Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Health and Wellness
Course Code	AEC-1 [T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Ability Enhancement Courses							
Pre-Requisite/s	knowledge of concept and nature of health, wellness and its various implications			**Co-Requisite/s**	knowledge of concept and nature of health, wellness and its various implications			
Course Outcomes & Bloom's Level	**CO1-** To introduce the learners to the concept of health and wellness and its relevance in daily life. **(BL1-Remember)** **CO2-** To introduce the learners to the relation between mind-body and its relevance.**(BL2-Understand)** **CO3-** To introduce learners to health behavior and promotion of human strengths for well-being. **(BL3-Apply)** **CO4-** demonstrate adequate knowledge on well-being and promotion of healthy behavior..**(BL4-Analyze)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✓ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	INTRODUCTION TO HEALTH & WELLNESS -Definition of health-WHO definition; Importance of health in everyday life;Components of health- physical, social, mental, spiritual and its relevance	Lecture method	5
2	Concept of wellness;Mental Health & wellness Determinants of health behaviours Using the mass media for health promotion	Lecture method, quiz, seminar	8
3	MIND – BODY AND WELL-BEING- Mind- Body connection in health- concept and relation; pt and relation Implications of mind-body connections;Wellbeing- why it matters?	Lecture method, quiz, seminar, group discussion	8
4	Digital wellbeing; Understanding health beliefs, and perspectives of indigenous people pertaining to Assam and North East India	adudi/video lectures, seminars, expert lectures	6
5	Promoting Human strengths and life enhancement: Classification of human strengths and virtues; cultivating inner strengths: Hope and optimism	adudi/video lectures, seminars, expert lectures	6

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Carr, A. (2004). Positive Psychology: The science of happiness and human strength. UK: Routledge.
Articles	
References Books	Forshaw, M. (2003). Advanced psychology: Health psychology. London: Hodder and Stoughton.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	2	1	-	1	-	1	-	1	-	1	1	1
CO2	2	1	1	2	1	1	-	2	-	-	-	-	2	2	2
CO3	2	2	2	2	-	1	-	-	1	1	-	-	3	2	3
CO4	3	2	2	2	1	-	1	-	-	-	-	-	3	2	3
CO5	3	3	2	3	-	-	1	2	1	-	1	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	English I [T]
Course Code	AEC-I [T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Foundation core							
Pre-Requisite/s				**Co-Requisite/s**	Opportunities for students to develop their reading and writing skills over the course of the semester through practices such as portfolios, revision assignments, collaborative work, and low-stakes assignments			
Course Outcomes & Bloom's Level	**CO1-** Comprehend and summarize characteristics & various structural principles prerequisite to Technical Communication**(BL1-Remember)** **CO2-** Classify and formulate the elementary intricacies of Scientific and Technical Writing using applicative grammar construct.**(BL2-Understand)** **CO3-** Create cohesive technical paragraphs & text.**(BL3-Apply)** **CO4-** Paraphrase text(s) and use appropriate referencing styles**(BL4-Analyze)** **CO5-** Evaluate goal setting, management, decision-making skills.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Module 1	Introduction to Communication Definition, Process, Principles and Types Forms & Grapevine Barriers & Noise	Classroom Lecture, PPts, Videoes	4
Module 2	Language Know-how Common Errors Learning through examples Functional Grammar & Contemporary usage	Classroom Lecture, PPts,	6
Module 3	Paragraph Development Techniques Principles & Methods Instruments for Cohesive Writing Creating Mind Maps and Infographics	Classroom Lecture, PPts,	8
Module 4	Writing skills Introduction to writing skills. Tone, Orientation, Attitude, Formal vs Informal, general writing, technical writing • Letter/ Application/e-mail, Format, and content Indianisms in Email Writing Writing for the Web: Do's & Don'ts of Email Writing, Netiquette	Classroom Lecture, PPts,	6
Module 5	Writing skills, Introduction to writing skills. Tone,Orientation, Attitude,Formal vs Informal,general writing,technical writing •Letter/ Application/e-mail, Format, andcontent • Indianismsin Email Writing •Writing for the Web:Do's & Don'ts of Email Writing,Netiquette	Classroom Lecture, PPts,	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
NA	NA	PBL		NA

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Prasad, V., “Advanced Communication Skills”, Atma Ram Publications, New Delhi
Articles	https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/recent_issues_pdf/2020/February/communication-skills-and-personality-development_February_2020_1580551794_4219373.pdf http://ijrar.com/upload_issue/ijrar_issue_140.pdf
References Books	Rutherford, Andrea, J., “Basic Communication Skills for Technology”, Pearson Education Asia
MOOC Courses	https://nptel.ac.in/courses/109103020
Videos	https://www.youtube.com/watch?v=DSaj9qMwvLI https://www.youtube.com/watch?v=pJ7RgUCEd5M

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	2	1	2	2	2	-	-	-	2	-	-	1	-	3
CO3	2	1	1	-	1	-	-	-	-	2	-	-	3	2	3
CO4	3	2	-	2	1	-	-	-	-	2	-	-	2	3	3
CO5	3	2	-	2	1	-	-	-	-	2	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Introduction To Food Technology [T]
Course Code	BSFT-0101[T]

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">1st</td><td rowspan="2">Semester</td><td rowspan="2">1st</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Embedded theory and lab</td></tr>
<tr><td>Course Category</td><td colspan="8">Discipline Core</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Students must have passed class 12 or equivalent from a recognised board with Physics, Chemistry, and Biology/Home Science as compulsory subjects</td><td>Co-Requisite/s</td><td colspan="4">Students should have basic knowledge of physics, chemistry and biology.</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- To remember the importance of health food, ethnic food, organic food, functional food, nutraceuticals, fabricated foods, convenience foods, GM foods, space foods (BL1-Remember)
CO2- To understand the food science concepts and food adulteration(BL2-Understand)
CO3- To provide experimental basis and processing ideas of fruits and vegetables technology (BL3-Apply)
CO4- To evaluate the applications of food laws in different food products(BL4-Analyze)
CO5- To apply the understanding of food technology in developing new food products and evaluating the food quality(BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="3">Skill Development ✓
Entrepreneurship ✕
Employability ✓
Professional Ethics ✕
Gender ✕
Human Values ✕
Environment ✕</td><td>SDG (Goals)</td><td colspan="4">SDG3(Good health and well-being)
SDG6(Clean water and sanitation)
SDG12(Responsible consuption and production)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	~~Food science concept: Basic SI unit of length, volume and weight, temperature, relative density, pH. Physicochemical properties of food-boiling point, evaporation, melting point, smoke point, surface tension, osmosis, humidity, freezing point and specific gravity~~ Introduction to Food Science, Food: Definition, functions and types, Different kinds of Food Industries, Components or segments of food industries and their market size and trends, Scope of food processing and technology	Lecture method, audio/video clips, group discussion, quiz, industrial visit	9
2	~~Colloidal systems in foods: Constituents of food, true solution, suspension, stability of colloidal system, types of colloidal system in food-sol, gel, emulsion, foam Classification of food: Health food, ethnic food, organic food, functional food, nutraceuticals, fabricated foods, convenience foods, GM foods, space foods~~ Classification of animal foods. Composition and processing of milk –pasteurization and sterilization; meat and poultry -slaughtering, fish – structure and types, and eggs - structure	Lecture method, audio/video clips, group discussion	9
3	~~Food additives: Food additives, antioxidants, sequestrants, preservatives, nutrient supplement, emulsifiers, stabilizers and thickening agents, bleaching and maturing agent, sweeteners, humectants and anticaking agents coloring and flavoring substance; Food adulteration: Types of adulterants intentional and incidental adulterants, methods of detection. Browning Reaction: Introduction, types, role of browning in food~~ Classification of plant foods. Composition and processing of cereals, pulses and oilseeds – milling, oil extraction, different by-products	lecture method, audio/video clips, group discussion, lecture with ppt	10
4	~~Fruits and Vegetables: Classification, general composition, names and sources of pigments, Dietary fiber. Post harvest changes in fruits and vegetables, physical changes, chemical changes during the storage of fruits and vegetables~~ Proximate composition and food properties: study of physico-chemical properties of foods, moisture content in fruits and vegetables, boiling point determination of milk and fruit juice, smoke point determination of oils and ghee, surface tension of viscous fluids, osmosis process in grapes, specific gravity of brewed coffee. Colloidal systems in foods, functional food, nutraceuticals	audio/video clips, group discussion, lecture with ppt, quiz	12
5	Food safety and quality assurance- definition, Evaluation of food-subjective and objective, Food standards - PFA, BIS, AGMARK, FPO, ~~ISI,~~ FSSAI.	Industrial visit, audio/video clips, group discussion, lecture with ppt, quiz	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Familiarization with Food Technology Lab and general laboratory guidelines	Experiments	BL2-Understand	2
2	To determine moisture content in given food sample	Experiments	BL4-Analyze	2
3	To determine ash content in given food sample	Experiments	BL4-Analyze	2
4	To determine crude fat content in given food sample	Experiments	BL4-Analyze	2
5	To determine crude protein content in given food sample	Experiments	BL4-Analyze	2
6	To determine crude fibre content in given food sample	Experiments	BL4-Analyze	2
7	To determine Total Soluble Solids (TSS), pH, and titratable acidity in given samples	Experiments	BL4-Analyze	2
8	To determine physical properties of food grains	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0

Part E

Books	Potter, N. N., & Hotchkiss, J. H. (2012, December 6). Food Science. Springer Science & Business Media.
Articles	https://www.ift.org/news-and-publications/food-technology-magazine
References Books	Vaclavik, V. A., & Christian, E. W. (2007, December 3). Essentials of Food Science. Springer Science & Business Media.
MOOC Courses	https://nptel.ac.in/courses/126105013
Videos	https://youtu.be/i5VwdkggtWU

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	1	-	-	-	-	-	-	3	1	1
CO2	3	3	2	3	2	1	1	-	-	-	1	-	3	1	1
CO3	3	2	3	3	2	1	1	-	-	-	1	-	3	1	1
CO4	3	2	1	1	1	1	-	-	-	-	-	-	3	3	3
CO5	3	2	2	2	1	1	1	-	-	-	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Microbiology [T]
Course Code	BSFT-0102[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must have studied Physics, Chemistry, and Biology/Home Science as compulsory subjects			**Co-Requisite/s**	Students should have basic knowledge of microorganisms and their classifications and structures (as studied in biology)			
Course Outcomes & Bloom's Level	**CO1-** To remember the interactions between microorganisms and the food environment, and factors influencing their growth and survival**(BL1-Remember)** **CO2-** To understand the significance and activities of microorganisms in food and characteristics of foodborne, waterborne and spoilage microorganisms, and methods for their isolation, detection and identification**(BL2-Understand)** **CO3-** To provide experimental basis, and to enable students to acquire a specialized knowledge and understanding in the field of food microbiology.**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in food production, fermentation and how it influences the microbiological quality **(BL4-Analyze)** **CO5-** To evaluate the application of microbiological methods and microbiological analysis of food in practice to ensure proper food quality measurement.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to microbiology: Scope of food microbiology, Characteristics and morphology of Lactic acid bacteria, Acetic acid bacteria, Clostridium, Proteolytic bacteria, Lipolytic bacteria, fungi, and algae. Control of micro-organisms- Growth curve; Influence of environmental factors on growth- pH, Water activity, O2 availability, Temperature, Pressure and Radiation.	Lecture Method, Ice Breaking session, Review Summarizing, Tutorials sessions	10
2	~~Principles, physical methods of food preservation: temperature (low, high, canning, drying), irradiation, hydrostatic pressure, high voltage pulse, microwave processing and aseptic packaging, chemical methods of food preservation: salt, sugar, organic acids, SO2, nitrite and nitrates, ethylene oxide, antibiotics and bacteriocins~~ Contamination and spoilage of different foods: Cereals, sugar and their products, Milk and milk products, Fruits and vegetables, canned foods, meat, fish, eggs and poultry.	Lecture Method, Quiz, Illustrate with analogies, Interactive videos	8
3	~~Contamination and spoilage of different foods: Cereals, sugar and their products, Milk and milk products, Fruits and vegetables, canned foods, Meat, fish, egg and poultry~~ Fermented foods: different fermented foods (Sauerkraut, Sausages, Bread, Soysauce, Idli, Tempeh, Poi, Dairy products - basic concepts of all briefly). Different microbial enzymes in industry; concept of probiotics, prebiotics, postbiotics and parabiotic	Lecture method, Summarizing, Quiz, Tutorials sessions, Expert Lecture	10
4	Food borne illness: Food intoxication- Staphylococcal intoxication, botulismFood infection- Salmonellosis, Clostridium perfringens, Bacillus cereus gastroenteritis, E.coli infection, Yersinia enterocolitica, Listeria monocytogenes and Campylobacter jejuni and others. Pre-biotic and pro-biotic	Audio/Video clips, group discussion, lecture with ppt, quiz	9
5	~~SCP- Microorganisms used, raw materials used as substrate, condition for growth and production, nutritive value and use of SCP; Fat from microorganisms- Microorganisms used raw materials, production of fat; Production of amino acids; Production or other substances added to foods. Production of enzymes- amylases, invertase, pectolytic enzymes, proteolytic enzymes, other enzymes~~ Microorganisms as food: Single cell protein, algae as food, and mycoprotein from fungi for use as food and feed, mushroom cultivation	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Introduction to Microbiology Laboratory Safety, use of equipment and perform sterilization techniques	Experiments	BL2-Understand	2
2	To study different parts of microscope and its working	Experiments	BL2-Understand	2
3	To prepare culture media (Nutrient broth and agar)	Experiments	BL3-Apply	2
4	To perform simple and Gram's staining	Experiments	BL3-Apply	2
5	To perform different streaking techniques	Experiments	BL5-Evaluate	2
6	To evaluate microbiological quality of water	Experiments	BL5-Evaluate	2
7	To enumerate Lactic acid bacteria from fermented foods	Experiments	BL5-Evaluate	2
8	To examine the microbial load of different food samples	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	

Part E

Books	Frazier, W. C. (1967, January 1). Food Microbiology. McGraw-Hill Companies.
Articles	https://agsci.psu.edu/global/ifsi/ukraine-food-safety-short-course-materials/fssc-case-studies/food-microbiology-case-study.pdf
References Books	Khetarpaul, N. (2006, January 1). Food Microbiology. Daya Books.
MOOC Courses	https://nptel.ac.in/courses/105107173
Videos	https://www.youtube.com/watch?v=zlRXDi-6j-Y&t=2s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	1	1	-	-	-	1	-	3	1	1
CO2	3	2	3	3	2	2	-	-	-	-	-	-	3	1	1
CO3	3	2	2	3	3	3	-	-	-	-	-	-	3	1	1
CO4	3	3	2	3	2	2	1	-	-	-	-	-	3	3	3
CO5	3	3	2	2	3	2	-	-	-	-	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Chemistry [T]
Course Code	BSFT0103[T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have the basic knowledge of Physical ,Inorganic and Organic chemistry			**Co-Requisite/s**	Students should know the chemistry and functions of Biomolecules			
Course Outcomes & Bloom's Level	**CO1-** To remember the basics of modern biochemistry and molecular biophysics, including the principles of biological phenomena, and structural, functional and dynamic aspects of biological components**(BL1-Remember)** **CO2-** To understand the core principles and topics of chemistry, structural and chemical biology including nucleic acid structure and interactions, signaling proteins and membrane proteins, enzyme kinetics and drug discovery and protein design**(BL2-Understand)** **CO3-** To provide the students a specialized knowledge and understanding in the field of food biochemistry**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in food constituents' interactions and their isolation, utilization and metabolism**(BL4-Analyze)** **CO5-** To evaluate the application of principles of biochemistry in practice to ensure healthy body metabolism.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Food Chemistry- Definition, Composition of food Water: Definition of water in food. Structure of water and ice, Types of water, Interaction of water with solutes, Sorption phenomenon, Water activity and packaging, Water activity and spoilage	Lecture, ppt, Tutorials sessions	6
2	Lipids: Classification of lipids, Characteristics, Physical properties- melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point. Chemical properties- reichert meissel value, polenske value, iodine value, peroxide value, saponification value. Effect of frying on fats, Changes in fats and oils- rancidity, lipolysis, flavor reversion, Auto-oxidation and its prevention, Technology of edible fats and oils- Refining, Hydrogenation and Interesterification.	Quiz, lecture, Interactive videos	10
3	Proteins: Protein classification and structure, Nature of food proteins (plant and animal proteins), Properties of proteins (electrophoresis, sedimentation, amphoterism and Denaturation), Functional properties of proteins eg. Organoleptic, solubility, viscosity, binding gelation / texturization, emulsification, foaming. Enzymes Introduction, classification. General characteristics. Enzymes in food processing. Industrial Uses of Enzymes. Immobilized enzymes.	Summarizing, Quiz, Tutorials sessions, Expert Lecture	10
4	Carbohydrates: Classification (mono, oligo and poly saccharides), Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums), Chemical reactions of carbohydrates, Modified celluloses and starches.	Lecture methods,Audio/Video clips, group discussion, quiz	9
5	~~Physico-chemical and nutritional changes occurring during food Processing treatments.~~ Vitamins: Structure, Importance and Stability, Water soluble vitamins, Fat soluble vitamins. Minerals: Sources and functions of micro and macro minerals in food. Energy content of foods. Body composition, Physiological fuel value, Measurement of Energy Expenditure: BMR, RMR, RDA, Food groups, Balanced diet, Exchange list.	Lecture methods,Audio/Video clips, group discussion, quiz	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To get familiarize with Food Technology Laboratory glasswares, instruments and general laboratory guidelines	PBL	BL2-Understand	3
2	To prepare and standardize the chemical solutions	Experiments	BL2-Understand	2
3	To determine moisture content in given food sample	Experiments	BL3-Apply	2
4	To determine ash content in given food sample	Experiments	BL3-Apply	2
5	To determine crude fat content in given food sample	Experiments	BL3-Apply	2
6	To determine crude protein content in given food sample	Experiments	BL3-Apply	2
7	To determine crude fibre content in given food sample	Experiments	BL3-Apply	2
8	To determine the titratable acidity and pH in given food sample	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	18	40	0

