Processing. Springer-Verlag, New York.
- Amerine, M.A.; Pangborn, R.M.; Roessler, E.B. (1965): Principles of Sensory Evaluation. Academic Press, New York.
- Jellinek, G. (1985): Sensory Evaluation of Food Theory and Practice. Ellis Horwood, Chichester.
- Kapsalis, J.G. (1987): Objective Methods in Food Quality Assessment. CRC Press, Florida.
- Lawless, H.T. and Klein, B.P. (1991): Sensory Science Theory and Applications in Foods. Marcel Dekker Inc.
- Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (1992): Guidelines for Sensory Analysis in Food Product Development and Quality Control. Chapman and Hall, London.
- Mahony, M. (1986): Sensory Evaluation Practices. Academic Press, London.
- Martens, M.; Dalen, G.A.; Russwurm, H. (eds) (1987): Flavour Science and Technology. John Wiley and Sons, Chichester.
- Moskowitz, H.R. (eds) (1987): Food Texture: Instrumental and Sensory Measurement. Marcel Dekker Inc. New York.

- Meilgaard, M.; Civille, G.V.; Carr, B.T. (1987): Sensory Evaluation Techniques, Vols. I and II, CRC Press, Florida.
- Moskowitz, H.R. (1983): Product Testing and Sensory Evaluation of Foods: Marketing and R & D approaches. Food and Nutrition Press, Connecticut.
- Moskowitz, H.R. (1985): New Directions for Product Testing and Sensory Analysis of Foods. Food and Nutrition Press, Connecticut.
- Piggott, J.R. (ed) (1988): Sensory Analysis of Foods. Elsevier Applied Science, London.
- Thomson, D.M.H. (1988): Food Acceptability. Elsevier Applied Science, London.
- Watts, B.M., Ylimaki, G.L., Jeffery, L.E. and Elias, L.G. (1989): Basic Sensory Methods for Food Evaluation. The International Development Research Centre, Ottawa, Canada.

3.5.1 Major (Elective)

Course Title	**Functional Foods and Nutraceuticals**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Gain knowledge about functional foods and nutraceuticals
	2. Understand about the health effects
	3. Be familiar with applications in industry
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. History and classification of Functional Foods and Nutraceuticals
	2. Understand the strains of micro-organisms used for probiotics, their mechanism of action, health benefits.
	3. Comprehend the various food products used as probiotics and quality assurance and control for introducing a probiotic product in the market.
Content Outline	1. Definition, history, classification – a. Type of classification (Probiotics, probiotics and symbiotic; Nutrient vs. Non-nutrient; according to target organ; according to source or origin). b. Probiotics • Taxonomy and important features of probiotic micro- organisms. • Health effects of probiotics including mechanism of action.

	• Probiotics in various foods: fermented milk products, non-milk products etc. • Quality Assurance of probiotics and safety.
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand the different sources and types of Prebiotics, their health benefits and effect of processing on prebiotics
	2. Comprehend the potential applications in the food industries and their role as functional food and nutraceutical
Content Outline	1. Prebiotics Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food applications for the following: • Non-digestible carbohydrates/oligosaccharides • Dietary fibre • Resistant starch • Gums
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Corelate the consumption of food in definite quantities and their potential health benefits
	2. Understand the changes in bioavailability, metabolism of the functional component after processing of food.
Content Outline	1. Other Food components with potential health benefits: a. Definition, chemistry, sources, metabolism and bioavailability, b. Effect of processing, c. Physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food applications for the following- • Polyphenols: Flavonoids, catechins, isoflavones, tannins • Phytoestrogens • Phytosterols • Glucosinolates • Pigments- Lycopene, Curcumin etc. • Organo sulphur compounds • Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins

	• Active biodynamic principles in spices, condiments, and other plant materials
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand the functional aspects of nutrients
	2. Comprehend the role of nutrients as functional foods and nutraceuticals
Content Outline	1. Non-nutrient effect of specific nutrients- • Proteins, Peptides, and nucleotides, • Conjugated linoleic acid and n-3 fatty acids, • Vitamins and Minerals
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE) 1. Market survey of Indian nutraceuticals. 2. Write review paper on spices and condiments used as nutraceuticals. 3. Assignment on medicinal herbs and their functional properties.	

References

- Janice L Raymond, MS, RDN, CSG and Kelly Morrow, MS, RDN, FAND (2023): Krause's Food Nutrition and Diet Therapy, 16th Edition, W.B. Saunders Ltd.
- Agarwal, A. and Udipi, S. (2022): Textbook of Human Nutrition, 2nd edition, Jaypee Brothers Medical Publishers
- Kesarvani, R.K., Sharma, A.K., Kesharwani, R. (2021): Nutraceuticals and Dietary Supplements – Applications in Health Improvement and Disease Management, 1st edition, CRC Press
- Catherine Ross , Benjamin Caballero Professor, Robert J. Cousins, Katherine L. Tucker : Modern Nutrition in Health & Diseases, 11th Edition (2020) Jones and Bartlett Publishers, Inc
- Wildman, R.E.C. ed. (2019): Handbook of Nutraceuticals and Functional Foods, 3rd edition, CRC Press
- Paliyath, G., Bakovic, M., Shetty, K. (2011): Functional Foods, Nutraceuticals, and Degenerative Disease Prevention, 1st edition, Wiley-Blackwell
- Saarela, M. (2011): Functional Foods: Concept to Product, 2nd edition, Woodhead Publishing Ltd.
- Cho S. S. and Dreher, M.L. (2001): Handbook Dietary Fibre, Marcel Dekker Inc., New York.
- Fuller, R. ed. (1997) Probiotics Applications and Practical Aspects, London: Chapman and Hall, New York.

- Salminen, S. A. Von Wright (eds) (1998): Lactic acid bacteria: microbiology and functional aspects, 2nd edition, Marcell Dekker Inc. New York.
- Goldberg, I. Ed (1994): Functional Foods: Designer Foods, Pharma Foods, Nutraceuticals, Chapman & Hall, New York.

3.5.2 Major (Elective)

Course Title	**Nutrition in Health and Fitness**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Understand the physiological changes, special needs and health concerns of people at different stages of life.
	2. Understand the importance of nutrition to physical, and psychological growth and development and ageing.
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand the physiological changes during growth, development and ageing and their effect on nutritional needs.
	2. Understand the effect of physiological changes on nutritional requirements and the role of nutrition during pregnancy and lactation
Content Outline	1. Nutrition during different life stages: Nutritional requirements, problems, and management • Infancy • Childhood • Adolescence • Adulthood • Old age 2. Nutritional modifications for physiological conditions: Pregnancy and lactation
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Therapeutic modifications of common health problems.
	2. Modify nutrition consumption according to health conditions

Content Outline	1. Dietary modifications for common health conditions: • Diarrhea, constipation • Underweight, obesity • Fevers 2. Therapeutic diets • Clear liquids • Full liquids • Soft diets
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand the concept of physical fitness and its components
	2. Guidelines for exercise and fitness
Content Outline	1. Physical fitness and wellness • Concepts of physical fitness and wellness • Principles of physical training • Exercise guidelines for normal adults based on principles of physical training
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Corelate the relation between nutrition and physical activity
	2. Understand importance of fluid balance in body
Content Outline	1. Nutritional requirements of physically active individuals • Macronutrient • Micronutrient • Fluid balance and rehydration
Assignments/Activities towards Comprehensive Continuous Evaluation (CCE): 1. Recent advances in therapeutic nutrition 2. Complimentary feeding for infants 3. Market survey on sport drinks 4. Demonstration of different times of exercises	

References

- Agarwal A and Udipi SA. (2013), Text Book of Human Nutrition, Jaypee Publishers, New Delhi.
- Anita F.P., (2002), Clinical Dietetics and Nutrition, Oxford University Press, Bombay.
- Guthrie Helen, (1986), Introductory Nutrition, Times Mirror/ Mosby College Publishing.

- Joshi, Shubhangini (2009), Nutrition and Dietetics, Mc Graw Hill Higher Education.
- Krause M.M, Mahan L. K. and Escott S.S. (2008), Krause's Food, Nutrition and Diet Therapy, 12th Edition, W. B. Saunders Company, Philadelphia.
- Mudambi, S.R., Rajgopal, M.V. (2012), Fundamentals of Foods and Nutrition, New Age International Pvt. Ltd.
- Roday Sunetra, (2012), Food Science and Nutrition, 2nd Edition, Oxford University Press.
- Robinson, and Lawler, (1990), Normal and Therapeutic Nutrition 17th Edition MacMillan Pub. Co.
- Robinson C. H., Lawler M. R., Cheneweth W.L. and Garwick A. E.,(1991), Normal and Therapeutic Nutrition, MacMillan Publication Co.
- Sri Laxmi B., (2022), Dietetics, New Age International Pvt. Ltd., Mumbai.