Part E

Books	Osgood, M., Ocorr, K.A. and Lehninger, A.L. (2000a) The absolute, ultimate guide to lehninger's principles of Biochemistry, third edition: Study guide and solutions manual. New York: Worth Publishers.
Articles	https://network.bepress.com/life-sciences/food-science/food-chemistry/
References Books	Harpers Illustrated Biochemistry (2015a). Erscheinungsort nicht ermittelbar: McGraw-Hill Professional. Stryer, L., Tymoczko, J.L. and Berg, J.M. (2002) Biochemistry. New York: W.H. Freeman.
MOOC Courses	https://nptel.ac.in/courses/126105027
Videos	https://www.youtube.com/watch?v=Dm3yP7FF4nI&t=1s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	-	1	-	1	1	-	1	-	-	1	1	1
CO2	2	1	1	1	-	1	-	1	1	1	-	-	1	1	1
CO3	2	2	2	1	1	1	1	1	1	1	-	-	1	1	2
CO4	3	2	2	2	1	2	1	1	2	1	-	-	1	2	2
CO5	3	2	2	2	1	1	2	1	1	1	-	-	1	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Introduction to Biology [T]
Course Code	GE-I [T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Generic Elective							
Pre-Requisite/s	basic concepts of taxonomy (systematic position) and diversity of animals. determine non-chordate & chordate classification up to their sub-classes/orders with suitable examples Taxonomy identification and their relation with phylogeny and evolution systematic position of various species of animals from microscopic unicellular to multicellur and complex animals.			**Co-Requisite/s**	Will create basic knowladge to biology or living world and students can apply whenever required.			
Course Outcomes & Bloom's Level	**CO1-** To describe general Introduction of biology**(BL1-Remember)** **CO2-** To understand the classification of living world evolution and phylogeny and Genetics**(BL2-Understand)** **CO3-** To understand the importance of Biology and its applications**(BL3-Apply)** **CO4-** To provide experimental basis and to enable students to basic concept of classification and animal identification as well as construction of phylogenetic trees**(BL4-Analyze)** **CO5-** To evaluate the applications of Biology in various fields**(BL5-Evaluate)** **CO6-** To apply the understanding of Biology in various field R&D and industries**(BL6-Create)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) SDG11(Sustainable cities and economies) SDG14(Life below water) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction & concepts of biology a closer look at ecosystem, study of cells– Prokaryotes Eukaryotes and tissues, level of organization, Biology in everyday life and at industrial level	Lecture method, audio/video clips, group discussion, quiz	8
2	Evolutionary history of biological diversity Mechanism of Macroevolution, Phylogeny and the tree of life Classification of biodiversity of life, Kingdoms of Life and their characteristics with suitable examples	Lecture method, audio/video clips, group discussion, review analysis	8
3	Theories of evolution (Lamarckism, Darwinism and Neo-Darwinism) Mechanism of speciation Natural selection Genetic approach to Biology inheritance.	Lecture method, audio/video clips, group discussion, classroom presentations	8
4	Principles of genetics Mendel Law The molecular basis of genetic information Nucleic acids The flow ofgenetic information from DNA to RNA to protein Distinction between Phenotype and Genotype term use in genetics.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Constituents of matter Structure of an atom The energy level of electron. Chemical reaction of Water Properties of water Homeostasis.	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	VK, V. P. A. (2010, January 1). Genetics, 9th Edition (Multicolour Edition). S. Chand Publishing. Singh, B. D. (1997, January 1). Fundamentals of Genetics.
Articles	https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_General_Biology_(Boundless)/01%3A_The_Study_of_Life/1.01%3A_The_Sc __Introduction_to_the_Study_of_Biology
References Books	Reddy, S. (2001, January 1). University Botany I : (Algae, Fungi, Bryophyta And Pteridophyta). New Age International. VK, A. (n.d.). Zoology for Degree Students (For B.Sc. Hons. 2nd Semester, As per CBCS). S. Chand Publishing.
MOOC Courses	https://nptel.ac.in/courses/102103091
Videos	https://www.khanacademy.org/science/biology/intro-to-biology/what-is-biology/v/overview-of-biology

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	1	2	2	-	-	-	-	-	-	-	1	2	3
CO2	2	3	1	2	2	-	-	-	-	-	-	-	2	2	3
CO3	1	2	2	1	1	-	-	-	-	-	-	-	2	1	3
CO4	1	2	2	1	1	-	-	-	-	-	-	-	1	1	2
CO5	1	2	1	1	2	-	-	-	-	-	-	-	1	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Introduction to Mathematics [T]
Course Code	GE-I [T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Generic Elective							
Pre-Requisite/s	Should be acquainted with the basics knowledge of mathematics and statistics.			**Co-Requisite/s**	Should be acquainted with the basics knowledge of mathematics and statistics.			
Course Outcomes & Bloom's Level	**CO1-** To remember mean, media and mode**(BL1-Remember)** **CO2-** To understand various theorems**(BL2-Understand)** **CO3-** To apply statistics in food industries, errors, precision and threshold**(BL3-Apply)** **CO4-** To analyze problem and provide solutions**(BL4-Analyze)** **CO5-** To acquire an overall concept about basic mathematics.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Successive differentiation, Mean Value Theorems and applications, Indeterminate forms, Introduction to anti-derivatives, Definite Integrals, Ordinary Differential equations.	Lecture Method	09
2	Eigen values, Cayley Hamilton Theorem, Applications of Matrices in solving system of equations.	Lecture Method	09
3	Scope of statistics in food industries, errors, precision and threshold. Descriptive measures-Measures of central tendency, dispersion, skewness and kurtosis. Axiomatic approach to probability.	Lecture Method, quiz, seminar	09
4	Applications of Bayes Theorem, Random variables, Probability distributions, Mathematical expectation and variance, Binomial, Poisson and Normal distributions.	Lecture Method, quiz, seminar	09
5	Correlation and Regression, Sampling distributions, Standard error, Type I and Type II errors, Hypothesis testing- Large sample tests for means and proportions, Student's t test, F-test, Chi square test, ANOVA (one way and two way)	Lecture Method, quiz, seminar	09

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Introduction to Mathematics for Life Scientists, by E.Batschelet, Third edition, Springer International Edition.
Articles	
References Books	Applied Calculus for the Managerial, Life and Social sciences by S.T.Tan, Fifth edition, Thomson Learning.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	-	-	1	1	-	-	1	2	1
CO2	2	2	1	1	-	-	1	-	-	-	-	-	1	2	1
CO3	2	2	2	2	-	1	-	-	-	1	-	-	2	2	1
CO4	3	2	2	2	1	-	1	-	-	-	-	-	2	2	2
CO5	3	2	2	2	-	-	1	-	-	1	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	NCC-I
Course Code	NCC-I

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	2	4
Course Type	Theory only							
Course Category	Generic Elective							
Pre-Requisite/s	Should be acquainted with the basics knowledge of General Awareness about Leadership Quality, Personality Development, Defense system etc			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Develop the qualities of social skills.**()** **CO2-** Imbibe leadership qualities. **()** **CO3-** Be motivated to serve the nation by joining Armed forces. **()** **CO4-** Contribute in environmental awareness and conservation activities**()** **CO5-** Keep abreast of current affairs & general awareness.**()** **CO6-** Effectively contribute in managing disaster relief tasks**()**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✓	**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG13(Climate action) SDG15(Life on land)					

Part B

Modules	Contents	Pedagogy	Hours
Unit 1. Personality Development	Group Discussions – Social Skills & Time management.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit 2. Leadership Development	Case Studies – Case Studies – Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965 war.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit 3. Disaster management	(i) Initiative Trg, Organising Skills. (ii) Dos and Don'ts. (iii) Natural Disasters. (iv) Man Made Disasters. (v) Fire Services and Fire Fighting.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit-4.Environmental Awareness	Adventure Environmental Awareness and Conservation, Local and global approaches to conserve nature.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit 5. General Awareness & Armed Forces	General Awareness, Army, Navy, Air Force and Central Armed Police Forces.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	R Gupta ; NCC National Cadet Corps A, B & C Certificate Examination Book; Ramesh Publishing House, 2018.
Articles	https://indiancc.mygov.in/
References Books	Singh, Neeraj; A Hand Book of NCC; Kanti Prakashan Publisher Cadet training hand book specialised subjects (2017)
MOOC Courses	
Videos	https://www.youtube.com/watch?v=eBA5t4iepAA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Basic Soft Skills
Course Code	SEC-I

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Communication skills, Body language and Etiquette, Group discussion skills, Interview skills, Presentation skills, and Emotional Intelligence, Time Management Skills, Preparation of CV and Life skills			**Co-Requisite/s**	Communication skills, Body language and Etiquette, Group discussion skills, Interview skills, Presentation skills, and Emotional Intelligence, Time Management Skills, Preparation of CV and Life skills			
Course Outcomes & Bloom's Level	**CO1-** Aims to increase learner's computer knowledge and unique soft skills so as to develop attributes that enhance an individual's interactions, earning power and job performance. **(BL2-Understand)** **CO2-** The objective of the course is to inculcate potential skills in the learners to prepare them to deal with the external world in a collaborative manner, communicate effectively, take initiative, solve problems, and demonstrate a positive work ethic so as to hold a good impression and positive impact.**(BL3-Apply)** **CO3-** is able to train learners' thinking, to improve their perseverance and patience. is able to enrich learners by fostering the building of self-esteem and self-confidence.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Soft Skills And Personality Development- The Institute of Chartered Accountants of India (Set up by an Act of Parliament) Southern India Regional Council Chennai
Articles	
References Books	
MOOC Courses	https://nptel.ac.in/courses/109104107
Videos	https://youtu.be/y-IPi4KMArQ?si=BWWXa95KQ6dC0dwE

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	-	1	1	-	-	-	2	1	1
CO2	1	2	1	2	2	1	1	-	-	1	1	-	3	1	2
CO3	2	2	3	2	3	-	-	1	-	1	-	-	3	1	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Bionstrumentation [T]
Course Code	SEC-I [T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Should be acquainted with the basics knowledge of instruments and their uses.			**Co-Requisite/s**	Knowledge of food analysis and food adulteration			
Course Outcomes & Bloom's Level	**CO1-** Demonstrate an understanding of physics and engineering in biosensor, electrodes**(BL1-Remember)** **CO2-** Demonstrate an understanding of the biomedical instrumentation principles in aspects of device design and applications**(BL2-Understand)** **CO3-** Apply these principles in the context of bioinstrumentation interactions with tissues, organs and human body to explain the measurement results and to develop the instrumentation**(BL3-Apply)** **CO4-** Students will demonstrate these abilities and hone the appropriate information gathering, computational and data-handling skills in homework and lab exercises.**(BL4-Analyze)** **CO5-** They will demonstrate their proficiency formally in examinations**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours
1	Microscopy: History, principle, types and applications (Bright field, dark field and fluorescent microscopy). Electron microscope: principle and applications of scanning electron , transmission electron microscope.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
2	Centrifugation: Basic principle, types (analytical and ultracentrifugation) and applications.	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	8
3	Chromatography: Principle, working and applications of Paper chromatography, thin layer chromatography, gel filtration chromatography, ion exchange chromatography and affinity chromatography,.	Audio/Video clips, group discussion, lecture with ppt, classroom presentation	8
4	Electrophoresis: principles, types and applications of paper, agarose gel & PAGE electrophoresis. Radioactivity: principle of radioactive decay, half life. Radioisotopes: applications in biological sciences, Scintillation counters: basic principle and application.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Spectrum and their Types, wave length range of electromagnetic radiation. Spectroscopy: basic principle and applications of colorimetry and U.V, Visible and Infrared spectroscopy. Microtomy: Basic principle and applications	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Nelson, D. L., Lehninger, A. L., & Cox, M. M. (2008, February 1). Lehninger Principles of Biochemistry. Macmillan.
Articles	
References Books	Work, T. S., & Work, E. (1983, January 1). Laboratory Techniques in Biochemistry and Molecular Biology Williams, B. L., & Wilson, K. (1975, January 1). A Biologist's Guide to Principles and Techniques of Practical Biochemistry.
MOOC Courses	https://nptel.ac.in/courses/126105020
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	1	-	1	-	1	-	-	1	1	1
CO2	2	1	1	1	1	-	-	1	-	1	-	-	1	1	1
CO3	2	2	2	2	1	1	1	1	1	1	-	-	2	1	1
CO4	3	2	2	1	1	-	1	-	1	-	1	-	2	1	1
CO5	3	2	2	1	1	1	1	1	1	-	1	-	2	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Environmental Science [T]
Course Code	VAC-I [T]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Interdisciplinary Minor							
Pre-Requisite/s	Should be acquainted with the basics knowledge of environment and its management			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the concept of different types of resources available and their limitations.**(BL1-Remember)** **CO2-** To Understand the concepts of ecosystems, biodiversity and conservation**(BL2-Understand)** **CO3-** To develop positive attitude towards practical response to different types of environmental challenges by adopting advance technology and sustainable development**(BL3-Apply)** **CO4-** Acquire expertise and skills needed for the Environmental Management Systems and techniques of monitoring, Environment audit, Environmental Impact Analysis, environment instrumentation and control systems and for the projects development, implementation, and maintenance.**(BL4-Analyze)** **CO5-** Students acquire skills for to communicate, prepare, plan and implement the environmental management plan in any projects							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG14(Life below water) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
1	Environment - Definition and its segments, (Lithosphere, Hydrosphere, Atmosphere and Biosphere) Ecology and Ecosystem: Basic concepts, Type & Components, Energy Flow, Food chain, food web, Ecological Pyramids. Biodiversity: Biodiversity as a natural resource; Levels and types of biodiversity; Biodiversity in India and the world; Biodiversity hotspots; Species and ecosystem threat categories. Major conservation policies: in-situ and ex-situ conservation approaches.	Lecture method, Video Case Study, Project Based Activity, Application Based Activity	8
2	Natural Resources – Classification, Water Resources and Forest Resources. Energy Resources- Classification-Conventional resources (Mineral, Oil, Coal, Gas, Nuclear Energy and Thermal Power)-Non-conventional resources (Solar, Geothermal, Wind energy, Biomass and Bio-gas).	Lecture method, Video Case Study, Project Based Activity, Application Based Activity	8
3	Water pollution – sources & effects. Characteristics and treatment of waste water (STP & ETP). Soil - formation of soil, elementary and mineral composition, soil pollution, effects and abatements. Air Pollution- Classification, sources and toxic effects of air pollutants. engineered systems for air purification: Atmospheric cleansing process, approaches to contamination control. Noise Pollution – sources & effects.	Lecture method, Video Case Study, Project Based Activity, Application Based Activity	8
4	Population Growth & Explosion. Green house gas effect, Global warming, Climate change, Acid rain, Ozone layer depletion and Photochemical Effect. Environmental legislation of India-Air act-1984, Water act-1974, Environment Protection act-1986, Forest conservation act-1980, Wild life protection act-1972.	WhAudio-Video, Case Study, Project Based Activity, Application Based Activity	8
5	Ethics- (types & theories) and moral values, NGOs and their role in environmental preservations, Effectiveness of various religions in environmental conservation A case study of Anupam Mishra (Ponds are still relevant, Saaf Maathe Ka Samaj, Rajasthan Ki Rajat Bunden & Paryavaran Ke Path). Solid waste - impacts on Society & management strategies. Swachha Bharat Abhiyan. Sustainable Habitat: Green Building, GRIHA Rating Norms.	Audio-Video, PPT, Case Study, Project Based Activity, Application Based Activity	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Anubha Kaushik & C.P. Kaushik Perspective in Environment and Ecology 2010 Robert Morrison & Brian Murphy Environmental Forensic 1st Edition 2005 J. Jeffrey Peice Environmental Pollution and Control 4th Edition, 1997 A. K. De Environmental Chemistry 7th Edition 2014 Anupam Mishra The Ponds are still relevant (Aaj Bhi Khare Hain Taalab) 1st Edition 2018 Anupam Mishra Rajasthan Ki Rajat Bunden Edition 2021
Articles	
References Books	K. Lee Lerner; Brenda Wilmoth Lerner Environmental Issues: Essential Primary Sources 2006-07-11 Elizabert Fisher Environmental Law: A very short Introduction 2018-01-01 Ashok Bajpai Paryavaran Ke Path with Anupam Mishra (Interview) 3rd Edition 2022
MOOC Courses	https://nptel.ac.in/courses/109105203
Videos	https://youtu.be/tqgo6PYfJLk?si=B690I2aRtfYXgvIz

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	-	-	1	2	-	-	-	-	1	-	-
CO2	1	2	-	-	-	-	1	2	-	-	-	-	1	-	-
CO3	1	2	-	-	-	-	1	2	-	-	-	-	-	-	-
CO4	1	2	-	-	-	-	3	2	-	-	-	-	-	2	-
CO5	1	2	-	-	-	-	3	2	-	-	-	-	-	-	3
CO6	1	2	-	-	-	-	3	2	-	-	-	-	-	-	3

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Communication skills [T]
Course Code	AEC-2 [T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Foundation core							
Pre-Requisite/s	Should be acquainted with the basics knowledge of food and the technology behind the processing of them			**Co-Requisite/s**	Opportunities for students to develop their reading and writing skills over the course of the semester through practices such as portfolios, revision assignments, collaborative work, and low-stakes assignments			
Course Outcomes & Bloom's Level	**CO1-** Comprehend and summarize characteristics & various structural principles prerequisite to Technical Communication**(BL1-Remember)** **CO2-** Classify and formulate the elementary intricacies of Scientific and Technical Writing using applicative grammar construct.**(BL2-Understand)** **CO3-** Create cohesive technical paragraphs & text.**(BL3-Apply)** **CO4-** Paraphrase text(s) and use appropriate referencing styles**(BL4-Analyze)** **CO5-** Evaluate goal setting, management, decision-making skills.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Module 1	Introduction to Communication Definition, Process, Principles and Types Forms & Grapevine Barriers & Noise	Classroom Lecture, PPts, Videoes	4
Module 2	Language Know-how Common Errors Learning through examples Functional Grammar & Contemporary usage	Classroom Lecture, PPts,	6
Module 3	Paragraph Development Techniques Principles & Methods Instruments for Cohesive Writing Creating Mind Maps and Infographics	Classroom Lecture, PPts,	8
Module 4	Writing skills Introduction to writing skills. Tone, Orientation, Attitude, Formal vs Informal, general writing, technical writing • Letter/ Application/e-mail, Format, and content Indianisms in Email Writing Writing for the Web: Do's & Don'ts of Email Writing, Netiquette	Classroom Lecture, PPts,	6
Module 5	Writing skills, Introduction to writing skills. Tone,Orientation, Attitude,Formal vs Informal,general writing,technical writing •Letter/ Application/e-mail, Format, andcontent • Indianismsin Email Writing •Writing for the Web:Do's & Don'ts of Email Writing,Netiquette	Classroom Lecture, PPts,	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
NA	NA	PBL		NA

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Prasad, V., “Advanced Communication Skills”, Atma Ram Publications, New Delhi
Articles	https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/recent_issues_pdf/2020/February/communication-skills-and-personality-development_February_2020_1580551794_4219373.pdf http://ijrar.com/upload_issue/ijrar_issue_140.pdf
References Books	Rutherford, Andrea, J., “Basic Communication Skills for Technology”, Pearson Education Asia
MOOC Courses	https://nptel.ac.in/courses/109103020
Videos	https://www.youtube.com/watch?v=DSaj9qMwvLI https://www.youtube.com/watch?v=pJ7RgUCEd5M

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	2	1	2	2	2	-	-	-	2	-	-	1	-	3
CO3	2	1	1	-	1	-	-	-	-	2	-	-	3	2	3
CO4	3	2	-	2	1	-	-	-	-	2	-	-	2	3	3
CO5	3	2	-	2	1	-	-	-	-	2	-	-	2	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Hindi I [T]
Course Code	AEC-II [T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Ability Enhancement Courses							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** भारतीय ज्ञान परम्परा सेवि द्यार्थि यर्थि ों को अवगत कराना**(BL1-Remember)** **CO2-** उत्कृष्ट साहि त्यि क पाठों के अध्ययन सेरूचि का वि कास करना**(BL2-Understand)** **CO3-** सांस्कृति क चेतना और राष्ट्रीय भावना का वि कास करना ।**(BL3-Apply)** **CO4-** भाषा-ज्ञान**(BL2-Understand)** **CO5-** सामान्य शब्दावली और वि शेष 'शब्दा वली के अध्ययन द्वा रा भा षा एवं संस्कृति बो ध का वि का स करना**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	1.. स्वतंत्रता पुकारती 2. पुष्प की अभि ला 3. वा क्य संरचना और अशुद्धि याँषा	Lecture method, audio/video clips, group discussion, quiz	5
2	पर्या यवा ची वि लो म, एकार्थी , अनेकार्थी , शब्दयुग्म शब्द 3. वह तो ड़ती पत्थर, 4. वर्ण-वि चा र (स्वर व्यंजन वर्गी करण उच्चा रण स्था न)	Lecture method, audio/video clips, group discussion, Review Analysis	4
3	भगवा न बुद्ध:- स्वामी वि वेकानंद 2. लो क तंत्र एक धर्म है.है 3. पल्लवन	lecture method, audio/video clips, group discussion, Review Analysis	5
4	1.अफसर 2 संक्षेपण 3 ना री त्व का अभि शा प 4. वि रा म चि ह्न	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	4
5	1.नैति क मूल्य परि चय एवं वर्गी करण २. अंतर्ज्ञा न और नैति क जी वन, 3. अप्प दी पो भव	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	हिंदी भाषा एवं नैतिक मूल्य- मध्य प्रदेश शासन
Articles	
References Books	हिंदी भाषा एवं नैतिक मूल्य- मध्य प्रदेश शासन
MOOC Courses	https://nptel.ac.in/courses/109106201
Videos	https://youtu.be/gHhQMNYvQXY?si=ZWLQBB-UwudAXFVm