3.5.3 Major (Elective)

Course Title	**Food Packaging II**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Provide extensive and advanced information about food packaging.
	2. Recognizing different types of packaging; traditional, active, intelligent, smart, edible, and biodegradable etc.
	3. Understanding the mechanism of food preservation by using the packaging
	4. Introducing of food packaging new concepts such as recycling, regulation, and environmental concerns.
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Determine the meaning of food packaging.
	2. Understand the concept of reduction the use of food packing and environmental concerns.
Content Outline	1. Introduction to food packaging a. Basic concepts and terms b. Non edible and edible packages c. Packaging requirements of selected food items d. Legislation issues of food packaging and effect of packaging materials on the environment
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to

	1. Correlate packaging type with food safety and shelf-life.
	2. Understand mechanisms of food spoilage mechanisms that can be controlled by food packaging.
Content Outline	1. Active packaging of foods a. Oxygen scavengers b. Carbon dioxide scavengers/emitters c. Humidity absorbers d. Ethylene scavengers e. Ethanol emitters f. Antimicrobial agents releasers g. Flavor/odor absorbers and releasers e. Temperature control packaging
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand food spoilage mechanisms that can be controlled by food packaging.
	2. Determine effect of food storage/processing conditions on properties and functions of the packages.
Content Outline	1. Intelligent packaging of foods a. Time-temperature indicators b. Gas and volatiles indicators c. Freshness indicators d. Radio frequency indicators
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Determine mechanical properties of packaging
	2. Analyse the importance of each packaging type to specific food
Content Outline	1. Mechanical properties of packaging materials a. Terms and concepts b. Factors affecting the mechanical properties c. Material's behavior under an applied stress d. Measuring mechanical properties of packaging

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Market survey on different types of packaging material used in food industry.
2. Methods of measuring mechanical properties of packaging
3. Elaborate on active packaging techniques and its application
4. Write a note on Packaging and labelling regulations

References:

- Ahvenainen R. (2003). Novel Food Packaging Techniques. CRC Press, Washington, DC.
- Brody, A. L, Zhuang, H and Han, J (2011) Modified Atmosphere Packaging for Fresh-Cut Fruits and Vegetables. Wiley-Balckwell, West Usses UK.
- Cha, D. and Chinnan, M. S. (2004). Biopolymer-Based antimicrobial packaging: A review. Critical Reviews in Food Science and Nutrition. 44: 223-237.
- Cho, S. Y., Lee, D. S. and Han, J. H. (2009). Antimicrobial packaging. The Wiley Encyclopaedia of Packaging Technology. 1-9.
- Daniel, L. and Zhao, Y. (2007). Innovations in the development and application of edible coatings for fresh and minimally processed fruits and vegetables. Comprehensive Reviews in Food Science and Food Safety, 6, 60-65.
- Embuscado ME, Kerry C. Hubber KC. (2009). Edible Films and Coatings for Food Applications. Springer Science + Business Media. LLC.
- Janjarasskul T, Krochta J.M. (2010). Edible Packaging Materials. Annual Review of Food Science and Technology. 1 :415-448.
- Kerry, J and Butler, P. (2008). Smart Packaging Technologies for Fast Moving Consumer Goods. JKohn Wiley & Sons, Ltd.
- Mehyar, G. F., and Han, J. H. (2004). Physical and mechanical properties of high-amylose rice and pea starch films as affected by relative humidity and plasticizer. Journal of Food Science. 69: E449-E454. Recommended books, materials, and media:
- Oles R. and Kirwan M. (2011). Food and Beverage Packaging Technology. 2nd edition. Wiley-Balckwell, West Usses UK.

3.6 Major

Course Title	**Food Product Development Pr**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Apply various aspects of food product development, including food science and technology, marketing and consumer research, finance, and communication, in the creation and commercialization of innovative food products.
	2. Develop products that meet consumer needs and are nutritionally and commercially viable.
	3. Establish and manage a small-scale food-processing unit.
	4. Create a viable business plan and navigate the entrepreneurial landscape in India within the food industry
Module 1 (Credit 1) Introduction to Food Product Development	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand process of new food product development

	2. Study health and social impact of food product
Content Outline	• Development of New Food Products • Definition and classification • Characterization of factors shaping new product development • Social concerns, health concerns, impact of technology, and marketplace influence
Module 2 (Credit 1) Market Research and Consumer Analysis	
Learning Outcomes	After learning the module, learners will be able to
	1. Conduct market and consumer surveys
	2. Gain knowledge of tapping traditional foods and unconventional sources of food.
Content Outline	Market and Consumer Surveys to Identify New Products • Line extension • Repositioning existing products • New form/reformulation • New packaging of existing products • Innovative products • Creative products Tapping Traditional Foods and Unconventional Sources of Foods • Minimizing post-harvest losses • Identification of concept and product for development • Market research for the concept and selected product
Module 3 (Credit 1) Product Development and Quality Assessment	
Learning Outcomes	After learning the module, learners will be able to
	1. Study for identification of products selection and standardization
	2. Conduct shelf-life study. Select appropriate packaging material and design label
Content Outline	1. Standardization of Product and Prototype Development 2. Bulk Preparation of Product 3. Packaging and Labeling of the Product o Packaging design, graphics, and labeling 4. Nutritional Evaluation o Estimation of relevant parameters

	5. Shelf-life Testing of the Product o Testing for appropriate quality parameters: chemical, microbiological, nutrient content, acceptability studies o Product integrity and conformance to standards
Module 4 (Credit 1) Entrepreneurship and Business Management	
Learning Outcomes	After learning the module, learners will be able to
	1. Develop new food products, calculate the cost, and select appropriate packaging
	2. Design product labels according to FSSAI standards
	3. Create a comprehensive business plan for a food processing venture
	4. Navigate the regulatory frameworks and legal requirements for starting a food business in India.
Content Outline	**Content Outline:** 1. Identification of Products, Selection of One Product and Its Standardization 2. Costing the Product and Determining the Sales Price 3. Advertising and Test Marketing of the Product 4. Components of a Comprehensive Business Plan o Market analysis o Financial projections o Marketing strategies 5. Understanding Legal Structures and Regulations for Food Businesses in India 6. Building a Brand and Developing a Marketing Strategy

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. **Market Analysis and Prototyping:** Assess students' ability to analyze market trends and consumer preferences, translating them into viable food product ideas and tangible prototypes for testing and refinement.
2. **Food Innovation:** Evaluate students' proficiency in utilizing food materials and technologies to innovate new product designs, emphasizing practical application through prototype development and user feedback.
3. **Manufacturing Strategies and Quality Control:** Measure students' competence in developing strategies for cost-effective food manufacturing and implementing quality control measures to ensure product excellence.
4. **Business Plan Development:** Assess students' capability to formulate comprehensive business plans that include market analysis, financial projections, and effective marketing strategies tailored to the food industry.
5. **Regulatory Frameworks and Legal Compliance:** Evaluate students' understanding of regulatory frameworks and legal requirements pertinent to establishing and operating food businesses in India, as demonstrated through their business plans and presentations.

References:

- Amerine, M.A.; Pangborn, R.M.; Roessler, E.B. (1965): Principles of Sensory Evaluation. Academic Press, New York.
- Askar, A. and Treptow (1993): Quality Assurance in Tropical Fruit Processing. Springer-Verlag, New York.
- ASTM (1968 to 1981): Special Technical Publications, American Society for Testing and Materials, Philadelphia.
- Ball, A.D. and Buckwell, G.D. (1986): Work Out Statistics: 'A' level. MacMillan, London.
- BSI (1975 to 1989) BS 5098 & BS 5929: Publications of British Standards Institution, London.
- Jellinek, G. (1985): Sensory Evaluation of Food Theory and Practice. Ellis Horwood, Chichester.
- Kapsalis, J.G. (1987): Objective Methods in Food Quality Assessment. CRC Press, Florida.
- Lawless, H.T. and Klein, B.P. (1991): Sensory Science Theory and Applications in Foods. Marcel Dekker Inc.
- Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (1992): Guidelines for Sensory Analysis in Food Product Development and Quality Control. Chapman and Hall, London.
- Mahony, M. (1986): Sensory Evaluation Practices. Academic Press, London.
- Martens, M.; Dalen, G.A.; Russwurm, H. (eds) (1987): Flavour Science and Technology. John Wiley and Sons, Chichester.
- Meilgaard, M.; Civille, G.V.; Carr, B.T. (1987): Sensory Evaluation Techniques, Vols. I and II, CRC Press, Florida.
- Moskowitz, H.R. (eds) (1987): Food Texture: Instrumental and Sensory Measurement. Marcel Dekker Inc. New York.
- Moskowitz, H.R. (1983): Product Testing and Sensory Evaluation of Foods: Marketing and R & D approaches. Food and Nutrition Press, Connecticut.
- Moskowitz, H.R. (1985): New Directions for Product Testing and Sensory Analysis of Foods. Food and Nutrition Press, Connecticut.
- Piggott, J.R. (ed) (1988): Sensory Analysis of Foods. Elsevier Applied Science, London.
- Resurrecion, A.V.A. (1998). Consumer Sensory Testing for Product Development. Aspen Publishers Inc., Guthersburg, Maryland USA.
- Thomson, D.M.H. (1988): Food Acceptability. Elsevier Applied Science, London.
- Watts, B.M., Ylimaki, G.L., Jeffery, L.E. and Elias, L.G. (1989): Basic Sensory Methods for Food Evaluation. The International Development Research Centre, Ottawa, Canada.