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	-	2	-	3	-	-	3	1	1
CO2	3	1	1	1	1	1	-	2	-	3	-	-	3	1	1
CO3	3	1	1	1	1	1	-	2	-	3	-	-	3	1	1
CO4	3	1	1	1	1	1	-	2	-	3	-	-	3	1	2
CO5	3	1	1	1	1	1	-	2	-	3	-	-	3	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Technology of Food Processing and Preservation [T]
Course Code	BSFT-0201 [T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must have studies Introduction to Food Technology and Basic chemistry in previous semester			**Co-Requisite/s**	Knowledge of chemical preservatives used in different foods and processing parameters applied to extend the shelf-life of product			
Course Outcomes & Bloom's Level	**CO1-** To remember the major food preservation principles, techniques and their merits and demerits **(BL1-Remember)** **CO2-** To understand the basic concepts of thermal as well as novel food processing methods including non-thermal food processing techniques using pressure, light, sound and microwave**(BL2-Understand)** **CO3-** To provide experimental basis, and to enable students to acquire a specialized knowledge and understanding in the field of food processing**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. developing new product, preserving fresh produce, killing microbes in food, etc.**(BL4-Analyze)** **CO5-** To evaluate the application of food preservation principles in various fields such as research and food industries**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	~~Concept, need of processing in preservation, processing techniques, effects of processing and preservation on health, Merits and demerits of food processing and preservation.~~ Preservation-Introduction, Preservatives - Natural preservatives-Mode of action, Chemical preservatives- Sulphur dioxide, Benzoic acid, Sorbic acid, Antioxidants. Gaseous chemical food preservatives, factors influencing action of preservatives concept of Packaging.	Lecture, discussion, ppt	8
2	~~Drying- Significance: Natural dryingSolar drying, Artificial drying- Hot air drying, Drum drying, Spray drying, Freeze drying Pretreatments blanching, sulphuring~~ Concept, need of processing in preservation, Processing-concept and levels, effects of processing. Thermal Processing Principles and application– Blanching, Pasteurization, Sterilization, Ultra high temp sterilization, Aseptic processing.	Lecture, discussion, ppt	12
3	~~New trends in processing: Concept of Hurdle Technology- microwave processing, Cold Pasteurization Techniques, Radiation and its effect on food. Ohmic heating, Use of preservatives. Vibration technology, High Pressure Processing, Plasma Technology, Extrusion~~ Drying- Significance: Natural drying- Solar drying, Artificial drying- Hot air drying, Drum drying, Spray drying, Freeze drying Pretreatments blanching, sulphuring	Quiz, Lecture, discussion, ppt, Expert Lecture	10
4	Freezing: Refrigeration, Effect of low temperature on Fresh Fruits, Vegetables, Meat and Fish products, Chill injury. Freezing, Freezing rate Quick freezing, Slow freezing, Air blast freezing, Contact freezing, Immersion freezing, Cryogenic freezing, Quality of frozen foods-Retrogradation, Protein denaturation, Freezer burn.	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	~~Preservatives - Natural preservatives-Mode of action, Chemical preservatives- Sulphur dioxide, Benzoic acid, Sorbic acid,~~	Audio/Video clips, group discussion, lecture with ppt, quiz	6

	~~Antioxidants. Gaseous chemical food preservatives, factors influencing action of preservatives- natural and chemical~~ New trends in processing: Concept of Hurdle Technology- microwave processing, Cold Pasteurization Techniques, Radiation and its effect on food. Ohmic heating. High Pressure Processing, Plasma Technology, Extrusion, ultrasound processing		

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Familiarization with Food Technology Lab and general laboratory guidelines	Industrial Visit	BL2-Understand	3
2	Study the blanching process and determine catalase/peroxidase activity	Experiments	BL2-Understand	2
3	Study the effect of blanching on vitamin C content in given food sample	Experiments	BL3-Apply	2
4	Examination of the enzymatic browning in fruits and vegetables.	Experiments	BL3-Apply	2
5	Determination of Total Soluble Solids (TSS), pH, and titratable acidity in given samples	Experiments	BL3-Apply	2
6	Preparation of osmotic dehydrated fruits and vegetables	Experiments	BL3-Apply	2
7	Preservation of seasonal fruits/vegetables by natural preservatives	PBL	BL4-Analyze	3
8	Estimation of sodium benzoate in food sample (qualitative and quantitative determination)	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	18	40	0

Part E

Books	Khader, V. (2004) Text book on Food Storage and preservation. Ludhiana: Kalyani Publishers.
Articles	
References Books	DESROSIER, N.W. (2018) Technology of Food Preservation. ED-TECH. Fennema, O.R. (1976) Principles of Food Science. New York: Dekker.
MOOC Courses	https://nptel.ac.in/courses/127105231
Videos	https://www.youtube.com/watch?v=vznRdblDl5w&t=1s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	1	-	1	1	-	-	3	1	1
CO2	3	2	1	1	1	1	2	1	2	1	-	-	3	1	1
CO3	3	2	2	1	1	-	1	-	-	-	-	-	3	2	2
CO4	3	2	2	2	2	1	1	1	-	1	-	-	3	2	2
CO5	3	2	2	2	2	1	1	-	1	1	-	-	3	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Additives [T]
Course Code	BSFT-0202 [T]

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">1st</td><td rowspan="2">Semester</td><td rowspan="2">2nd</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Theory only</td></tr>
<tr><td>Course Category</td><td colspan="8">Discipline Core</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Candidates must have studied food chemistry and food microbiology in previous semesters.</td><td>Co-Requisite/s</td><td colspan="4">Students should have prior knowledge of preservatives, chemical compounds etc.</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- To remember the food additives, their classification, properties, usage limit and their importance. (BL1-Remember)
CO2- To understand the applications of different additives in food processing and nutrition in addition to their stabilization and protection techniques(BL2-Understand)
CO3- To provide the students a specialized knowledge and understanding in the field of food additives and their utilization(BL3-Apply)
CO4- To apply the subject knowledge in future perspectives i.e. such as in food processing and new product development.(BL4-Analyze)
CO5- To evaluate the theoretical knowledge in different commercialized products and implement the same to create processed and value added food products(BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="3">Skill Development ✓
Entrepreneurship ✓
Employability ✓
Professional Ethics ✓
Gender ✕
Human Values ✕
Environment ✓</td><td>SDG (Goals)</td><td colspan="4">SDG2(Zero hunger)
SDG3(Good health and well-being)
SDG6(Clean water and sanitation)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	~~Nutrient supplements & thickeners, polysaccharides, bulking agents, antifoaming agents, synergists ,antagonists~~ Definitions, classification and functions, need for food additives, Safety concerns, regulatory authorities; Food preservatives-classifications, antimicrobial agents (types, mode of action and their application), Antioxidants (synthetic and natural, mechanism of oxidation inhibition), Chelating agents: types, uses and mode of action	Lecture method, quiz, seminar	8
2	~~Antioxidants (synthetic and natural, mechanism of oxidation inhibition),chelating agents: types, uses and mode of action, Coloring agents: color retention agents, applications and levels of use, natural colorants, sources of natural color (plant, microbial, animal and insects), misbranded colors, color extraction techniques, color stabilization~~ Nutrient supplements, bulking agents, antifoaming agents, Flour improvers, leavening agents, humectants, buffering agents, and anticaking agents. Sweeteners: Introduction, types, properties and uses of saccharin, acesulfame-K, aspartame, HFCS, invert sugar, and sugar alcohols (polyols) as sweeteners in food products	Lecture method, quiz, seminar, quiz	12
3	~~Flour improvers: leavening agents, humectants and sequesterants, hydrocolloids, acidulants, pH control agents buffering salts, anticaking agents, etc.~~ Flavoring agents: Introduction, types and flavor extraction and stabilization; Flavor enhancers- Introduction and types Coloring agents: Introduction, types, sources, applications, permitted and misbranded colors, color extraction and stabilization techniques	Summarizing, Quiz, Whiteboard, Expert Lecture	7
4	~~Sweeteners: natural and artificial sweeteners, nutritive and nonnutritive sweeteners, properties and uses of saccharin, acesulfame-K, aspartame, corn sweeteners, invert sugar sucrose and sugar alcohols (polyols) as sweeteners in food products~~ Emulsifiers: Introduction, types, selection of emulsifiers, emulsion stability, and	Lecture method, group discussion, industrial visit	8

	mechanism of action. Thickeners and hydrocolloids: Introduction and types		
5	~~Emulsifiers: Types, selection of emulsifiers, emulsion stability, functions and mechanism of action. Additives, food uses and functions in formulations; permitted dosages~~ E-codes, CAS system. Uses and function of food additives in food formulations (different products). Regulation concerning food additives and other categories of ingredients approval and usage in European Union.	Group discussion, lecture, ppt	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	0	40	20	60	0

Part E

Books	Food Additives by Branen AL, Davidson PM & Salminen S
Articles	https://www.researchgate.net/publication/221925228_Food_Additive
References Books	Encyclopedia of Food and Color Additives by Gerorge AB Food Antioxidants: Technological, Toxicological and Health Perspective by Madhavi DL, Deshpande SS & Salunkhe DK. Food Flavours. Part A by Morton ID & Macleod AJ Food Proteins:Processing Applications by Shuryo Nakai Food Polysaccharides and Their Applications by Stephen AM
MOOC Courses	https://nptel.ac.in/courses/126105027
Videos	https://youtu.be/Dm3yP7FF4nI?si=55vFo027nUaRB6jy

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	1	-	-	-	-	-	-	3	1	1
CO2	3	3	2	2	3	2	-	-	-	-	-	-	3	1	1
CO3	3	3	2	3	3	2	-	-	-	-	-	-	3	1	1
CO4	3	2	2	3	3	3	1	-	-	-	1	-	3	3	3
CO5	3	3	3	2	2	2	1	-	-	-	1	2	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Processing of Fruits and Vegetables[T]
Course Code	BSFT-0203 [T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have studies Post-Harvest technology and food preservation in previous semesters			**Co-Requisite/s**	Study of nutritional composition of fruits and vegetables and preparation of value added products			
Course Outcomes & Bloom's Level	**CO1-** To remember the specific processing technologies used for vegetable, fruits and products derived from these materials **(BL1-Remember)** **CO2-** To understand the application of scientific principles in the processing technologies, product specification and regulations **(BL2-Understand)** **CO3-** To provide students an experimental basis and a specialized knowledge and understanding in the changes in the composition of the raw material with respect to the type of processing technology used **(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in fruits/vegetables processing and new product development from them **(BL4-Analyze)** **CO5-** To evaluate the real life knowledge gained in fruits and vegetables composition and properties and implement the same to create processed and value added food products. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	~~Reasons of spoilage.~~ ~~Canning and bottling of fruits and vegetables: Selection of fruits and vegetables, process of canning, factors affecting the process- time and temperature, containers of packing, lacquering, syrups and brines for canning, spoilage in canned foods~~ Technology of Fruits and Vegetables: Structural, Compositional, and nutritional aspects of fruits and vegetables. Indian and global scenario on production and processing of fruits and vegetable; primary processing: grading, sorting, cleaning, washing, peeling, slicing, and blanching; minimal processing	Lecture method, quiz, group discussion	9
2	~~Fruits beverages: Introduction, Processing of fruit juices (selection, juice extraction, deaeration, straining, filtration and clarification), preservation of fruit juices (pasteurization, chemically preserved with sugars, freezing, drying, tetra-packing, carbonation), processing of squashes, cordials, nectars, concentrates and powder.~~ Canning and bottling of fruits and vegetables: process of canning, factors affecting the process- time and temperature, containers of packing, lacquering, syrups and brines for canning, spoilage in canned foods. Dehydration of fruits and vegetables: using various drying technologies like sun drying, solar drying (natural and forced convection), osmotic, tunnel drying, fluidized fed drying, freeze drying, convectional and adiabatic drying; intermediate moisture fruits and vegetables. Fruit powders using spray drying.	Lecture method, Quiz, Illustrate with analogies	9
3	~~Jams, jellies and marmalades: Introduction, Jam: Constituents, selection of fruits, processing and technology, Jelly: Essential constituents (Role of pectin, ratio), Theory of jelly formation, Processing and technology, defects in jelly, Marmalade: Types, processing and technology, defects. Pickles, chutneys and sauces: Processing, Types, Causes of spoilage in pickling~~. Fruits beverages: Introduction, Processing of fruit juices (selection, juice extraction, deaeration, straining, filtration and clarification), preservation of fruit juices (pasteurization, chemically preserved with sugars, freezing, drying, tetra-packing,	Lecture method, industrial visit, Expert Lecture	9

	carbonation), processing of squashes, cordials, nectars, concentrates and powder.		
4	~~Tomato products: Selection of tomatoes, pulping and processing of tomato juice, tomato puree, paste, ketchup, sauce and soup.~~ ~~Dehydration of foods and vegetables: Sun drying and mechanical dehydration, process variation for fruits and vegetables, packing and storage~~ Jams, jellies, and marmalades: Introduction, Jam: Constituents, selection of fruits, processing and technology, Jelly: Essential constituents (Role of pectin, ratio), Theory of jelly formation, Processing and technology, defects in jelly, Marmalade: Types, processing and technology, defects. Technology of preserved, crystallized, and glazed fruits	Lecture method, group discussion, audio-video clips, quiz	9
5	~~Spices: Processing and properties of major and minor spices, Essential oils and oleoresins, adulteration Tea-Coffee and Cocoa: Processing, variety and products~~ Tomato products: Selection of tomatoes, pulping and processing of tomato juice, tomato puree, paste, ketchup, sauce, and soup. Pickles, chutneys, and sauces: Processing, Principle and methods of pickling, types of pickles, nature, and control of spoilage in pickles.	Lecture method, Audio/Video clips, group discussion, quiz	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preparation of jam/ jelly/ marmalade from selected fruit	Experiments	BL3-Apply	2
2	Preparation of RTS beverage	Experiments	BL3-Apply	2
3	Preparation of squash	Experiments	BL3-Apply	2
4	Preparation of grape raisins	Experiments	BL3-Apply	2
5	Preparation of dried fig / banana fig	Experiments	BL3-Apply	2
6	Preparation of fruit candy	Experiments	BL3-Apply	2
7	Osmotic dehydration of fruit slices	Experiments	BL4-Analyze	2
8	Preparation of fruit leather	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	0	60	18	40	0

Part E

Books	Lal, G., Siddappa, G. S., & Tandon, G. L. (1986, January 1). Preservation of Fruits and Vegetables.
Articles	
References Books	Manay, N. S., & Shadaksharaswamy, M. (2008, January 1). Food: Facts and Principles. New Age International. Ranganna, S. (1986, January 1). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill Education Vere Cruess, W. (1938, January 1). Commercial Fruit and Vegetable Products.
MOOC Courses	https://nptel.ac.in/courses/126105015
Videos	https://www.youtube.com/watch?v=k1a2PSEXahM&t=1s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	-	-	1	-	1	-	1	-	-	3	1	1
CO2	2	1	1	-	1	1	1	1	-	-	1	-	3	1	2
CO3	2	2	2	1	1	1	1	1	1	1	1	-	3	2	2
CO4	2	2	2	2	2	1	1	1	-	-	1	-	3	2	3
CO5	2	2	2	1	1	1	-	-	1	-	1	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Basics of food biochemistry [T]
Course Code	GE-II [T]

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">1st</td><td rowspan="2">Semester</td><td rowspan="2">2nd</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Embedded theory and lab</td></tr>
<tr><td>Course Category</td><td colspan="8">Generic Elective</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Student must have studied food chemistry in previous semester</td><td>Co-Requisite/s</td><td colspan="4">knowledge of metabolic pathway of biomolecules present in food</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- To remember the basics of modern biochemistry and molecular biophysics, including the principles of biological phenomena, and structural, functional and dynamic aspects of biological components.(BL1-Remember)
CO2- To understand the core principles and topics of chemistry, structural and chemical biology including nucleic acid structure and interactions, signaling proteins and membrane proteins, enzyme kinetics and drug discovery and protein design(BL2-Understand)
CO3- To provide the students a specialized knowledge and understanding in the field of food biochemistry.(BL3-Apply)
CO4- To apply the subject knowledge in future perspectives i.e. such as in food constituents' interactions and their isolation, utilization and metabolism(BL4-Analyze)
CO5- To evaluate the application of principles of biochemistry in practice to ensure healthy body metabolism.(BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="3">Skill Development ✓
Entrepreneurship ✕
Employability ✕
Professional Ethics ✕
Gender ✕
Human Values ✕
Environment ✕</td><td>SDG (Goals)</td><td colspan="4">SDG2(Zero hunger)
SDG3(Good health and well-being)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	Carbohydrates metabolism: Glycolysis, alcoholic and lactic acid fermentation, gluconeogenesis, TCA cycle, glycogenolysis & glycogen synthesis. Functions of carbohydrates.	Lecture method, group discussion, quiz, seminar	10
2	Lipids- Fatty acids, triacyl glycerols; glycerophospholipids, sphingolipids, sterols. Nucleic acids- Nucleotides, Nitrogenous Bases- Purines and Pyrimidines; nucleotides as regulating molecules, different types of DNA and RNA. Functions of lipids and nucleic acids.	Lecture method, group discussion, quiz, seminar	10
3	Metabolism of amino acids: Assimilation of Ammonia: its incorporation in glutamate, glutamine and alanine as nitrogen carrier, regulation of glutamate dehydrogenase and glutamine synthetase, transamination, nitrogen excretion and urea cycle. Functions of amino acids.	QuiLecture method, Expert Lecture	10
4	Electron-transport chain (ETC) and oxidative phosphorylation: Constituents of ETC & their sequence (Complex I-IV) & location, inhibitors of ETC, chemiosmotic theory, ATP synthase complex- structure and function, dicarboxylic acid shuttle, glycerol phosphate shuttle.	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	Biochemistry of digestion, role of hormones and enzymes. Basics of function of nerve system. Biochemistry of blood clotting.	Lecture with ppt, quiz	5

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Qualitative examination of carbohydrates in given food samples	Experiments	BL2-Understand	2
2	Quantitative examination of carbohydrates (PSA method) in given food samples	Experiments	BL2-Understand	2
3	To perform amino acids and protein qualitative tests	Experiments	BL3-Apply	2
4	Quantitative determination of proteins by biuret reagent	Experiments	BL3-Apply	2
5	Qualitative and Quantitative tests	Experiments	BL3-Apply	2
6	To extract the lipid content from food samples	Experiments	BL3-Apply	2
7	To determine the in-vitro protein digestibility from legumes	Experiments	BL3-Apply	2
8	To perform the electrophoresis	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	18	40	0