4.1 Major (Core)

Course Title	**Recent Methods in Food Processing, Preservation and Packaging**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Acquire systematic knowledge of basic and applied aspects of recent methods of food processing
	2. Know the basic principles in the production of important food products
	3. Understand the potential and use of various by-products of food industry
	4. Gain knowledge about various packaging materials and importance of packaging
	5. Be familiar with packaging laws/regulations and tests used for evaluation
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Acquire scientific knowledge of basic and applied aspects of recent methods of food processing
	2. Know the purpose of food processing, principles of food processing, properties of food use of extreme temperature and water activity in food
Content Outline	1. Purpose of food processing and post-harvest handling of foods of plant and animal origin. 2. Physical and Chemical Principles of Food Processing 3. Properties of Foods: Physical, thermal, heat transfer, water activity and electrical diffusion, surface, optical and sensory. 4. Reduction in water content and water activity by various methods
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand the technology of various advance methods used in food processing and preservation
	2. Study the application of non thermal processes used in food processing and their technical knowledge.

Content Outline	Physical Methods- 1. Irradiation of food 2. Microwave processing 3. Use of pulsed electric fields 4. Use of electricity – Ohmic heating
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand the technology of various advance methods used in food processing and preservation
	2. Study the application of various processes used in food processing and their technical knowledge.
Content Outline	Physical Methods- 1. Use of light and sound 2. Use of combination of treatments 3. Use of extreme temperatures: Thermal processing and use of low temperature 4. High pressure treatment 5. Use of modified atmosphere
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Know the advance methods of preservation using Hurdle technology and chemicals
	2. Understand use of chemical agents and its role in preservation
Content Outline	Chemical Methods and Hurdle Technology- 1. Use of antimicrobials from plants, animals and micro-organisms. 2. Use of chemicals: Antioxidants, nitrates, salt, sugar, acid etc. 3. Surface treatment and edible coatings 4. Encapsulation and controlled release 5. Use of hurdle technology

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Elaborate on thermal properties of food
2. Write a note on different types of Extrusion methods and its application
3. Write an application of high hydrostatic pressure in food industry
4. Explain the terms

a) Radappertisation
b) Dosimetry
c) Lyophilization

5. Elaborate on principle of irradiation, different sources of radiation and application of irradiation in food processing

References

- Arthey, D. and Ashurst, P.R. (1996), Fruit Processing, Blackie Academic and Professional, London.
- Alzamora, S.M., Tapia, M.S. and A. Lopez-Malo, (1993), Minimally Processed Fruits and Vegetables: Fundamental Aspects and Applications, Aspen Publishers Inc., Maryland.
- Barbosa-Canovas, G.V., U.R. Pothakamury, E. Palou and B.G. Swanson (1998): Non-thermal preservation of Foods, Marcel Dekker, Inc. New York.
- Connor, J.M. and Schick W.A. (1997), Food Processing An Industrial Powerhouse in Transition, John Wiley and Sons, New York.
- Holdsworth, S.D., (1997), Thermal Processing of Packaged Foods, Aspen Food Engineering Series, Aspen Publishers, Maryland.
- Gould, G.W., (1995), New Methods of Food Preservation, Blackie Academic & Professional, London.
- Linden, G. and D. Lorient, (1999), New Ingredients in Food Processing. Biochemistry and Agriculture, CRC Press Florida / Woodhead Publishing Ltd., Cambridge.
- Lewis, M. and N. Heppell (2000): Continuous Thermal Processing of Foods – Pasteurization and UHT Sterilisation Aspen Publishers, Maryland.
- Rahman, M.S., (1999), Handbook of Food Preservation, Marcel Dekker, Inc. New York.
- Salunkhe, D.K. and Kadam, S.S. (1995), Handbook of Fruit Science and Technology,
- Singh, R.P. and Oliveira, F. (1994), Minimal Processing of Foods and Process Optimisation An Interface, CRC Press, London.
- Stadelman, W.J. and Cotterill, D.J. (1986), Egg Science and Technology, AVI Publishing Co., INC., Westport.