Part E

Books	Osgood, M., Ocorr, K.A. and Lehninger, A.L. (2000) The absolute, ultimate guide to lehninger's principles of Biochemistry, third edition: Study guide and solutions manual. New York: Worth Publishers.
Articles	
References Books	Harpers Illustrated Biochemistry (2015). Erscheinungsort nicht ermittelbar: McGraw-Hill Professional. Campbell, M.K. and Farrell, S.O. (2012) Biochemistry. Pacific Grove, CA: Brooks/Cole.
MOOC Courses	https://nptel.ac.in/courses/102106087
Videos	https://youtu.be/82yp3h2IzlQ?si=Z-aPUfssHzemE-EO

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1	1	1	-	-	1	-	-	3	1	1
CO2	2	1	1	1	1	1	-	-	-	1	-	-	3	1	1
CO3	2	1	1	1	1	1	1	1	1	1	-	-	3	1	2
CO4	3	2	2	2	1	1	-	1	-	1	-	-	3	1	2
CO5	3	2	2	2	1	1	1	1	1	1	-	-	3	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Tools and techniques for food [T]
Course Code	GE-II [T]

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">1st</td><td rowspan="2">Semester</td><td rowspan="2">2nd</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Embedded theory and lab</td></tr>
<tr><td>Course Category</td><td colspan="8">Generic Elective</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Should be acquainted with the basics knowledge of instruments and their uses.</td><td>Co-Requisite/s</td><td colspan="4">Knowledge of food analysis and food adulteration</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- Demonstrate an understanding of physics and engineering in biosensor, electrodes(BL1-Remember)
CO2- Demonstrate an understanding of the biomedical instrumentation principles in aspects of device design and applications(BL2-Understand)
CO3- Apply these principles in the context of bioinstrumentation interactions with tissues, organs and human body to explain the measurement results and to develop the instrumentation(BL3-Apply)
CO4- Students will demonstrate these abilities and hone the appropriate information gathering, computational and data-handling skills in homework and lab exercises.(BL4-Analyze)
CO5- They will demonstrate their proficiency formally in examinations(BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="2">Skill Development ✓
Entrepreneurship ✕
Employability ✓
Professional Ethics ✕
Gender ✕
Human Values ✕
Environment ✕</td><td>SDG (Goals)</td><td colspan="5"></td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	Microscopy: History, principle, types and applications (Bright field, dark field and fluorescent microscopy). Electron microscope: principle and applications of scanning electron , transmission electron microscope.	Lecture method, audio/video clips, group discussion, quiz	8
2	Centrifugation: Basic principle, types (analytical and ultracentrifugation) and applications.	Lecture method, audio/video clips, group discussion, review analysis	8
3	Chromatography: Principle, working and applications of Paper chromatography, thin layer chromatography, gel filtration chromatography, ion exchange chromatography and affinity chromatography,.	Lecture method, audio/video clips, group discussion, classroom presentation	8
4	Electrophoresis: principles, types and applications of paper, agarose gel & PAGE electrophoresis. Radioactivity: principle of radioactive decay, half life. Radioisotopes: applications in biological sciences, Scintillation counters: basic principle and application.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Spectrum and their Types, wave length range of electromagnetic radiation. Spectroscopy: basic principle and applications of colorimetry and U.V, Visible and Infrared spectroscopy. Microtomy: Basic principle and applications	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Estimation of Fat content	Experiments	BL4-Analyze	3
2	Estimation of Crude Fibre	Experiments	BL4-Analyze	3
3	Estimation of Beta-Carotene	Experiments	BL4-Analyze	3
4	Estimation of Water Absorption Index	Experiments	BL4-Analyze	3
5	Estimation of Phenols	Experiments	BL4-Analyze	3
6	To separate plant pigments using TLC	Experiments	BL4-Analyze	3
7	Estimation of Protein by Follin’s Lowry method 8. Estimation of Sugars	Experiments	BL4-Analyze	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	

Part E

Books	Nelson, D. L., Lehninger, A. L., & Cox, M. M. (2008, February 1). Lehninger Principles of Biochemistry. Macmillan.
Articles	
References Books	Work, T. S., & Work, E. (1983, January 1). Laboratory Techniques in Biochemistry and Molecular Biology Williams, B. L., & Wilson, K. (1975, January 1). A Biologist's Guide to Principles and Techniques of Practical Biochemistry.
MOOC Courses	https://nptel.ac.in/courses/126105020
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	1	-	1	-	1	-	-	1	1	1
CO2	2	1	1	1	1	-	-	1	-	1	-	-	1	1	1
CO3	2	2	2	2	1	1	1	1	1	1	-	-	2	1	1
CO4	3	2	2	1	1	-	1	-	1	-	1	-	2	1	1
CO5	3	2	2	1	1	1	1	1	1	-	1	-	2	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	NCC-2
Course Code	NCC-2

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">1st</td><td rowspan="2">Semester</td><td rowspan="2">2nd</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>2</td><td>0</td><td>2</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Theory only</td></tr>
<tr><td>Course Category</td><td colspan="8">Generic Elective</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Should be acquainted with the basics knowledge of General Awareness about Leadership Quality, Personality Development, Defense system etc</td><td>Co-Requisite/s</td><td colspan="4"></td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- Develop the qualities of social skills.()
CO2- Imbibe leadership qualities. ()
CO3- Be motivated to serve the nation by joining Armed forces. ()
CO4- Contribute in environmental awareness and conservation activities()
CO5- Keep abreast of current affairs & general awareness.()
CO6- Effectively contribute in managing disaster relief tasks()</td></tr>
<tr><td>Coures Elements</td><td colspan="3">Skill Development ✓
Entrepreneurship ✕
Employability ✓
Professional Ethics ✕
Gender ✕
Human Values ✓
Environment ✓</td><td>SDG (Goals)</td><td colspan="4">SDG3(Good health and well-being)
SDG4(Quality education)
SDG6(Clean water and sanitation)
SDG13(Climate action)
SDG15(Life on land)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
Unit 1. Personality Development	Group Discussions – Social Skills & Time management.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit 2. Leadership Development	Case Studies – Case Studies – Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965 war.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit 3. Disaster management	(i) Initiative Trg, Organising Skills. (ii) Dos and Don'ts. (iii) Natural Disasters. (iv) Man Made Disasters. (v) Fire Services and Fire Fighting.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit-4.Environmental Awareness	Adventure Environmental Awareness and Conservation, Local and global approaches to conserve nature.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5
Unit 5. General Awareness & Armed Forces	General Awareness, Army, Navy, Air Force and Central Armed Police Forces.	Lecture, Tutorials, Group discussion, Collaborative work, self-study, Seminar presentations by students, individual and group drills, group and individual field-based assignments, Educational Excursion	5

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	R Gupta ; NCC National Cadet Corps A, B & C Certificate Examination Book; Ramesh Publishing House, 2018.
Articles	https://indiancc.mygov.in/
References Books	Singh, Neeraj; A Hand Book of NCC; Kanti Prakashan Publisher Cadet training hand book specialised subjects (2017)
MOOC Courses	
Videos	https://www.youtube.com/watch?v=eBA5t4iepAA

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Mathematical aptitude and Reasoning [T]
Course Code	SEC- II

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Basic Knowledge of mathematical operations.			**Co-Requisite/s**	Basic knowledge of logics, diagrams and interpenetration of data.			
Course Outcomes & Bloom's Level	**CO1-** CO1: To read between the lines and understand various language structures and understand the basic mathematics tools **(BL1-Remember)** **CO2-** CO2: To demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions **(BL2-Understand)** **CO3-** CO3: To provide experimental basis and increase students' aptitude using mathematics to analyze real-life situations **(BL3-Apply)** **CO4-** CO4: To develop and evaluate abstract, logical and critical thinking. **(BL4-Analyze)** **CO5-** CO5: To apply the understanding of mathematical aptitude and reasoning to reflect critically upon their work and the work of others**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Problems on Trains, Height and Distance, Calendar, Average, Numbers, Problems on H.C.F and L.C.M, Simplification.	Audio/Video clips, group discussion, lecture with PPTs, quiz	4
Unit 2	Surds and Indices, Chain Rule, Boats and Streams, Odd Man Out and Series, Time and Distance, Time and Work, Problems on Ages.	Audio/Video clips, group discussion, lecture with PPTs, quiz	4
Unit 3	Permutation and Combination, Problems on Numbers, Decimal Fraction, Square Root and Cube Root, Ratio and Proportion. Data Interpretation: Table Charts, Pie Charts, Bar Charts, Line Charts.	Audio/Video clips, group discussion, lecture with PPTs, classroom presentations, Analysis	4
Unit 4	Verbal Reasoning: Logical Sequence of Words, Syllogism, Cause and Effect, Venn Diagrams, Analogy, Character Puzzles, Classification, Arithmetic Reasoning, Blood Relation Test, Series Completion, Dice, Cube and Cuboids, Seating Arrangement, Direction Sense Test, Data Sufficiency, Verification of Truth	Audio/Video clips, group discussion, lecture with PPTs, Quiz	4
Unit 5	Puzzles: Sudoku, Number puzzles, Missing letters puzzles, Logical puzzles, Clock puzzles.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	1. Dr. R. S. Aggarwal, Quantitative Aptitude, S. Chand Publication. 2. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, McGraw Hill Publications.
Articles	
References Books	Experts, D. (2018). Crack IAS Prelims General Studies Paper 2 with 5 Mock Tests 7th Edition. Disha Publications. http://books.google.ie/books
MOOC Courses	https://nptel.ac.in/courses/111106162
Videos	https://youtu.be/IdKQ8p0fvmA?si=XvQsNFDcmpfuzMTs

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	1	-	-	-	-	1	-	-
CO2	3	3	1	3	3	2	-	-	-	-	-	-	1	-	-
CO3	3	2	-	1	3	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-	1	1	1
CO5	2	2	-	1	-	-	-	-	-	-	-	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	India in 21st Centuary [T]
Course Code	VAC-II [T]

Part A

Year	1st	Semester	2nd	Credits	L	T	P	C
					2	00	00	2
Course Type	Theory only							
Course Category	Ability Enhancement Courses							
Pre-Requisite/s	1. *Understanding of Sociological Concepts*: A foundational knowledge of sociological concepts is essential to grasp the composition of Indian society discussed in Unit I. This includes understanding social institutions, cultural environments, and threats to national integration. 2. *Historical Background*: Familiarity with the history of India, particularly the Indian Freedom Movement, is crucial for comprehending Unit II. Knowledge of events such as the Revolt of 1857, the emergence of nationalism, and the various phases of the freedom struggle provides context for understanding the birth of the Indian nation-state. 3. *Awareness of Political Movements*: A basic understanding of political movements in India, particularly those led by figures like Gandhi, is necessary for Unit III. Familiarity with concepts like non-cooperation, civil disobedience, and the Quit India movement aids in analyzing the dynamics of Indian freedom and partition. 4. *Knowledge of Post-Independence Era*: Understanding the phases of nation-building since independence is vital for Unit IV. This includes awareness of the planned progress era, populist policies, and the paradigm shift towards liberalization and globalization. Knowledge of responses from different societal groups and regions enriches the understanding of India's post-independence journey. 5. *Global Awareness*: Unit V delves into global concerns such as environmental issues, globalization, and movements for democracy and sustainability. A broad understanding of global trends and their impact on nations is necessary to engage with this content effectively.			**Co-Requisite/s**	1. *Foundational Understanding of Sociological Concepts*: - Understanding social institutions, cultural environments, and threats to national integration is fundamental. - Familiarity with sociological theories such as functionalism, conflict theory, and symbolic interactionism can provide a deeper comprehension of societal dynamics. 2. *Historical Context of India*: - Knowledge of Indian history, including the colonial period, the struggle for independence, and post-independence developments, offers context for understanding the evolution of Indian society. - Understanding the socio-economic impacts of colonial rule and the transition to independence enhances insight into contemporary social issues. 3. *Understanding of Political Movements in India*: - Knowledge of key figures, ideologies, and strategies of political movements in India, including those led by Gandhi, Nehru, and other prominent leaders, is essential. - Awareness of the socio-political context of colonial India and the role of various stakeholders in the struggle for independence enriches understanding. 4. *Familiarity with Post-Independence Developments*: - Understanding the socio-economic and political changes in post-independence India, including the Nehruvian era, economic reforms, and social movements, is			

			crucial. - Awareness of key policies, such as the Green Revolution, reservation system, and economic liberalization, provides insights into contemporary Indian society. 5. *Global Perspective and Awareness*: - Knowledge of global trends in areas such as technology, economics, environment, and geopolitics enhances understanding of India's position in the global context. - Understanding global issues like climate change, international trade, and human rights movements enables students to analyze their impact on India and vice versa.
Course Outcomes & Bloom's Level	**CO1-** 1. Students are able to define, identify and explain the process of Indian Freedom movement and development of political Institutions.**(BL1-Remember)** **CO2-** 2. Students are able to summarize and extract the time before Independence and after Independence India.**(BL2-Understand)** **CO3-** 3. Students are able to evaluate India society, Its nature and agencies of social change with reference to modernization.**(BL5-Evaluate)** **CO4-** 4. Students are able to write the historical accounts that shaped the very nature and character of 20 and 21 st century India with reference to Nation Building and constitution**(BL6-Create)**		
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✓ Human Values ✓ Environment ✓	**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG10(Reduced inequalities) SDG12(Responsible consuption and production) SDG13(Climate action)

Part B

Modules	Contents	Pedagogy	Hours
1	Composition of Indian Society Society- (a) Introduction of Nature of India society and Indian nation state. (b) Major Social Institutions and Organization and threats to national integration (c) Social and Cultural Environment of India Society in 19th ,20th and 21st century.	Lectures and visual PowerPoint slides ● Students read text and commentary on assigned topics as well as published research articles before the lectures ● Students read cases discussed in the text-books, as well as more detailed articles. ● Students participate in class discussions to crystallize the concepts	5
2	Indian Freedom Movement- emergence 1) Revolt of 1857 , Rise of nationalism & Birth of Congress 2). Partition of Bengal & swadeshi movement, Home rule movement Round table conferences 3) Revolutionary movements, Gandhian movements (i) Non-Cooperation (ii) Civil Disobedience (iii) Quit India movement	Lectures and visual PowerPoint slides ● Students read text and commentary on assigned topics as well as published research articles before the lectures ● Students read cases discussed in the text-books, as well as more detailed articles. ● Students participate in class discussions to crystallize the concepts	5
3	Indian freedom and Partition- 1.) Communism – Rise & spread (2.) Muslim league & its politics , Hindu communism. (3) India's partition & independence References	Lectures and visual PowerPoint slides ● Students read text and commentary on assigned topics as well as published research articles before the lectures ● Students read cases discussed in the text-books, as well as more detailed articles. ● Students participate in class discussions to crystallize the concepts	5
4	Nation building Since Independence- 3 stages of making of the Indian Nation state: - Era of planned progress. (1951-1971) Period of Populist policies and programmers (1971 to 1992) Period of paradigm shift towards liberalization and globalization (since 1992). Responses of various classes, communities and regions.	Lectures and visual PowerPoint slides ● Students read text and commentary on assigned topics as well as published research articles before the lectures ● Students read cases discussed in the text-books, as well as more detailed articles. ● Students participate in class discussions to crystallize the concepts	5
5	Nation Building and Global Concern- a. Environmental concerns in 21st century b. Question of Globalization and its Impact c. Global Movement for Democracy and sustainability	Lectures and visual PowerPoint slides ● Students read text and commentary on assigned topics as well as published research articles before the lectures ● Students read cases discussed in the text-books, as well as more detailed articles. ● Students participate in class discussions to crystallize the concepts	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
00	00	00		00	

Part E

Books	1. Bose, N.K. 1967, Culture and Society in India. Bombay: Asia Publishing House 2. Dube, S.C. 1990, Indian village.(New Delhi: National Book Trust.) 3. Percival Spear : History of Indian Society , Penguin , 1966. 4. Uberoi, Patrica : Family , kinship and Marriage , New Delhi : oxford University Press , 1995 , PP 50 to 73 , 416 to 451 5. Gandhi , M K : Removal of Untouchability , Navjeevan Publishing House , Ahmadabad , 1954
Articles	
References Books	1. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak
MOOC Courses	
Videos	1.https://www.youtube.com/watch?v=i8N6YRTJsDk 2. https://youtu.be/MWsT7x3qd3E 3.https://www.youtube.com/watch?v=pQghqJSUAK4&list= 4.https://youtu.be/9BEU8A_JZPU 5.https://youtu.be/pPsKQwaZ4dg https://hdr.undp.org/

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
CO2	-	-	-	-	-	1	-	-	2	1	-	-	1	1	1
CO3	-	-	-	-	-	2	2	-	-	-	-	-	2	1	1
CO4	-	-	-	-	-	1	-	-	-	-	-	-	2	1	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	2	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	English II [T]
Course Code	AEC III

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	1.Basic Language Proficiency 2.Educational Background 3.Motivation and Willingness to Learn Time Commitment 4.Technology Proficiency			**Co-Requisite/s**	1.Communication Skills Workshop 2.Emotional Intelligence Training 3.Conflict Resolution Seminar 4.Leadership Development Program 5.Cross-Cultural Competency Training 6.Career Development Workshops			
Course Outcomes & Bloom's Level	**CO1-** Determine interpersonal skills and be an effective goal-oriented team player.**(BL1-Remember)** **CO2-** Elaborate creativity and lateral thinking.**(BL2-Understand)** **CO3-** Examine attitudes, emotional intelligence and understand its influence on behavior.**(BL3-Apply)** **CO4-** Justify approaches to conflict resolution**(BL4-Analyze)** **CO5-** Evaluate goal setting, management, decision-making skills.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
1	Self Analysis - SWOT Analysis, who am I, Attributes, Importance of Self Confidence, Self Esteem. Interpersonal Skills - Gratitude Understanding the relationship between Leadership Networking & Teamwork. Assessing Interpersonal Skills Situation description of Interpersonal SkillTeamwork: Necessity of Team Work Personally, Socially and Educationally	Lecture method	6
2	Creativity - Out of box thinking, Lateral Thinking.Leadership - Skills for a Good Leader, Assessment of Leadership Skills	PPT, Audio Video Mode	6
3	Attitude- Factors influencing Attitude, Challenges, and lessons from Attitude, Etiquette. Emotional Intelligence What is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales. Managing Emotions.	Mind Maps	6
4	Motivation - Factors of motivation, Self-talk, Intrinsic & Extrinsic Motivators. Conflict Resolution - Conflicts in Human Relations – Reasons Case Studies, Approaches to conflict resolution.	Lecture method, Audio Video Mode	8
5	Goal Setting - Wish List, SMART Goals, Blueprint for success, Short Term, Long Term, Lifetime Goals. Time Management Value of time, Diagnosing Time Management, Weekly Planner To-do list, Prioritizing work. Extempore Decision Making - Importance and necessity ofDecision Making, Process and practical way of Decision Making, Weighing Positives & Negatives. Technical Topic Presentation.	Audio Video Mode	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998. ThomasA Harris, I am ok, You are ok, New York-Harper and Row, 1972
Articles	https://www.frontiersin.org/articles/10.3389/feduc.2019.00087/full https://www.cii.co.uk/media/6158020/a-useful-guide-to-swot-analysis.pdf http://www.mmmut.ac.in/News_content/35141tpnews_10142020.pdf
References Books	Covey Sean, Seven Habit of Highly Effective Teens, New York, Fireside Publishers, 1998. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998. Thomas A Harris, I am ok, You are ok, New York-Harper and Row, 1972 Daniel Coleman, Emotional Intelligence, Bantam Book, 2006
MOOC Courses	https://www.edx.org/learn/leadership/catalyst-leading-with-effective-communication-inclusive-leadership-training?hs_analytics_source=referrals&utm_source=mooc.org&utm_medium=referral&utm_campaign=mooc.org-course-list https://www.edx.org/learn/writing/university-of-california-berkeley-academic-and-business-writing?hs_analytics_source=referrals&utm_source=mooc.org&utm_medium=referral&utm_campaign=mooc.org-course-list
Videos	https://www.youtube.com/watch?v=fq98P9N9Hbg https://www.youtube.com/watch?v=uA5YeqgsjmYhttps://www.youtube.com/watch?v=eBSeCp__xhI

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	2	-	-	-	-	-	2	-	-	-	1	-	2
CO2	-	2	1	-	-	-	-	-	-	-	-	-	3	-	2
CO3	-	3	-	-	-	-	-	-	-	-	2	-	-	2	-
CO4	-	-	-	-	-	-	2	-	3	-	-	-	-	-	-
CO5	-	2	-	2	-	-	-	-	-	-	-	-	2	-	3
CO6	-	3	-	3	-	-	-	-	-	-	-	-	-	3	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Public health and hygiene [T]
Course Code	AEC-III [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Ability Enhancement Courses							
Pre-Requisite/s	Knowledge of food handling and hygiene			**Co-Requisite/s**	Basic hygiene practices			
Course Outcomes & Bloom's Level	**CO1-** To understand and apply the emerging concepts and issues to health, hygiene and sanitation**(BL2-Understand)** **CO2-** To critically understand the present scenario of health hygiene in Indian and Northeast **(BL3-Apply)** **CO3-** To apply and design hygiene promotion and education programmes for development.**(BL4-Analyze)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	
Articles	A. Jiménez et al. infrastructure function and hygiene. Journal of Epidemiology and Community Health, 65, 432– 437. doi:10.1136/jech.2009.091637 Bailie, R. S. et al. (2011). Evaluation of an Australian indigenous housing programme: Community level impact on crowding, 288
References Books	Public Health and Hygiene- V. Kumaresan, R. Sorna Raj,
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	-	1	1	-	1	2	-	-	1	1	1
CO2	2	2	2	1	-	1	-	-	1	-	2	-	2	2	1
CO3	2	3	2	-	1	-	-	2	-	1	-	-	3	3	1
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Processing of cereals, millets and pulses [T]
Course Code	BSFT-0301 [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students must have studied introduction to food technology and food chemistry in previous semester			**Co-Requisite/s**	Students should have basic knowledge of plat parts and morphology, various preservation and processing techniques.			
Course Outcomes & Bloom's Level	**CO1-** To remember the cereals composition and milling process and technological methods used to increase cereal grains, pulses and oil-seeds quality **(BL1-Remember)** **CO2-** To understand the core principles, and properties of interaction of various flour components and their role in end use quality**(BL2-Understand)** **CO3-** To provide the students an experimental basis and specialized knowledge and understanding in the field of cereals processing**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as interaction,and interpretation of cereals, pulses and oil-seeds utilization.**(BL4-Analyze)** **CO5-** To evaluate the practical knowledge on cereals and oilseeds and implement the same to create processed and value added food products.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to cereal technology- Basic introduction of major cereals- wheat, rice, corn and barley.Wheat: Introduction, types, milling, flour grade, flour treatments (bleaching, maturing), products and byproducts ~~Rice Physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of by products~~	Lecture, discussion and PPT	11
2	~~Corn Milling (wet & dry) , cornflakes, corn flour, Barley Milling(pearl barley, barley flakes & flour) Oats Milling (oat meal, oat flour & oat flakes)~~ Rice: Introduction, types, physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, different products, utilization of by products.	Lecture, discussion and PPT, Interactive videos	11
3	~~Rye and triticale milling (flour), uses and by products~~ Corn: Introduction, types, milling (wet & dry), corn flour, different products Introduction to barley, oats and sorghum –Processing and products	Lecture, discussion and PPT	10
4	~~TECHNOLOGY OF PULSES Milling of pulses, Dry milling, Wet milling, Improved milling method~~ Millets:Introduction, types, composition, milling and value addition Pseudo-cereals: (amaranth, quinoa, buckwheat), composition and nutritional value, health benefits and current applications for the development of gluten-free foods.	Audio/Video clips, group discussion, lecture with ppt, quiz	08
5	~~Sources of protein (defatted flour, protein concentrates and isolates), properties and uses, protein texturization, fibre spinning. Sugar processing and refining~~. Pulses: Introduction, types, dry milling, wet milling, improved milling method Oilseeds: Introduction, types, extraction of oil and refining	Audio/Video clips, group discussion, lecture with ppt, quiz	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To determine 1000 kernel weight, bulk density, particle density and angle of repose of given cereals, millets and pulses	Experiments	BL4-Analyze	2
2	To determine the gluten content of wheat flour	Experiments	BL4-Analyze	2
3	Determination sedimentation value of flour	Experiments	BL5-Evaluate	2
4	To extract the oil from oilseeds	Experiments	BL3-Apply	2
5	To estimate the water absorption power (atta, and maida)	Experiments	BL4-Analyze	2
6	To prepare the bread from different flours	Experiments	BL6-Create	2
7	To prepare cookies from composite flour	Experiments	BL6-Create	2
8	To prepare Millet Based Deep Fried Snacks	Experiments	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	0

Part E

Books	The technology of food preservation by Kent, N.L.
Articles	
References Books	Technology of Cereal by KA Rosentrater Post-harvest Technology of Cereals, Pulses and Oilseeds by Chakraverty Rice Science and Technology by Marshall Food Facts and Priniciples by Shakuntala Manay
MOOC Courses	https://nptel.ac.in/courses/126103017
Videos	https://www.youtube.com/watch?v=F8jhoaV-nsE&t=1s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2	-	-	-	-	-	-	3	1	1
CO2	3	3	2	3	3	3	1	-	-	-	1	-	3	1	1
CO3	3	2	3	3	2	2	1	-	-	-	1	2	3	1	1
CO4	3	2	2	3	3	3	-	-	-	-	-	-	3	3	3
CO5	3	3	3	2	2	2	-	-	-	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Unit Operation [T]
Course Code	BSFT-0302 [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Basic concepts of Physics, Chemistry & Mathematics			**Co-Requisite/s**	To be familiar with the basic concepts of technology of processing of fruits and vegetables			
Course Outcomes & Bloom's Level	**CO1-** The subject Unit Operations is designed for under graduate students of food technology for understanding of basic concepts of each and every division of the subject along with its applications in other fields. **(BL1-Remember)** **CO2-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge on different techniques **(BL2-Understand)** **CO3-** The course aims to provide basis of analyzing the applications of Unit Operations in various fields of research and industries. **(BL3-Apply)** **CO4-** The course aims to provide basis of design, production, transfer of mass and heat produced through research and in industries. **(BL4-Analyze)** **CO5-** To apply the tools in identifying the problems and providing solutions to them. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours
1	FluidMechanics:DimensionalAnalysis.BasicequationsofFluidFlow,HagenPonselle equation,BernoulliEquation,FluidFriction.Flowthroughpipesandopenchannels,Orifi ceandVenturimeters,PitotTube,Weirs,Rotametersandothertypesofmeters,Transporta tionoffluids,PipeFittingsandvalves,Pumps– classification,centrifugalandpositivedisplacementtype– peristaltic. Blowers and Compressors (oil-free).	Lecture method, seminar, quiz	8
2	MechanicalOperations:Principles of comminution, Types of comminuting equipment. Crushers, Grinders, Mixing and Agitations Power consumption in mixing,Mechanicalseparation,Screening,Typesofscreen,Filtration,Principle of Constant pressure and constantrate filtration, Settling classifiers, Floatation.	Lecture method, seminar	8
3	Extraction, Drying and Crystallization: Liquid equilibrium, liquid extraction, stagewise contact, liquid solid equilibria, leaching, batch drying and mechanism of batch drying, principle and operation of a spray drier, preliminary idea of crystallization	Audio/Video clips, group discussion, lecture with ppt.	9
4	Advanced separation processes: Dialysis, ultrafiltration, reverse osmosis, pervaporation, and electrodialysis and membrane separation. Molecular diffusion in fluids, diffusivity, mass transfer coefficients, interphase mass Transfer, gas absorption, counter current multistage operation, packed tower	Audio/Video clips, group discussion, lecture with ppt.	10
5	HeatandMassTransfer:Systems for heatingand cooling food products, ThermalPropertiesofFood,Modesofheattransfer,Applicationofsteady stateheattransfer-estimationofconductiveheattransfer coefficient, convectiveheattransfercoefficient,overallheattransferco efficientand, anddesignoftubularheatexchanger. Fick'sLaw of Diffusion,Mass transfer in packaging material.	Audio/Video clips, group discussion, lecture with ppt.	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Unit Operations of Chemical Engineering: McCabe, Smith and Harriot, TMH, 5th edition
Articles	
References Books	Transport Processes and Unit operations: Geankopolis, PHI, 3rd edition Unit operations and unit processes for Engineers and Biologists; B. C. Bhattacharya and C. M. Narayanan; Khanna Publications, Delhi
MOOC Courses	https://nptel.ac.in/courses/103107088
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	1	1	-	-	1	1	-	1	1	1
CO2	1	1	1	-	-	-	-	1	-	-	-	-	1	1	1
CO3	2	1	2	-	1	2	-	1	-	1	1	-	2	1	2
CO4	2	2	2	-	-	2	-	-	-	-	-	-	2	2	2
CO5	3	2	2	1	-	1	-	1	-	1	2	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Processing of spices and plantation crops [T]
Course Code	BSFT-0303 [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	candidates must have passed class 12 or equivalent from a recognised board with Physics, Chemistry, and Biology/Home Science as compulsory subjects and an overall grade of at least 50%			**Co-Requisite/s**	Student should have basic knowledge about plants, their morphology and anatomy.			
Course Outcomes & Bloom's Level	**CO1-** To provide an overview on post-harvest losses and its impact on the Indian economy **(BL1-Remember)** **CO2-** To comprehend about fruit and vegetable physiology, metabolic processes and various nutritional changes in fruits and vegetables along with post-harvest handling techniques.**(BL2-Understand)** **CO3-** To generate knowledge on different pre-processing operations involved before processing of fruits and vegetables**(BL3-Apply)** **CO4-** : To interpret various post-harvest disorders and diseases of fruits, minimizing the losses by suitable packaging and minimal processing operations. **(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕			**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG10(Reduced inequalities) SDG12(Responsible consuption and production) SDG13(Climate action)			

Part B

Modules	Contents	Pedagogy	Hours
1	Post-harvest aspects of crops – objectives – post harvest systems and losses in agricultural commodities structure, optimum stage of harvest, importance of loss reduction. Post harvest handling (harvesting, precooling, sorting, grading and packaging) of perishables i.e. fruits and vegetables.Post harvest treatment for quality retention of horticultural crops; spoilage of fruits & vegetables, methods to reduce decay	Lecture methods, Audio/Video clips, group discussion, quiz	8
2	Coffee: Production, composition, classification, and processing of coffee; types: decaffeinated coffee, coffee brew concentrate, standards, and specifications of coffee products; chicory: technology of chicory powder and use in coffee products. Tea: Production, composition, classification, and manufacturing; types of tea; tea products such as soluble tea, tea concentrate, instant tea, decaffeinated and flavoured tea; quality evaluation and grading of tea.	Lecture methods,Audio/Video clips, group discussion, Review Analysis	12
3	Cocoa: Production, processing, and chemical composition of cocoa beans. Cocoa Processes: Cleaning, roasting, alkalization, cracking and fanning, Nib grinding for cocoa liquor, cocoa butter, and cocoa powder Manufacturing process for chocolate: Ingredients, Mixing, Refining, conching, Tempering, moulding etc. to obtain chocolate slabs, chocolate bars. Enrobed and other confectionary products.	Lecture methods, Audio/Video clips, group discussion,classroom presentations	10
4	Spices, condiments, seasonings and culinary herbs; classification and beneficial properties of spices; processing and manufacturing of major Indian spice: pepper, cardamom, ginger, chili and turmeric, clove, garlic, Cumin, coriander, cinnamon, mint and vanilla.	Lecture methods, Audio/Video clips, group discussion, quiz	8
5	Oleoresins and essential oils: method of manufacture; chemistry of the volatiles; enzymatic synthesis of flavor identical; adulteration problem in spices, packaging of spices.	Lecture methods, Audio/Video clips, group discussion, quiz	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To estimate 1000 kernel weight, bulk density, true density and porosity of given sample of grains	Experiments	BL2-Understand	2
2	To determine coefficient of friction and angle of repose of given grain samples	Experiments	BL4-Analyze	2
3	To determine the caffeine content in given samples of tea and coffee	Experiments	BL5-Evaluate	2
4	To prepare decaffeinated tea	Experiments	BL6-Create	2
5	To determine the adulteration of spices	Experiments	BL4-Analyze	2
6	To prepare the essential oil from spices	Experiments	BL6-Create	2
7	To prepare masala pre-mix for culinary uses	Experiments	BL6-Create	2
8	To perform grading of different kind of tea	Experiments	BL5-Evaluate	2
9	To prepare chocolate based food product	Experiments	BL6-Create	2
10	To visit a related industry	Industrial Visit	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	

Part E

Books	Spices, condiments and seasonings-Kenneth T. Farrell
Articles	https://www.researchgate.net/profile/Gangaiah-Bandla/publication/349075652_AN_OVERVIEW_OF_INTEGRATED_FARMING_SYSTEMS_OF_COASTAL_INDIA/links/6020d8a7299bf1cc26ae8793/AN-OVERVIEW-OF-INTEGRATED-FARMING-SYSTEMS-OF-COASTAL-INDIA.pdf#page=25
References Books	Tea Production and Processing-Banerjee B. Spice Science and Technology -Kenji Hirasa and MitsnoTakemasa Chocolate, Cocoa and Confectionery Technology. -Minifie BW Handbook on Spices. National Institute of Industrial Research Board, -NIIR Coffee Processing Technology-Sivetz M & Foote HE
MOOC Courses	https://onlinecourses.nptel.ac.in/noc22_ag13/preview
Videos	https://www.youtube.com/watch?v=-NyDCWuAGfk&embeds_referring_euri=https%3A%2F%2Fonlinecourses.nptel.ac.in%2F&source_ve_path=Mjg2NjY&feature=emb_logo

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	1	1	-	-	-	1	1	3	1	1
CO2	3	3	3	2	2	2	-	-	-	-	-	2	3	1	1
CO3	3	2	3	3	3	1	-	-	-	-	-	1	3	1	1
CO4	2	2	2	2	3	3	-	-	-	-	-	3	3	3	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food and Business Management
Course Code	GE-III

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Generic Elective							
Pre-Requisite/s	candidates must have studied food processing & preservation and food additives in previous semester			**Co-Requisite/s**	Knowledge of food processing sector, food industry layout and food preservation			
Course Outcomes & Bloom's Level	**CO1-** To remember the managerial roles, management processes and types of organizations in the food businesses. **(BL1-Remember)** **CO2-** To understand the fundamentals of marketing, its research, consumer behaviour and advertising to apply them to promote the business.**(BL2-Understand)** **CO3-** To provide the students a specialized knowledge and understanding about manpower management, government schemes, and business ethics. **(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as fulfilling corporate social responsibility and to formulate new business proposals.**(BL4-Analyze)** **CO5-** To evaluate the theoretical knowledge and implement the same to increase the profit of food business.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Food Business Management- Definitions, importance and principles; Theories and functions of management; Organizational structures, principles and types	Lecture, discussion, ppt	7
2	Food Products Marketing - Concept of market structure, micro and macro environments; Marketing research and marketing information systems. Consumer behaviour; consumerism; classification of food products and factors affecting prices, product life cycle; Advertising- functions, objectives, personal selling, sales promotion, publicity and public relations, product promotion strategies	Lecture, discussion, ppt	10
3	Human resource management: Definitions, objectives of manpower planning, process, sources of recruitment, process of selection; types of promotions and transfers; wage and salary administration and employee welfare; Corporate social responsibility: Importance, business ethics	Quiz, lecture, discussion	9
4	Finance management: Definition, scope, and objective; Different systems of accounting; Cost: Short run and long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost in food industry and break even analysis; Budgeting and profit planning -types of budget and their preparations	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	Government regulations/ guidelines for food business, Foreign investment policies – FDI in food processing, Preparation of Business Proposals, Case studies on project formulation in various types of food industries - their production, marketing and cost analysis	Audio/Video clips, group discussion, lecture with ppt, quiz	9

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Food and Beverage Management by Bernard Davis, Andrew Lockwood, Peter Alcott, Ioannis and S. Pantelidis
Articles	
References Books	Principles of Management by Gupta Meenakshi Managing by Mintzberg, H. Financial Management: Theory and Practice by Eugene F. Brigham and, Michael C. Ehrhardt
MOOC Courses	https://nptel.ac.in/courses/110101167
Videos	https://youtu.be/YUVybfnKA9I

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1	-	-	-	-	1	-	2	3	3	3
CO2	2	1	1	1	1	-	-	3	-	2	-	3	3	3	3
CO3	2	1	1	1	1	-	-	3	-	2	-	3	3	3	3
CO4	2	1	1	1	1	-	-	2	-	2	-	3	3	3	3
CO5	2	1	1	1	1	-	-	2	-	2	-	3	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Basics of Computer & Information Technology [T]
Course Code	GE-III

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Generic Elective							
Pre-Requisite/s	Student must have studied computer science in 10+2			**Co-Requisite/s**	Knowledge of MS Word, Powerpoint and Excel			
Course Outcomes & Bloom's Level	**CO1-** The course prepares the student to understand the basic concepts of Computer Applications, its applications and future prospects.**(BL1-Remember)** **CO2-** The subject Computer Applications is designed for under graduate students of biotechnology for understanding of basic concepts of each and every division of the subject along with its applications in other fields.**(BL2-Understand)** **CO3-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge and understanding. **(BL3-Apply)** **CO4-** The course aims to provide basis of analyzing the applications of Fundamentals of Biostatistics and Computer Applications in various fields of research and industries.**(BL4-Analyze)** **CO5-** The course aims to provide basis of experimental design, computer applications and use of statistical tools in research and industries.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Computer Systems – Basics of Computer Systems, various Hardware Components – Data Storage and various Memory Units – Central Processing Unit, Introduction to Software and its life cycle.	Quiz	6
2	DOS, MS-Offices and its application, Operating System: types of operating system, application, process and its characteristics. WWW, web browser, Email.	Quiz	6
3	Introduction to Computer Networking- Introduction, Goals, Networking Topologies & Technologies – LAN, WAN, MAN,PAN, Wireless LAN.	Networking	8
4	Introduction to Biostatistics, common terms, notions and Applications, Statistical population and Sampling Methods, Classification and tabulation of Data, Diagrammatic and graphical presentation, Frequency Distribution, Measures of central value, Measures of variability; Standard deviation, standard Error, Range, Mean Deviation, Coefficient of Variation, Analysis of variance	Networking	8
5	Basis tests, Test of significance; t-test, chi-square test. Regression; Basis of regression, regression analysis, Estimation, testing, Prediction, Checking and residual analysis. Multivariate Analysis. Design of Experiments, randomization, replication, local control, complimentary Randomized randomized block design.	Activity based learning can be given to implement application aspect	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Various Components of Computer	Virtual Labs	BL2-Understand	2
2	MS-DOS:Internal & External DOS Commands	Virtual Labs	BL2-Understand	2
3	Windows Operating System	Virtual Labs	BL2-Understand	2
4	MS-WORD	Virtual Labs	BL3-Apply	2
5	MS Excel	Virtual Labs	BL3-Apply	2
6	MS-POWER POINT	Virtual Labs	BL3-Apply	2
7	Web browser & E-Mail	Virtual Labs	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	18	40	0