4.2Major (Core)

Course Title	**Food Processing Pr**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Measure water activity in foods.
	2. Develop skills for processing of foods using various methods and technologies
	3. Be able to use different preservatives for processing and preservation of variety of food products
	4. Develop skills in canning of foods
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain major food preservation techniques and underlying principles

	2. Compare various food processing technology
Content Outline	1. Water Activity- a. Conduct experiments on measurement of water activity in fresh fruits / dehydrated fruits – Raisins, figs (dry), dried vegetable, milk powder/instant coffee powder. 2. Dehydration- Conduct experiments on- a. Dehydration of raw banana powder, potato and Sweet Potato powder, methi, palak etc. 3. Low Temperature processing- a. Experiment on storage of leafy vegetables, fruits, perishable produce at refrigerated temperature, cold storage, and chilling temperature. b. By using appropriate preprocessing and various packaging material. 4. Frozen food Processing- a. Experiments on processing of Fruit pulp, fruits, vegetables by using appropriate freezing technique. b. Quality Evaluation and storage studies. c. Freezing of Peas/ corn/ *pulao* mixture / vegetable mixture
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain different processing and preservation of fruits and vegetables and prepare various milk products
	2. Describe different processing and food preservation techniques based on different food materials like low temperature processing, high temperature processing, preservation by chemicals and high concentration.
Content Outline	1. High Temperature processing- Experiments on- a. Blanching of fruits and vegetables. b. Pasteurization of milk and milk products, concentration tomato pulp, fruit pulp, paste and its quality aspects. 2. Processing of high Sugar based products- Experiments on- a. Fruit Jam making process b. Marmalade making process c. Jellies / synthetic jelly making process d. Preparation of fruit candies (amala, tutti-frutti)

Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand different preservation methods used in food processing
	2. Understand preservation by chemical preservatives
Content Outline	1. Preparation of chutneys, fruit concentrates, *murabbas* 2. Processing of Intermediate moisture foods / glazed fruits/ orange peels, cherries, amala *kathi*. 3. Use of chemical preservatives in processed foods- Experiments on- a. Preparation of fruit juices/ ketchups with and without sodium benzoate, sodium, and potassium meta bisulphate, Benzoate, SO_2, salts (KMS, NaMS) b. Evaluation of quality, shelf life, packaging, storage study aspects (chemical, physical, microbial, sensory)
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Differentiate drying method and types of dryers
	2. Understand different unit operations using salting, pickling, and canning
Content Outline	1. Processing by using Salt- Experiments on- a. Salting of fish, salting of vegetables packaging and storage. b. Preservation of onion, gherkins, and vegetables by brining / preservation in brine using various containers. c. Quality evaluation of products. 2. Pickling- a. Pickling of Fruits and vegetables b. Commercial processing 3. Canning processing of fruits and vegetables and other foods- a. Commercial canning – sweet corn, baby corn, pineapple, mango, papaya, strawberry, mushroom (button), fruit juices, cherry tomatoes, okra. b. Home scale canning c. Retortable pouch technology processing RTE/RTC foods

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE) : Continuous assessment with practical performance

4.3 Major (Core)

Course Title	**Research Applications in Nutrition and Food Processing**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Appreciate and understand the importance of different types of scientific writing / documentation.
	2. Develop competence in writing and abstracting skills.
	3. Develop competence in oral presentations.
	4. Write research and review article on studies conducted
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Select an appropriate research design
	2. Employ various formats for citation in their study
Content Outline	1. Literature search and use of databases 2. Styles and formats for writing references
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Enable them to write review of literature
	2. Demonstrate the ability to choose appropriate review papers for their study
Content Outline	1. Writing review of literature on an upcoming area 2. Review paper including bibliography
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Enable them to do oral presentations effectively

	2. Perform current literature reviews using print and online databases
Content Outline	1. Oral presentations on the following: a. Book review b. Research topics in upcoming/recent areas c. Own research
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Identify, explain, compare, and prepare the key elements of a research proposal/report
	2. Write research proposal to funding agencies
Content Outline	1. Writing a scientific paper including abstract and identification of key words 2. Developing a research proposal for funding 3. Intellectual property rights and patenting