Part E

Books	T. (2001, April 1). Pc Software For Windows 98 Made Simple.
Articles	
References Books	Sinha, P. K., & Sinha, P. (2004, November 1). Computer Fundamentals. Gupta, S. (2021, January 15). Statistical Methods. Sultan Chand & Sons.
MOOC Courses	https://nptel.ac.in/courses/106105080
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	1	-	1	-	1	-	2	1	1
CO2	2	1	1	1	1	-	1	-	-	-	-	-	2	1	1
CO3	2	1	1	2	1	-	1	1	1	-	1	-	2	1	1
CO4	2	1	1	2	1	-	-	-	-	1	-	-	2	1	2
CO5	3	2	2	2	1	1	-	1	-	1	1	-	2	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Biostatistics & Computer applications [T]
Course Code	SEC III [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Student must have studied computer science in 10+2			**Co-Requisite/s**	Knowledge of MS Word, Powerpoint and Excel			
Course Outcomes & Bloom's Level	**CO1-** The course prepares the student to understand the basic concepts of Computer Applications, its applications and future prospects.**(BL1-Remember)** **CO2-** The subject Computer Applications is designed for under graduate students of biotechnology for understanding of basic concepts of each and every division of the subject along with its applications in other fields.**(BL2-Understand)** **CO3-** The course aims to provide experimental basis, and to enable students to acquire a specialized knowledge and understanding. **(BL3-Apply)** **CO4-** The course aims to provide basis of analyzing the applications of Fundamentals of Biostatistics and Computer Applications in various fields of research and industries.**(BL4-Analyze)** **CO5-** The course aims to provide basis of experimental design, computer applications and use of statistical tools in research and industries.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Computer Systems – Basics of Computer Systems, various Hardware Components – Data Storage and various Memory Units – Central Processing Unit, Introduction to Software and its life cycle.	Quiz	6
2	DOS, MS-Offices and its application, Operating System: types of operating system, application, process and its characteristics. WWW, web browser, E- mail.	Quiz	6
3	DOS, MS-Offices and its application, Operating System: types of operating, Topologies & Technologies – LAN, WAN, MAN,PAN, Wireless LAN.	Networking	8
4	Introduction to Biostatistics ,common terms ,notions and Applications, Statistical population and Sampling Methods,Classification and tabulation of Data, Diagrammatic and graphical presentation,Frequency Distribution, Measures of central value,Measures of variability; Standard deviation, standard Error, Range, Mean Deviation, Coefficient Variation, Analysis of variance.	Networking	8
5	Basic tests, tests of significance, t-test, chi-square test, Regression , Basis of regression, regression analysis, Estimation, testing, Prediction, Checking residual analysis. Multivariate Analysis. Design of Experiments, randomization, replication, local control, complementary randomized, randomized block design.	Activity based learning can be given to implement application aspect	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Various Components of Computer	Virtual Labs	BL2-Understand	2
2	MS-DOS:Internal & External DOS Commands	Virtual Labs	BL2-Understand	2
3	Windows Operating System	Virtual Labs	BL2-Understand	2
4	MS-WORD	Virtual Labs	BL3-Apply	2
5	MS Excel	Virtual Labs	BL3-Apply	2
6	MS-POWER POINT	Virtual Labs	BL3-Apply	2
7	Web browser & E-Mail	Virtual Labs	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	0

Part E

Books	T. (2001, April 1). Pc Software For Windows 98 Made Simple.
Articles	
References Books	Sinha, P. K., & Sinha, P. (2004, November 1). Computer Fundamentals. Gupta, S. (2021, January 15). Statistical Methods. Sultan Chand & Sons.
MOOC Courses	https://nptel.ac.in/courses/106105080
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	1	-	1	-	1	-	2	1	1
CO2	2	1	1	1	1	-	1	-	-	-	-	-	2	1	1
CO3	2	1	1	2	1	-	1	1	1	-	1	-	2	1	1
CO4	2	1	1	2	1	-	-	-	-	1	-	-	2	1	2
CO5	3	2	2	2	1	1	-	1	-	1	1	-	2	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	One-week Hands on training of Food Processing [T]
Course Code	SEC-III [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					1	0	1	2
Course Type	Embedded theory and lab							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Knowledge of food analysis and instrumentation			**Co-Requisite/s**	Hands on experience of developing value-added food products.			
Course Outcomes & Bloom's Level	**CO1-** To learn the useful processing of different segments of food and their nutritive value and their value addition.**(BL1-Remember)** **CO2-** To understand the effect of various processing techniques on quality of products. **(BL2-Understand)** **CO3-** To demonstrate the hands on experience of developing value-added food products.**(BL3-Apply)** **CO4-** To illustrate procedures to identify opportunities in research, innovation and protection of their work**(BL4-Analyze)** **CO5-** To apply the knowledge of food processing prospects to build startups in country.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Processing of cereals, pulses and oilseeds: Milling and preparation of dalia, pasta, macroni, noodles, popped products, beer, etc., oil extraction from oilseeds, and oilseed cake	Lecture method, laboratory practiacls	6
2	Processing of bakery and confectionery: Preparation of bread, biscuit, cookies, rusks, muffins, pastry, patties, toffees, and candies	Lecture method, laboratory practiacls, workshop	6
3	Processing of milk: Preparation of flavoured milk, paneer, curd, butter, ghee, whey, ice-cream, khoa, and gulab jamun.	Hans on training	6
4	Processing of fruits and vegetables: Preparation of juice, squash, syrup, jam, jelly, marmalade, pickle, sauces, and wine	Hans on training	6
5	Processing of meat, fish and poultry: Meat emulsion, sausages, meat balls, coagulated egg products, poached egg, fish paste and sauce	Hans on training	6

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Milling and preparation of dalia, pasta, macroni, noodles, popped products, beer, etc., oil extraction from oilseeds, and oilseed cake	Experiments	BL6-Create	3
2	Preparation of bread, biscuit, cookies, rusks, muffins, pastry, patties, toffees, and candies	Experiments	BL6-Create	3
3	Preparation of flavoured milk, paneer, curd, butter, ghee, whey, ice-cream, khoa, and gulab jamun.	PBL	BL6-Create	3
4	Preparation of juice, squash, syrup, jam, jelly, marmalade, pickle, sauces, and wine	PBL	BL6-Create	3
5	Meat emulsion, sausages, meat balls, coagulated egg products, poached egg, fish paste and sauce	PBL	BL5-Evaluate	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	30	40	

Part E

Books	S. Ranganna; Handbook of analysis and quality control for fruit and vegetable products
Articles	
References Books	Chakraverty,A; Post Harvest Technology Of Cereals, Pulses And Oilseeds. Oxford & IBH Publishing & Co. Pvt. Ltd., New Delhi.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	-	1	1	2	-	-	1	1	2
CO2	2	2	2	1	2	-	1	-	-	-	2	-	2	2	2
CO3	3	2	3	2	2	-	-	1	1	1	-	-	3	3	3
CO4	3	3	3	2	1	1	2	-	-	-	-	2	3	3	3
CO5	3	3	3	2	1	-	`1	-	1	1	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Disaster Management
Course Code	VAC III (T)

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Foundation core							
Pre-Requisite/s	To be familiar with the basics of natural disasters as well as anthropogenic factors and various approaches for disaster managements.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To learn types of disasters and its profile in India**(BL1-Remember)** **CO2-** To understand the causes and impacts of disasters on environment and related case studies of Global and National disasters. **(BL2-Understand)** **CO3-** To learn about risk reduction approaches of disasters with safety issues in mitigating industrial disasters.**(BL3-Apply)** **CO4-** To understand the concept of Disaster Management Cycle and its Risk Reduction Measures**(BL4-Analyze)** **CO5-** To apply the National Acts and policies for mitigating disasters, Role of Army, Police, Community, Corporate, Media etc. for post Disaster Management.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG13(Climate action) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
1	Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks, Capacity buildings) Factors of disasters, Global trends in disaster: urban disasters, pandemics, complex emergencies, Climate change	Audio/Video clips, group discussion, lecture with ppt, quiz	8
2	Classification of disaster: geophysical, hydrological, climatological, meteorological, biological and technological or man-made hazards. Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc. Differential impacts- in terms of caste, class, gender, age, location, disability.	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	8
3	Disaster management cycle – Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA).	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	8
4	Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Disaster Management Indian scenario, India's vulnerability profile, Disaster Management Act 2005 and Policy guidelines, Environmental Legislation for Disaster Risk Management in India. Role of information technology in protecting environment and health. Role of NGOs Cases Studies: Bhopal Gas Disaster, Gujarat Earth Quake, Orissa Super-cyclone, South India Tsunami, Bihar floods, Plague Surat, COVID-19 pandemic	Audio/Video clips, group discussion, lecture with ppt, Case Based Assignments, Quiz, Application Based Activity	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	• Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423 • Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361] • Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011 • Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010. • Kapur, Anu & others, 2005: Disasters in India Studies of grim reality, Rawat Publishers, Jaipur
Articles	
References Books	• Coppola P Damon, 2007. Introduction to International Disaster Management, Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. • Cuny, F. 1983. Development and Disasters, Oxford University Press. Document on World Summit on Sustainable Development 2002. • Govt. of India: Disaster Management Act 2005, Government of India, New Delhi. Government of India, 2009. National Disaster Management Policy. • Disaster Management Guidelines. GOI-UNDP Disaster Risk Reduction Programme (2009-2012. • Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003 • National Institute of Disaster Management • National Disaster Management Authority • http://nidm.gov.in, http://cwc.gov.in , http://ekdrm.net , http://www.emdat.be , http://www.nws.noaa.gov , http://pubs.usgs.gov , http://nidm.gov.ini http://www.imd.gov.ini
MOOC Courses	https://nptel.ac.in/courses/130106113
Videos	https://youtu.be/tPm85HpraQg?si=7-MaACyah6FWLUXn

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	-	-	1	2	-	-	-	-	1	-	-
CO2	1	2	-	-	-	-	1	2	-	-	-	-	1	-	-
CO3	1	2	-	-	-	-	1	2	-	-	-	-	-	-	-
CO4	1	2	-	-	-	-	1	2	-	-	-	-	-	2	-
CO5	1	2	-	-	-	-	1	2	-	-	-	-	-	-	3
CO6	1	2	-	-	-	-	1	2	-	-	-	-	-	-	3

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Human Nutrition [T]
Course Code	VAC-III [T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have studied Food Chemistry in previous semester			**Co-Requisite/s**	Knowledge of biomolecules (Carbohydrates, proteins and fats) present in food and relationship between diet and health			
Course Outcomes & Bloom's Level	**CO1-** To remember the basic nutrients present in our daily dietary food like carbs, proteins, lipids, minerals, vitamins, etc**(BL1-Remember)** **CO2-** To understand the core principles and requirements of nutrients for a healthy body**(BL2-Understand)** **CO3-** To provide the students a specialized knowledge and understanding in the field of food nutrition to creation of new foods which enhances our health.**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as interpretation of nutrient composition of foods**(BL4-Analyze)** **CO5-** To evaluate the scientific research on nutrition, and their role in better human health**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✓ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Food and Nutrition: Basic terms used in study of food and nutrition, Understanding relationship between food, nutrition and health.	Lecture method, Ice Breaking session, Review Summarizing, Tutorials sessions	09
2	Balanced Diet: Functions of foodphysiological, psychological and social. Concept of Balanced Diet, Food Groups, Food Pyramid, Food Exchange List, Principles of Meal Planning, factors influencing Meal planning	Lecture method, Quiz, Illustrate with analogies, Interactive videos	09
3	Nutrients: Classification, digestion, absorption, functions, dietary sources, RDA, clinical manifestations of deficiency and excess of the following in brief: Energy, Carbohydrates, lipids and proteins, Fat soluble vitamins-A, D, E and K, Water soluble vitamins– B-complex vitamins& Vitamin C, Minerals- calcium, iron, iodine, fluorine, sodium, potassium, magnesium & phosphorus	lecture method, Summarizing, Quiz, Tutorials sessions, Expert Lecture	10
4	Methods of Cooking: Dry, moist, frying and microwave cooking, Advantages,disadvantages and the effect of various methods of cooking on foods.	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	Nutrition Improvement of Foods: Nutrient losses in cooking and enhancing the nutritional quality of foods.	Audio/Video clips, group discussion, lecture with ppt, quiz	09

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Agarwal, A., Udipi, S.A. and Agravāla, P. (2022) Textbook of human nutrition. New Delhi: Jaypee Brothers Medical Publishers.
Articles	https://www.news-medical.net/condition/Diet-Nutrition
References Books	Agarwal, A., Udipi, S.A. and Agravāla, P. (2022) Textbook of human nutrition. New Delhi: Jaypee Brothers Medical Publishers.
MOOC Courses	https://nptel.ac.in/courses/126104004
Videos	https://www.youtube.com/watch?v=kM9PRu-OiRc&t=2s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	-	1	-	1	1	-	-	3	1	1
CO2	3	1	1	1	-	1	-	1	1	1	-	-	3	1	1
CO3	3	2	2	2	1	1	1	1	1	1	-	-	3	1	2
CO4	3	2	2	2	1	1	1	-	-	1	-	-	3	1	2
CO5	3	2	2	2	1	1	1	1	1	1	-	-	3	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Bakery & confectionery [T]
Course Code	BSFT-0402 [T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have studies Cereals, Pulses and Oilseeds in the previous semesters			**Co-Requisite/s**	Knowledge of manufacuring of bakery and confectionery products			
Course Outcomes & Bloom's Level	**CO1-** To remember the various ingredients required for bakery and processing methods of bakery and confectionery products, various product faults and their remedies**(BL1-Remember)** **CO2-** To understand the scientific principles in the processing technologies, product specification and regulations, hierarchy of bakery department and different working temperatures for bakery products**(BL2-Understand)** **CO3-** To provide students an experimental basis and a specialized knowledge and understanding in the development and quality control of bakery and confectionery products**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in research and development in bakery products**(BL4-Analyze)** **CO5-** To evaluate the real life knowledge gained and properties and implement the same to create new bakery and confectionery products**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	**Bakery industry**: Current status, growth rate, and economic importance of Bakery Industry in India. ~~Product types, nutritional quality and safety of products, pertinent standards & regulations.~~ Major bakery industries in India **Role of Raw Materials Required for Bakery & Confectionery:** Wheat flour, sugar, fat, eggs, Essential ingredients: flour, sugar,	Lecture method, industrial visit	7
2	~~Introduction to Confectionery: Scope of confectionery, Confectionery terms, Small and large equipment~~ Small and large equipment used in manufacturing of bakery and confectionary products - Different types of ovens and other heating equipments, proofing chamber, measuring tools, Preparatory tools, mixing tools, Cutting tools, baking pans and other tools. Bread- Introduction, Types of bread, Manufacturing techniques, faults and corrective measures, Quality Characteristics.	Lecture method, Quiz, Illustrate with analogies.	8
3	Cakes: Introduction, Types of cake, ~~ingredients & processes for cakes, Equipments used~~ Manufacturing: Sugar batter method, Flour batter method, Genoese. Blending, faults and corrective measures. Modified Bakery Products: Modification of bakery products for people with special nutritional requirements e.g., high fiber, low sugar, low fat, gluten free bakery products	Audion-video clips, Expert Lecture	10
4	~~Moistening Agents: Milk, Egg, Water. Fats and Oil:Composition, functions in confectionery, types of fats and oil, storage. Leavening Agents:Chemical, natural, water vapors and biological BISCUITS, COOKIES & CRACKERS Ingredients & processes, Equipments used, product quality characteristics, faults and corrective measures. Production and quality of breakfast cereals, macaroni products and malt.~~ Introduction to Confectionery: Scope of confectionery, Confectionery terms, technology for manufacture of flour, fruit, milk, sugar, chocolate, based confectionery products; cooler, flavor and texture of confectionery; standards and regulations	Lecture method, Audio/Video clips, group discussion, quiz	12

5	~~MODIFIED BAKERY PRODUCTS Modification of bakery products for people with special nutritional requirements e.g. high fiber, low sugar, low fat, gluten free bakery products.~~ Sugar Confectionaries: Caramels, Chocolates, Fondant, Fudge, Hard candy(lollipops, jawbreakers), Jelly candies, Marshmallow, Principles of production, Quality Characteristics	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To study the leavening action of baking powder, sodium- bicarbonate and ammonium-bicarbonate.	Experiments	BL2-Understand	2
2	Determination dough rising capacity of yeast	Experiments	BL3-Apply	2
3	Preparation of biscuits and cookies	Experiments	BL3-Apply	2
4	Preparation of bread-different types	Experiments	BL3-Apply	2
5	To identify the external and internal characteristics of bread	PBL	BL4-Analyze	3
6	Preparation of cake-different types	Experiments	BL3-Apply	2
7	Preparation of low fat cake and cookies	Experiments	BL3-Apply	2
8	Preparation of toffees	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	0	60	30	40	0

Part E

Books	Dubey, S. C. (1980, January 1). Basic Baking.
Articles	
References Books	Chopra, U. R. S. K. V. N. S. T. S. S. V. S. (2010, January 1). Basic Food Preparation: A Complete Manual. Manay, N. S., & Shadaksharaswamy, M. (2008, January 1). Food: Facts and Principles. New Age International. Khan, R. (2012, December 6). Low-Calorie Foods and Food Ingredients. Springer Science & Business Media.
MOOC Courses	https://nptel.ac.in/courses/126105027
Videos	https://www.youtube.com/watch?v=Dm3yP7FF4nI

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	-	1	1	-	1	1	-	-	3	1	1
CO2	2	2	1	1	1	-	1	1	-	1	2	-	3	2	2
CO3	2	2	2	2	1	1	-	1	-	1	-	-	3	2	2
CO4	2	2	2	1	1	-	1	1	1	1	2	-	3	2	2
CO5	3	2	2	2	1	1	1	1	1	1	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Hindi II [T]
Course Code	AEC IV [T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Ability Enhancement Courses							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** भारतीय ज्ञान परम्परा सेवि द्यार्थि यों को अवगत कराना ।**(BL1-Remember)** **CO2-** उत्कृष्ट साहित्यि क पाठों के अध्ययन सेरूचि का वि कास करना**(BL2-Understand)** **CO3-** सांस्कृति क चेतना और राष्ट्रीय भावना का विकास करना ।**(BL3-Apply)** **CO4-** भाषा-ज्ञान**(BL4-Analyze)** **CO5-** सामान्य शब्दावली और वि शेष 'शब्दावली के अध्ययन द्वारा भाषा एवंसंस्कृति बोध का वि कास करना**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	1. समसामयि क सं दर्भ- श्रीमद्भगवद्गीता-कर्मयोग 2. सूर्यकांत त्रि पाठी नि रासा- परि चय पाठ:- जागो फि र एकबार (दो) कवि ता 3. अमरकांत - परि चय पाठ दोपहर का भोजन (कहानी) 4 महादेवी वर्मा :- परि चय पाठ :- गि ल्लू(रेखांकि त)	Audio/Video clips, group discussion, lecture with ppt, quiz	4
2	1. हजारी प्रसाद द्वि वेदी, - परि चय पाठ :- नाखून क्यों बढ़तेहैं, ललि त नि बं ध) 2. मध्य प्रदेश की लोक कलाएँ (सं कलि त) 3. मध्य प्रदेश का लोक-साहि त्य (सं कलि त)	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	4
3	1. मुहावरेऔर कहावते(भाषा) 2. समास : परि भाषा और भेद (शब्द रचना / व्याकरण) 3. बीज शब्द. (Keywords) अवधारणा मूलक शब्द उद्योग, सभ्यता, सं स्कृति , शि क्षा, सूचना-समाज	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	5
4	1.मांडव (यात्रा वृतांत): पं रामनारायण उपाध्याय 2 शि रीष के फूल (नि बं ध):- आचार्य हजारी प्रसाद द्वि वेदी 3. जवानी (काव्ये) : श्रीमाखनलाल चतुर्वेदी .	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	5
5	1. मध्यप्रदेश के पर्यटन स्थल 2. उसनेकहा था (कहानी): श्री चन्द्रधर शर्मा - गुलेरी" 3. जनजातीय जीवन,	Audio/Video clips, group discussion, lecture with ppt, Review Analysis D.TEXT BOOKS:	4

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	भाषा और संस्कृति- मध्य प्रदेश शासन
Articles	
References Books	भाषा और संस्कृति- मध्य प्रदेश शासन
MOOC Courses	https://nptel.ac.in/courses/126104007
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	-	2	-	3	-	-	3	1	1
CO2	3	1	1	1	1	1	-	2	-	3	-	-	3	1	1
CO3	3	1	1	1	1	1	-	2	-	3	-	-	3	1	1
CO4	3	1	1	1	1	1	-	2	-	3	-	-	3	1	2
CO5	3	1	1	1	1	1	-	2	-	3	-	-	3	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Statistical Methods [T]
Course Code	AEC-IV [T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Ability Enhancement Courses							
Pre-Requisite/s	Knowledge of basic mathematics, theorems			**Co-Requisite/s**	To learn Statistics, concepts of statistical population and sample			
Course Outcomes & Bloom's Level	**CO1-** To remember graphical representation of data. **(BL1-Remember)** **CO2-** To understand problems based on measures of central tendency.**(BL2-Understand)** **CO3-** To apply Karl Pearson and rank correlation coefficient**(BL3-Apply)** **CO4-** To analyze lines of regression, angle between lines and estimated values of variables**(BL4-Analyze)** **CO5-** Calculate price and quantity index numbers using simple and weighted average of price relatives.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical, including histogram and ogives, consistency and independence of data with special reference to attributes.	Lecture method, group discussion	6
2	Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, absolute moments, factorial moments, skewness and kurtosis, Sheppard's corrections.	Lecture method, group discussion	6
3	Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.	Lecture method, group discussion, expert lecture	8
4	Index Numbers: Definition, construction of index numbers and problems thereof for weighted and unweighted index numbers including Laspeyre's, Paasche's, Edgeworth- Marshall and Fisher's Ideal Index numbers. Errors in Index numbers. Chain index numbers, conversion of fixed based to chain based index numbers and vice-versa. Consumer price index numbers. Uses and limitations of index numbers.	Lecture method, group discussion, expert lecture, quiz	8
5	Theory of equations, statement of the fundamental theorem of algebra and its consequences. Relation between roots and coefficients or any polynomial equations. Vector spaces, Subspaces, sum of subspaces, Span of a set, Linear dependence and independence, dimension and basis.	Lecture method, group discussion, expert lecture, quiz	6

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata. Gupta, S. C. and Kapoor, V.K. (2008): Fundamentals Of Mathematical Statistics, 4 thEdition (Reprint), Sultan Chand &Sons
Articles	Mukhopadhyay, P. (1999): Applied Statistics, New Central Book Agency
References Books	Miller, Irwin and Miller, Marylees(2006): John E.Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia
MOOC Courses	https://nptel.ac.in/courses/103106112
Videos	https://youtu.be/qj94mSPrrYY

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	-	1	-	1	1	-	-	1	1	1
CO2	1	1	1	1	1	-	-	-	1	-	1	-	2	1	1
CO3	1	1	1	1	-	1	1	1	-	-	-	-	2	2	1
CO4	2	2	1	1	1	-	-	-	2	-	2	-	3	2	2
CO5	2	2	1	1	-	-	1	-	2	-	1	-	3	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Beverage Technology [T]
Course Code	BSFT-0401 [T]

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">2nd</td><td rowspan="2">Semester</td><td rowspan="2">4th</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Embedded theory and lab</td></tr>
<tr><td>Course Category</td><td colspan="8">Disciplinary Major</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Student must have studies food microbiology and introduction to food technology in previous semester</td><td>Co-Requisite/s</td><td colspan="4">knowledge of food fermentation and preservation</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- To remember the basics of Beverage technology, including the origin, principles and applications(BL1-Remember)
CO2- To understand the core principles, techniques and mechanism of nonalcoholic and alcoholic fermentation(BL2-Understand)
CO3- To provide the students a specialized knowledge and understanding regarding manufacturing of various alcoholic beverages as well as nonalcoholic beverages(BL3-Apply)
CO4- To study the concept of additives being used in beverages(BL4-Analyze)
CO5- To evaluate the quality standards comprising of Chemical, Microbial & Sensory Evaluation (BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="3">Skill Development ✓
Entrepreneurship ✓
Employability ✓
Professional Ethics ✕
Gender ✕
Human Values ✕
Environment ✕</td><td>SDG (Goals)</td><td colspan="4">SDG2(Zero hunger)
SDG3(Good health and well-being)
SDG6(Clean water and sanitation)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to beverage technology & History of Growth of Beverages. Importance and Market Scenario. Classification of beverages	Lecture method, quiz, group discussion	5
2	Carbonated beverages – Introduction, process technology, and carbonation; Non-carbonated beverages- Bottled Water, Stimulating beverages-Tea, Coffee, Cocoa, Fruit-based beverages	Lecture method, Quiz, Illustrate with analogies	12
3	Alcoholic beverages- Role of yeast in fermentation, Production technology of fermented (beer, wine) and distilled beverages (Brandy, Rum, Whiskey, Gin, Vodhka, Sake, etc)	Lecture method, Expert Lecture	12
4	Additives for Beverages: Colors, Acids, Emulsifiers Preservatives, Sweeteners, Flavors, Flavor Enhancers. Health drinks, energy drinks, diet drinks	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	Quality Control and Standards for beverages and bottled water, Chemical, Microbial & Sensory Evaluation, defects in beverages.	Lecture method, Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Determination of Quality parameters of bottled water	Experiments	BL2-Understand	3
2	Brewing perfect French press coffee from roasted coffee beans	Experiments	BL2-Understand	2
3	Preparation of fruit smoothies	Experiments	BL3-Apply	2
4	Preparation of nectar and cordials	Experiments	BL3-Apply	2
5	Determination of TSS, pH and titratable acidity of different beverages	Experiments	BL3-Apply	2
6	Determination of the caffeine level in stimulating beverages	Experiments	BL3-Apply	2
7	Preparation of Alcoholic beverages	Experiments	BL3-Apply	3
8	Preparation of coconut water energy drink	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	0

Part E

Books	Manay, N.S. and Shadaksharaswamy, M. (2008) Foods: Facts and principles. New Delhi: New Age International Ltd.
Articles	
References Books	Mudgil, D. and Barak, S. (2018) Beverages: Processing and technology. Jodhpur, India: Scientific Publishers. Varnam, A.H. and Sutherland, J.R. (2009) Beverages: Technology, Chemistry and Microbiology. Londos €tc.: Chapman and Hall.
MOOC Courses	https://nptel.ac.in/courses/126105020
Videos	https://www.youtube.com/watch?v=h5NpTku5BGc

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	-	1	-	1	1	1	-	-	3	1	1
CO2	3	2	1	1	1	1	1	-	1	-	-	-	3	1	1
CO3	3	2	2	2	1	1	1	1	1	1	-	-	3	1	1
CO4	3	2	2	1	1	1	1	-	1	1	-	-	3	2	2
CO5	3	2	2	2	1	1	1	1	1	1	-	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ITM UNIVERSITY
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CELEBRATING DREAMS

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Livestock product technology [T]
Course Code	BSFT-0403 [T]

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">2nd</td><td rowspan="2">Semester</td><td rowspan="2">4th</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Embedded theory and lab</td></tr>
<tr><td>Course Category</td><td colspan="8">Discipline Core</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Students must have studied food processing and preservation, food nutrition and related subjects in previous semester</td><td>Co-Requisite/s</td><td colspan="4">Students should have prior basic knowledge of preservation, processing etc.</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- To remember the raw material characteristics, handling, processing, and preservation(BL1-Remember)
CO2- To understand the scientific principles in the processing technologies, by-product utilization of meat, poultry, fish and egg products(BL2-Understand)
CO3- To provide students an experimental basis and a specialized knowledge and understanding in the development and quality control of meat, poultry and fish products and maintaining hygiene, sanitation and mechanized practices of meat, fish, poultry and egg industry(BL3-Apply)
CO4- To apply the subject knowledge in future perspectives i.e. such as in research and development in meat, poultry and fish products(BL4-Analyze)
CO5- To evaluate the real life knowledge gained and properties and implement the same to create new flesh products. (BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="3">Skill Development ✓
Entrepreneurship ✕
Employability ✓
Professional Ethics ✕
Gender ✕
Human Values ✕
Environment ✕</td><td>SDG (Goals)</td><td colspan="4">SDG1(No poverty)
SDG2(Zero hunger)
SDG3(Good health and well-being)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	~~Meat Quality-color, flavor, texture, WaterHolding Capacity(WHC),Emulsification capacity of meat~~ Introduction: Terminologies related to meat, fish and poultry processing; Indian meat industry: Livestock, poultry, egg and fish population and their processing and export; Structure of muscle tissues; Effects of feed, breed and environment on production of meat animals, poultry and fish	Lecture method, quiz, group discussion	7
2	Slaughter process: Ante-mortem examination of meat animals, Slaughter techniques, ~~slaughter of buffalo, sheep/ goat, poultry, pig,~~ Dressing of carcasses, Post-mortem examination of meat, Grading, Meat Quality- color, texture, water-holding capacity (WHC), emulsification capacity. ~~Preservation of meat: Refrigeration and freezing, thermal processing-canning of meat, retort pouch, dehydration, irradiation, and RTE meat products, meat curies, Sausages processing, types and defects. By□products: Importance, classification and uses, Manufacture of Natural casings.~~	Lecture method, Quiz, Illustrate with analogies, industrial visit	10
3	Preservation of meat: Refrigeration and freezing, thermal processing, dehydration, and irradiation. Meat products: RTE meat products, Sausages processing - Types and defects. By-products: Importance, classification and uses, Manufacture of Natural casings. ~~Egg Industry and Egg Production Practices: The egg industry, its techniques of working, General management, structure, composition and nutritive value of egg and its products.~~	Lecture method, Expert Lecture, quiz	10
4	Egg: Structure of egg, composition and nutritive value of egg, Preservation of eggs: Refrigeration and freezing, thermal processing, dehydration & coating. Egg processing- dried and frozen eggs, Factors affecting egg quality and measures of egg quality.	Audio/Video clips, group discussion, lecture with ppt, quiz	9
5	Fish and seafoods: Structure, Composition and nutritive value of fish, Fish dressing, Preservation of fish: Fish Curing, Smoking and Canning;Fishery by-products Other Seafoods: Introduction and processing.	Group discussion, lecture with ppt, quiz	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To study the structure of an egg	Experiments	BL2-Understand	2
2	To determine the specific gravity of eggs	Experiments	BL5-Evaluate	2
3	To study the process of osmosis by the removal of egg shell	Experiments	BL4-Analyze	2
4	To determine the exterior and interior quality (breakout method) of table eggs.	Experiments	BL4-Analyze	2
5	To determine egg quality using candling	Experiments	BL4-Analyze	2
6	Preparation of an egg/chicken pickle and its sensory evaluation	Experiments	BL6-Create	2
7	Determination of water holding capacity of meat	Experiments	BL5-Evaluate	2
8	Determination of extract release volume (ERV) of meat	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	

Part E

Books	Outlines of meat science and technology by B.D Sharma
Articles	
References Books	Poultry Meat and Egg Production by Parkhurst and Mountney
MOOC Courses	https://nptel.ac.in/courses/127106236
Videos	https://www.youtube.com/watch?v=i5VwdkggtWU

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	2	1	-	-	-	-	-	-	3	1	1
CO2	3	3	2	1	2	1	-	-	1	-	-	1	3	1	1
CO3	2	3	3	2	2	2	1	-	1	-	1	2	3	1	1
CO4	1	2	3	2	2	3	1	-	1	-	1	1	3	3	3
CO5	1	3	2	-	2	1	-	-	1	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Entrepreneurship Development [T]
Course Code	GE-IV [T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Generic Elective							
Pre-Requisite/s	Students must have studied food business managemnet in previous semester			**Co-Requisite/s**	Students should have prior knowledge of economics and basics of management			
Course Outcomes & Bloom's Level	**CO1-** Communicate with required clarity ensuring that the information communicated is clear and accurate.**(BL1-Remember)** **CO2-** Comprehend and apply basic computer working, basic operating system and uses internet services to get accustomed & take benefit of IT developments in the industry.**(BL2-Understand)** **CO3-** To demonstrate knowledge of entrepreneurship and identify establishment for supporting the development of businesses/entrepreneurship.**(BL3-Apply)** **CO4-** To illustrate procedures to achieve a safe working environment in line with occupational health, safety, environment regulations.**(BL4-Analyze)** **CO5-** Comply time management technique in day-to-day work.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	Concept and definition of Entrepreneurship; The conceptual model of Entrepreneurship given by John Kao. Views given by Schumpeter Walker & Drucker on Entrepreneurship - Entrepreneur and Manager -Enterprise and Entrepreneur. Managing Creativity Issues to be addressed in working the definition of creativity – Definition -Attributes of a creative person - Creative Thinking and Motivation - Managing Creativity - Organizational Actions that enhance and hinder Creativity - Organizational priorities and Creativity - Managerial responsibilities in a creative organization	Lecture method, quiz, group discussion	10
2	Definition of Small Business - Composition of Small Business- Economic Contribution of Small Business. Strategic Planning for Small Business -Steps in Strategic Planning. Forms of Ownership: Sole Proprietorship, Partnership& Corporation form of Organization Advantages and Disadvantages. Franchising- What is Franchising - Advantages and Disadvantages to Franchising - Franchise Evaluation Checklist –Franchise contracts - Types of Franchise arrangements. Brief insight of Startup, Entrepreneurship, features, related scheme and benefits.	Lecture method, Quiz, Illustrate with analogies	10
3	Introduction: Project - definition, features, types infrastructure creation-a special type of projects, ~~significance of infrastructure in economic development bottlenecks in the infrastructure creation.~~ Identification: Idea generation, Project screening Feasibility study. The advantages and disadvantages of starting your business. The advantages and disadvantages of buying all existing business – Critical areas to be examined while buying all existing business. ~~Determining the value of a business – Financial Recor Keeping – Profit Planning & Cost Control, Projec costing: Breakdown structure of the project, cos estimation of the project, factor affecting the cost of th project, Costing with alternativ configurations/specifications.~~ Project Appraisal: technical appraisal, marketing appraisal, legal and environment appraisal, financial appraisal- cost estimation of the project and evaluating project using pay back and NPV, Detailed project report. Introduction to SCBA (Social cost benefit analysis).	Lecture Method, Expert Lecture, audio-video clips	12

4	Arrangement of funds: Traditional sources of financing – Equity shares, preference shares, Debentures/bonds, loan from financial institutions- Loan syndication and consortium finance; Alternative sources of financing- Foreign Issue, FDI & FII, ~~ECB, Private equity, Securitization, BOT projects, PPP.~~ SWOT analysis and its usefulness	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	~~Role played by various Financial Institutions like IDBI, ICICI and IFCI: Special Role played by SIDBI and Commercial Banks – Approval of term loan applications by Commercial Banks – How to decide about a suitable agency for assistance Role played by SFCR and NSIC; Project Implementation: Project contracts – Principles, practical aspects of contacts, legal aspects of project management, global tender, Negotiation for projects, Project insurance, Human resource management, network analysis.~~ Government schemes and incentives for promotion of entrepreneurship development Government policy for entrepreneurship development-Prime Minister's Employment Generation Program (PMEGP), Market Development Assistance Scheme for Micro/ Small Manufacturing Enterprises/ Small & Micro Exporters, Rajiv Gandhi Udyami Mitra Yojana - A Scheme of "Promotion and Handholding of Micro and Small Enterprises", Schemes for Women Entrepreneurs a) Mahila Udyami Yojana (MUY) b) SBI Stree Sakthi Package c) Priya Darshini Yojana	Audio/Video clips, group discussion, lecture with ppt, quiz	10

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	
Articles	https://www.forbes.com/entrepreneurs/?sh=3e2b77403035
References Books	Effective Small Business Management by Scarborough & Zimmerer
MOOC Courses	https://nptel.ac.in/courses/110106141
Videos	https://www.youtube.com/watch?v=N3-FZn_iQFU&t=3s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	-	-	-	-	1	1	-	3	1	3	3	1	1
CO2	3	3	2	1	1	-	-	-	-	2	-	2	3	1	1
CO3	1	1	3	3	2	2	1	-	-	-	1	1	3	1	1
CO4	3	1	-	-	-	2	2	1	-	-	2	-	3	3	3
CO5	1	2	-	-	-	-	1	1	-	3	1	3	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Intellectual Property Rights [T]
Course Code	GE-IV [T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Generic Elective							
Pre-Requisite/s	Knowledge of food businees managemnet, startups			**Co-Requisite/s**	To gain knowledge about rights for the protection of invention done in the project work.			
Course Outcomes & Bloom's Level	**CO1-** The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.**(BL1-Remember)** **CO2-** To get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right, trademarks, designs and information Technology Act**(BL2-Understand)** **CO3-** Further teacher will have to demonstrate with products and ask the student to identify the different types of IPR's.**(BL3-Apply)** **CO4-** The students once they complete their academic projects, they get awareness of acquiring the patent **(BL4-Analyze)** **CO5-** They also get the knowledge of plagiarism in their innovations which can be questioned legally**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy . Law relating to Intellectual Property, Universal Law Publishing Co, by Dr. B.L.Wadehra
Articles	
References Books	
MOOC Courses	https://nptel.ac.in/courses/110105139
Videos	https://youtu.be/HX8_UdIwy58

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	-	2	-	1	1	-	1	1	1
CO2	1	1	1	1	-	1	1	-	-	2	-	-	1	2	1
CO3	2	2	1	1	-	1	-	2	1	-	2	-	2	2	1
CO4	2	2	1	1	1	-	1	-	-	1	-	-	2	2	2
CO5	2	2	1	1	-	1	-	1	-	1	2	-	1	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Introduction to food analysis [P]
Course Code	SEC-IV [P]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Knowledge of proximate and chemical analysis of food products			**Co-Requisite/s**	knowledge of instruments used in food analysis			
Course Outcomes & Bloom's Level	**CO1-** To understand the working principle and instrumentation of various instruments used in food analysis.**(BL1-Remember)** **CO2-** The students will know the importance of various methods to identify any malfunction aspect of food.**(BL2-Understand)** **CO3-** To provide students an experimental basis and a specialized knowledge and understanding in the analysis of food.**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in research and development in food products**(BL4-Analyze)** **CO5-** To evaluate the real life knowledge gained and properties and implement the same to create new food products.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction – Sampling methods – Sample preparation and preservation- Extraction methods and Separation process of food components;– Official Methods of Food Analysis.	Lecture method	
2	Nature and Concept of Food analysis, Basic instrumentation: Principle for pH meter, filtration, Reverse osmosis. Centrifugation: Principle, Theory (RCF, Sedimentation coefficient) and types of Rotors, Ultracentrifugation,.	Quiz, Illustrate with analogies,, Interactive videos, disussion	
3	Chromatography: Theory & Principle, chromatographic parameter (partition coefficient, capacity factor, retention & dead time, Resolution& their calculation), components of chromatography & types.	Quiz, Tutorials sessions, Expert Lecture	
4	Advance chromatography: GC, HPLC, (principle, instrumentation &application). Separation technique & analysis: Electrophoresis.	Quiz, Tutorials sessions, Expert Lecture	
5	Introduction to quality attributes of food Appearance, flavour, textural factors; Gustation importance, taste perception, Taste measurement-Electronic Tongue; Olfaction definition and importance of odour and flavour, Odour measurement technique- e- nose; Perception of colour & Colour Measurement.	Audio/Video clips, group discussion, lecture with ppt, quiz	