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Submit a research proposal for funding from bank
2. Presentation on Book review
3. Presentation on Thesis synopsis
4. Demonstration on using IPR portal

4.4.1 Major (Elective)

Course Title	**Institutional Management**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Gain knowledge of food service management and establishment
	2. Understand quantity and quality food production
	3. Understand about safeguards in food production
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Define concepts of Management systems and their importance

	2. Understand principles and function of food management system
Content Outline	1.Food Service Systems and their development • Types of food services system • Commercial and non-commercial • Approaches of Food Management Services Principles and functions • Tools of Management
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain different aspects of institutional management
	2. Facilitate implementation of management in the institution
Content Outline	1. Layout and design • Definition of layout and design • Factors affecting layout and design • Determining work centres • Principles of kitchen layout • Work flow • Work simplification
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain institutional management process
	2. Understand various components included in institutional management
Content Outline	1. Equipment's • Classification of equipment • Factor affecting equipment selection • Purchase and installation • Care and Maintenance of equipment • Cleaning systems
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Analyse the importance of purchasing and receiving of material
	2. Understand process of stock keeping and storage system

Content Outline	1. Purchasing, receiving and storage • Purchasing activity • Methods of purchasing and receiving • Methods and procedures of delivering • Types of storage, store keeping, store record maintenance • Maintenace of food quality during storage • Approaches towards Entrepreneurship development

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Planning menu for different organisations.
2. Market survey
3. Write a note on cleaning systems used for commercial set ups
4. Visit to the warehouse and storage units

References

- Green Erric (1986), Profitable food and beverage management operations, John Williams Company
- Jagmohan Negi, (2013), Managing Hotels and Restaurants, Authors press, Delhi
- Peter Drucker, (2005), The practice of management, Allied publication limited
- Ramaswamy, (2010), Principles of management, Himalaya publication
- Sethi Mohini (2007), Catering management and integrated approach, Willey Publication
- Verghese Brain, (2015), Professional food and beverage management, Mac Millan India Ltd.
- West B and Wood L (1988), Food Service in Institutions, John Wiley and Sons, New York.

4.4.1 Major (Elective)

Course Title	**Digital Marketing**
Course Credits	4
Course Outcomes	After going through the course, learners will be able to
	1. Outline the basics of digital marketing and digital marketing plan
	2. Evaluate and apply key concepts related search engine marketing
	3. Understand the practical application of affiliate marketing to improve sales performance
	4. Utilize the concepts of display ads and e-mail marketing in digital campaigns
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to

	1. Translate some of the key marketing and business models that will help to shape your digital marketing strategy
	2. Understand the concept of digital marketing and its real-world iterations
Content Outline	1. Introduction to marketing • Meaning and Definition-Market and Marketing-Approaches to marketing-Concepts of Marketing • Fundamentals of Digital marketing & Its Significance, • Traditional marketing Vs Digital Marketing, • Evolution of Digital Marketing, • Digital Marketing Landscape
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe digital marketing theories and concepts;
	2. Explain how digital marketing theories and concepts are applied in the food domain;
Content Outline	1. Introduction to digital marketing • Introduction to E-marketing, • Importance, strategies for online marketing, challenges faced by organization, • Online marketing mix, segmentation and targeting in virtual world, issues of online marketing. • Changing trends in digital marketing era. • The online consumer, digital ecosystem, marketing in a virtual world, potential of digital marketing, types of online consumer behaviour.
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Demonstrate their understanding of the various new medias such as; social media, mobile technology, web analytics, search engine optimization, viral advertising.
	2. Evaluate the effectiveness of interactive websites and analyze digital marketing strategies through SEO
Content Outline	1. Search Engine Optimisation • Meaning of SEO • Types of SEO • Trends in SEO • Different kinds of traffic on and off Page Optimization (OPO)- Email campaign creation • Google AdWords and analytics, search and display on search engines

	• Search Engine Optimization Process • Keyword analysis & process • Search Engine Marketing (SEM) – Paid versus natural Search, • SEM landscape.
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Outline an approach for developing a digital marketing plan
	2. Explain the key digital marketing activities needed for competitive success
Content Outline	1. Marketing planning and advertisement display • Display adverting • Buying Models, different type of ad tools, • Display advertising terminology, types of display ads, different ad formats • Ad placement techniques, • Important ad terminology, Programmatic Digital Advertising. • Role and importance of content to business – use of content marketing • Content strategy and planning • Key Drivers • Digital Consumer and Communities • Role of influencers in Digital Marketing.

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1. Discussion of Case studies on how to improve marketing and implement strategies to improve product visibility
2. Designing marketing plan for a food product using different platforms
3. Designing of advertisement using various tools
4. Visit to the advertising agency to understanding working and system

References

- Ahuja V., (2015), Digital Marketing, Oxford University Press
- Annmarie H, and A. Joanna, (2009), Quick win Digital Marketing, Paperback edition
- Bansal Deepak, (2009), A Complete Guide to Search Engine Optimization, B.R Publishing Corp
- Chaffey and Ellis, (2012), Digital Marketing, Pearson
- Gupta S., (2020) Digital Marketing, 6th edition, McGraw-Hill
- Godfrey Parkin, (2009), Digital Marketing: Strategies for Online Success, New Holland
- Kamat and Kamat, (2020), Digital Marketing, 2nd edition, Himalaya
- Ryan D, (2014), Marketing Strategies for Engaging the Digital Generation
- Ryan Damian, (2020), Understanding Digital Marketing, Kogan Page
- Strauss. J and Frost. R, (2014), E- Marketing, Pearson Education

4.6 Research Project

Course Title	**Dissertation**
Course Credits	6
Course Outcomes	After going through the course, learners will be able to
	1) Formulate research problems effectively within a specific academic domain or field.
	2) Conduct comprehensive literature reviews to identify gaps and trends relevant to their research area
	3) Design and implement rigorous research methodologies using appropriate tools and techniques
	4) Draft and present scholarly research reports adhering to academic conventions and standards.
Module 1 (Credit 1) Introduction to Research Methods	
Learning Outcomes	After learning the module, learners will be able to
	1) Evaluate various research methodologies and their applications in academic research.
	2) Formulate clear research questions and hypotheses aligned with specific research objectives.
Content Outline	• Overview of research paradigms and their significance • Defining research problems and objectives • Choosing appropriate research designs and methodologies
Module 2 (Credit 1) Literature Review and Theoretical Framework	
Learning Outcomes	After learning the module, learners will be able to
	1) Conduct comprehensive literature reviews and synthesize existing research findings
	2) Develop a robust theoretical framework to guide research objectives and hypotheses
Content Outline	• Strategies for conducting effective literature searches • Synthesizing and critically analyzing literature • Establishing a theoretical foundation for research
Module 3 (Credit 1) Research Design and Methodology	
Learning Outcomes	After learning the module, learners will be able to

	1) Design and justify research methodologies appropriate to research questions..
	2) Implement data collection techniques and tools, ensuring validity and reliability
Content Outline	• Quantitative, qualitative, and mixed-methods research designs • Sampling techniques and sample size determination • Data collection methods, instruments, and procedures
Module 4 (Credit 1) Data Analysis and Interpretation	
Learning Outcomes	After learning the module, learners will be able to
	1. Analyze research data using appropriate statistical or qualitative analysis methods
	2. Interpret research findings in relation to research questions and hypotheses
Content Outline	• Data cleaning, coding, and analysis procedures • Statistical analysis techniques (e.g., descriptive statistics, inferential statistics) • Qualitative data analysis methods (e.g., thematic analysis, content analysis)
Module 5 (Credit 1) Writing and Presenting Research Reports	
Learning Outcomes	After learning the module, learners will be able to
	1) Structure and draft comprehensive research reports adhering to academic writing standards...
	2) Present research findings effectively in written and oral formats to diverse audiences
Content Outline	• Components of a research report (e.g., introduction, literature review, methodology, results, discussion) • Writing style, clarity, and coherence in academic writing • Oral presentation skills and strategies for academic conferences
Module 6 (Credit 1) Dissertation Preparation and Publication	
Learning Outcomes	After learning the module, learners will be able to
	1. Prepare and finalize a dissertation manuscript meeting academic publication standards
	2. Navigate the publication process, including journal submission and peer review

Content Outline	• Dissertation writing process and timeline management • Formatting guidelines and publication ethics • Responding to reviewer comments and revising manuscripts

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE)

1) Submission of a research proposal outlining research questions, methodologies, and theoretical frameworks.
2) Compilation and presentation of a comprehensive literature review demonstrating thoroughness and critical analysis.
3) Development and implementation of a research design, including data collection methods and ethical considerations.
4) Analysis and interpretation of research data, presenting findings in written reports and oral presentations.
5) Evaluation of research report writing skills, focusing on clarity, coherence, and adherence to academic standards.
6) Preparation of a dissertation manuscript ready for submission to academic journals, including response to reviewer comments.