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Determination of moisture content from a given food sample by lab oven method	Experiments	BL3-Apply	2
2	Determination of total ash content in the given food sample.	Experiments	BL4-Analyze	2
3	Determination of acid insoluble ash from a given food sample.	Experiments	BL4-Analyze	2
4	Determination of crude fat in a given food sample.	Experiments	BL4-Analyze	2
5	Determination of amount of crude fiber in a given food sample.	Experiments	BL4-Analyze	2
6	Determination of Titratable Acidity in Foods using a Potentiometric Titration	Experiments	BL4-Analyze	2
7	Determination of pH in a given food sample	Experiments	BL4-Analyze	2
8	Determination of extent of liking in a given food sample by hedonic scale rating.	Experiments	BL4-Analyze	2
9	To perform Thin Layer Chromatography (TLC) of Food Colours	Experiments	BL4-Analyze	2
10	High Performance Liquid Chromatography (HPLC) of Sugars	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	

Part E

Books	Yeshajahn Pomeranz et.al, Food Analysis, Theory and Practice
Articles	
References Books	Joslyn, M.A., Methods in Food Analysis
MOOC Courses	https://nptel.ac.in/courses/126105015
Videos	https://youtu.be/k1a2PSEXahM?si=funi1jTWOchWfrnR

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	2	1	1	1	1	1	-	1	-	1	2	1
CO2	1	2	2	3	1	1	1	1	-	1	-	-	1	2	2
CO3	2	2	3	3	1	2	2	2	1	-	1	-	2	3	3
CO4	2	2	3	3	2	2	2	1	1	-	-	-	2	3	3
CO5	2	2	3	3	2	2	1	1	-	1	1	-	2	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Technical writing [P]
Course Code	SEC-IV [P]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Knowledge of English communication			**Co-Requisite/s**	this course will teach processes for analyzing writing contexts and producing effective, clean, and reader-centered documents in an efficient manner.			
Course Outcomes & Bloom's Level	**CO1-** Demonstrate rhetorical knowledge to create effective technical writing documents for endusers.**(BL1-Remember)** **CO2-** Apply and adapt flexible writing process strategies to produce clear, high-quality deliverables in a multitude of technical writing genres**(BL2-Understand)** **CO3-** Use professional technical writing conventions of clean and clear design, style, and layout of written materials**(BL3-Apply)** **CO4-** Gather and apply researched information that is appropriate to your field, as demonstrated by reading and analyzing documents, and citing sources correctly**(BL4-Analyze)** **CO5-** Write clearly, correctly, and concisely**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Internal Communication: Writing Memos and Emails	Seminar	BL3-Apply	2
2	External Communication: Formal Letters	Seminar	BL3-Apply	2
3	Using Visuals to Convey Information	Experiments	BL3-Apply	2
4	Process Documentation	Experiments	BL3-Apply	2
5	Writing Proposals	Simulation	BL4-Analyze	2
6	Communicating on the Internet	PBL	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	

Part E

Books	Technical Writing Process by Kieran Morgan
Articles	
References Books	The Insider’s Guide to Technical Writing by Krista Van Laan Managing Your Documentation Projects by JoAnn T. Hackos
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	-	2	-	1	-	1	-	1	1	1
CO2	1	2	2	1	1	-	1	-	-	-	-	-	1	1	1
CO3	1	2	2	1	-	-	-	1	1	1	-	-	2	2	1
CO4	2	2	2	1	1	1	-	-	-	-	1	-	2	2	1
CO5	2	2	1	-	-	-	1	-	1	-	-	-	2	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Environmental Issues and Sustainable Development [T]
Course Code	VAC-IV [T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Foundation core							
Pre-Requisite/s	Basic Knowledge of Environmental Issues and Sustainable development			**Co-Requisite/s**	Knowledge about SDGs and Strategies for implementation of SDGs.			
Course Outcomes & Bloom's Level	**CO1-** CO1. To develop sentiments and sensitize them towards environmental challenges and concept of sustainable development.**(BL2-Understand)** **CO2-** CO2. To acquire analytical skills/methods in assessing environmental impacts through a multidisciplinary approach;**(BL4-Analyze)** **CO3-** CO3. Ability to design sustainability performance metric to assess the impact on community's sustainable development**(BL3-Apply)** **CO4-** CO4. Acquire expertise and skills to evaluate feedback systems that can readjust the pathways of processes and procedures to ensure success in implementing sustainable development initiatives.**(BL1-Remember)** **CO5-** CO5. Students acquire skills to communicate, prepare, plan and implement the sustainable development project to achieve milestone of SDGs.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✓		**SDG (Goals)**	SDG4(Quality education) SDG5(Gender equality) SDG12(Responsible consuption and production) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours
1	~~History and emergence of the~~ concept of Sustainable Development, Environmental issues and crisis, Resource degradation, greenhouse gases and Effects, desertification,~~ social insecurity,~~ Industrialization, Globalization ~~and Environment.~~ Dimension of Sustainable Development, Principles of Sustainable Development.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, discussion (questions & answers section)	8
2	Sustainable Development Goals: Capacity Building for Sustainable Environment, Sustainable Land Management. Global and regional progress on SD, Individual and collective actions for SD, ~~Sustainable Mountain development, Clean air for~~ Climate Mitigation and Human Health, Sustainable Corporate Practices, Sendai Framework for Disaster Risk Reduction, Conservation and Management of Global Forest Ecosystem.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
3	~~Society, environment, culture and economy;~~ current challenges - natural, political, socio-economic imbalance; sustainable development initiatives and policies of various countries: global, regional, national, local; ~~needs of present and future generation - political, economic, and environmental.~~ Global Indicators Framework, Sustainable development indicators, SDG Reports 2023 & 2019. Socio-economic challenges.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
4	Global Sustainable Development Reports. GSD-2019, GSD 2023. Implementation Progress: SDG Progress report, Sustainability and development indicators and SDGs, UN's outlook of sustainable development and efforts	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures,Audio/Video clips, Group discussion.	8
5	Case Studies & Projects on Rural Sustainable Development (Indian village perspectives) - Village resources (broad perspectives); current challenges and thematic areas; village social hierarchy; village economy; needs of present and future generation; conflicts - sustainability and rural culture & tradition; ~~road to achieving sustainable development goals - bridging conflicts and way forward.~~ *AI for achieving sustainable development goals.*	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion. Field visits. Industrial Visit (MSW/BMW/STP/ETP)	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	12
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Dinar, A., & Rapoport, A. (2013, March 5). Analyzing Global Environmental Issues. Routledge.
Articles	1. Sala, Serenella, Biagio Ciuffo, and Peter Nijkamp. "A systemic framework for sustainability assessment." Ecological Economics 119 (2015): 314-325. 2. Gasparatos, Alexandros, and Anna Scolobig. "Choosing the most appropriate sustainability assessment tool." Ecological Economics 80, no. 0 (2012): 1-7. 3. Stafford-Smith, Mark, David Griggs, Owen Gaffney, Farooq Ullah, Belinda Reyers, Norichika Kanie, Bjorn Stigson, Paul Shrivastava, Melissa Leach, and Deborah O'Connell. "Integration: the key to implementing the Sustainable Development Goals." Sustainability science 12, no. 6 (2017): 911-919. 4. Streimikis, Justas, and Tomas Baležentis. "Agricultural sustainability assessment framework integrating sustainable development goals and interlinked priorities of environmental, climate and agriculture policies." Sustainable Development 28, no. 6 (2020): 1702-1712.
References Books	French, D., & Kotzé, L. J. (2018, June 29). Sustainable Development Goals. Edward Elgar Publishing.
MOOC Courses	https://nptel.ac.in/courses/109105190
Videos	https://youtu.be/O5kI0OcNJxU

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	-	-	1	-	-	-	-	-	-	-	-
CO2	1	2	2	-	-	-	2	-	-	-	-	-	-	-	-
CO3	2	1	3	-	-	-	2	-	-	-	-	-	-	-	-
CO4	2	2	3	-	-	-	3	-	-	-	-	-	-	-	-
CO5	2	3	2	-	-	-	3	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food and International Trade [T]
Course Code	VAC-IV [T]

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">2nd</td><td rowspan="2">Semester</td><td rowspan="2">4th</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>2</td><td>0</td><td>0</td><td>2</td></tr>
<tr><td>Course Type</td><td colspan="8">Theory only</td></tr>
<tr><td>Course Category</td><td colspan="8">Interdisciplinary Minor</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Knowledge of Food Laws and regulations</td><td>Co-Requisite/s</td><td colspan="4">knowledge of exports, related policies, tariffs, competition; characteristics of international markets and trade</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- to understand the food production and consumption patterns and trends in India as well as in world(BL1-Remember)
CO2- to acknowledge the characteristics of international markets and trade(BL2-Understand)
CO3- To demonstrate knowledge of exports, related policies, tariffs, competition, etc(BL3-Apply)
CO4- To illustrate the working of various regional trade alliances and markets and implementation of international standards for harmony in food trade(BL4-Analyze)
CO5- to apply for and take benefits of government schemes to promote international trade in food businesses(BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="3">Skill Development ✕
Entrepreneurship ✕
Employability ✕
Professional Ethics ✕
Gender ✕
Human Values ✕
Environment ✕</td><td>SDG (Goals)</td><td colspan="4">SDG1(No poverty)
SDG2(Zero hunger)
SDG3(Good health and well-being)
SDG4(Quality education)
SDG6(Clean water and sanitation)
SDG9(Industry Innovation and Infrastructure)
SDG12(Responsible consuption and production)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	Food production trends in India and world - Different kinds of food industries, their market size and components of food industries; major growing areas of cereals, pulses, fruits, vegetables, milk, tea, coffee, meat, eggs, etc. in India and World. World consumption of food: Patterns and types of food consumption across the globe	Group discussion, lecture method, quiz	06
2	International marketing and international trade, salient features of international marketing; Composition & direction of Indian exports, international marketing environment, Deciding when & how to enter international market, Foreign Exchange markets	lecture method, quiz	06
3	Exports- Direct exports, indirect exports, Licensing, Joint ventures, Direct investment, India's ex-im policy, International trade theories. Absolute advantage, Comparative advantage, Trade tariffs. Subsidies. Quotas. Dumping.	Audio/Video clips, group discussion, lecture method	07
4	Regional trade alliances and markets- OECD, EEU, ASEAN, SAARC, NAFTA And Africa Union, International standards- ISO, Codex Alementarius, FAO, WTO and world trade agreements related to food business	Audio/Video clips, group discussion, lecture method	06
5	Government intervention in the trade of food products; Government institutions related to international food trade: APEDA, MPEDA, Tea Board, Spice Board, MOFPI, etc. Case Study: Food loss in international trade, Indonesia tuna exported to European Union, US, and Japan; Local Food Supply Chains	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	05

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	John Daniels, Lee Radebaugh, Brigham, Daniel Sullivan; International Business by Pearson Education
Articles	
References Books	Aswathappa; International Business by Tata McGraw-Hill Education, New Delhi.
MOOC Courses	https://nptel.ac.in/courses/126105336
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1	1	1	-	1	1	1	-	2	1	2
CO2	2	2	2	2	2	1	1	-	-	-	1	-	2	2	2
CO3	3	3	2	2	2	-	-	1	-	2	1	-	3	3	3
CO4	3	3	3	2	1	1	1	-	1	-	1	-	3	3	3
CO5	3	3	3	2	1	-	-	2	-	1	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Dairy Technology [T]
Course Code	BSFT-0501 [T]

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">3rd</td><td rowspan="2">Semester</td><td rowspan="2">5th</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Embedded theory and lab</td></tr>
<tr><td>Course Category</td><td colspan="8">Discipline Core</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">candidates must have passed class 12 or equivalent from a recognised board with Physics, Chemistry, and Biology/Home Science as compulsory subjects and an overall grade of at least 50%</td><td>Co-Requisite/s</td><td colspan="4">The student should have a basic knowledge of milk.</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- To remember the milk characteristics, handling, processes related to storage, processing and distribution of milk and milk Products (BL1-Remember)
CO2- To understand thescientific principles in the thermal processing technologies, and production of different dairy products(BL2-Understand)
CO3- To provide students an experimental basis and a specialized knowledge and understanding in the development and quality control of milk and dairy products(BL3-Apply)
CO4- Toapply the subject knowledge in future perspectives i.e. such as in research and development in dairy products(BL4-Analyze)
CO5- Toevaluate the real life knowledge gained and properties and implement the same to create new dairy products. (BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="3">Skill Development ✓
Entrepreneurship ✓
Employability ✓
Professional Ethics ✕
Gender ✕
Human Values ✕
Environment ✕</td><td>SDG (Goals)</td><td colspan="4">SDG2(Zero hunger)
SDG3(Good health and well-being)
SDG12(Responsible consuption and production)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	General: Dairy development in India – Dairy Cooperatives – NDRI, NDDB, TCMPF - Operation Flood – Milk and Milk Products Order '92 – Nutritive value of milk ICMR recommendation of nutrients – Milk production in India with reference to Global milk production – Per capita availability of milk in India – Role of milk and milk products in human nutrition.	Lecture methods, ppt.	8
2	Dairy Chemistry: Milk Composition – Physico Chemical properties of milk – Animal, Feed and Environmental factors influencing the composition of milk – Milk lipids, Proteins, Sugar and their biosynthesis, classes and significance – Minerals and Vitamins in Milk – Thermal stability of Milk – Freezing Point depression of Milk.	quiz, lecture, ppt	8
3	Dairy Processing and Technology: Dairy processing – Milk collection, transportation & Grading of milk –Standardization – Pasteurization – Homogenization of milk .Manufacture of dairy products cream– butter – ghee – Ice cream – concentrated and dried milk products. Dairy Plant Operations and Management: Plant layout and design, Piping and equipment design, Maintenance and cleaning procedures, Energy management and waste disposal	Summarizing, Quiz, Tutorials sessions, Expert Lecture	8
4	Dairy Microbiology: Milk and microbes – Common micro organisms in milk – spoilage of milk –Fermentation of milk - Desirable and undesirable fermentation – milk borne Diseases –Milk and Public Health – common starter cultures in dairy industry-their classification.	Lecture methods,Audio/Video clips, group discussion, quiz	8
5	Standards For Milk And Milk Products: Definition of Milk and Milk Products under the PFA Rules, 1955/Food Safety Act 2006 .BIS, PFA standards – Maximum Permissible limits of Aflatoxin, Pesticides, Antibiotic residues and Heavy metals in Milk and Milk Products . Labeling of Milk and Milk Products	Lecture methods, Group discussion, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To perform platform tests in milk.	Experiments	BL2-Understand	2
2	To estimate milk protein by Folin method.	Experiments	BL4-Analyze	2
3	To estimate milk fat by Gerber method.	Experiments	BL5-Evaluate	2
4	Preparation of flavored milk.	Experiments	BL6-Create	2
5	Pasteurization of milk	Experiments	BL3-Apply	2
6	To prepare casein and calculate its yield	Experiments	BL6-Create	2
7	Learning objective To prepare yoghurt from different sources of milk and conduct its sensory evaluation. Learning This project will help students to learn the preparation of yoghurt and also the principle of sensory evaluation	PBL	BL6-Create	2
8	Significance of lactose in industry	Seminar	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	18	40	0

Part E

Books	
Articles	https://www.frontiersin.org/articles/10.3389/fanim.2021.760310/full
References Books	De Sukumar Outlines of Dairy Technology, Oxford University Press, Oxford. 2007. Webb and Johnson, Fundamentals of Dairy Chemistry
MOOC Courses	https://onlinecourses.nptel.ac.in/noc24_ag15/preview
Videos	https://www.youtube.com/watch?v=8MCm0-ncgos&t=4s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	1	-	1	-	1	-	3	1	1
CO2	1	1	2	1	-	-	1	1	-	1	-	-	3	1	1
CO3	2	1	1	1	-	1	-	-	1	-	1	-	3	1	1
CO4	3	2	1	1	1	-	1	1	-	1	-	-	3	3	3
CO5	3	2	2	2	2	2	1	1	1	-	2	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Sensory Evaluation [T]
Course Code	BSFT-0502 [T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Students should have studied food additives and food chemistry			**Co-Requisite/s**	Students should have basic knowledge of characterstics/ attributes of different food products			
Course Outcomes & Bloom's Level	**CO1-** CO1: Illustrate the ability to identify solutions to problems related to the sensory analysis of food and to apply and expand upon the theoretical concepts presented in lectures.**(BL1-Remember)** **CO2-** CO2: Compiles, familiarity and competence with the practical skills and techniques used to analysesthe sensory properties of food. This will include experimental planning, the preparation of suitable samples and the use of instruments e.g., viscometers and color meters, as well as the collection of experimental data and its presentation, statistical analysis and interpretation.**(BL2-Understand)** **CO3-** CO3: State terminology, appropriate to the field of sensory analysis, correctly and contextually.**(BL3-Apply)** **CO4-** CO4: Ability to explain the benefits and limitations of the sensory evaluation of food and be able to recommend, justify and critique commonly used methods of sensory analysis.**(BL4-Analyze)** **CO5-** CO5: To modify foods to meet specified sensory requirements and which are intended to contribute to reducing community health concerns.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to sensory analysis, importance of sensory evaluation in food industries, general testing conditions of sensory evaluation and laboratories. Requirements of sensory laboratory; organizing sensory evaluation program.	Lecture method, audio/video clips, group discussion, quiz	8
2	Selection of sensory panelist, factors affecting sensory evaluation, sensory quality parameters- size and shape, texture, flavor, aroma, color& gloss. Sample Preparation, Factors Influencing Sensitivity and Data	Lecture method, audio/video clips, group discussion, quiz	8
3	Methods of evaluation: Subjective evaluation- preference tests, acceptance tests, hedonic scale, discrimination tests, descriptive tests. Objective evaluation- physical methods & chemical methods, threshold, dilution. Objective evaluation- physical methods; chemical methods.	Lecture method, audio/video clips, group discussion, quiz	8
4	Effect of sensory analysis on food quality & new product development, risk of consumer satisfaction & consumption , product optimization and quality assurance, sensory evaluation and product marketing	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	~~Nutrional Quality of foods: Food proteins (Digestibility, Boilogical Value, (NPU, PER)~~ Computer-aided sensory evaluation of food & beverage, statistical analysis of sensory data - ANOVA; multiple comparisons test; testing hypothesis; level of significance; type I and II errors.	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Use nine-point hedonic scale for sensory evaluation	Experiments	BL2-Understand	2
3	Preparation of dilution sample for sensory evaluation	Experiments	BL3-Apply	2
4	Threshold test in different food products	Experiments	BL3-Apply	2
5	Estimation of crude fibre in the food sample	Experiments	BL4-Analyze	2
6	Estimation of color properties in food sample	Experiments	BL4-Analyze	2
7	Determination of textural changes by different unit operations	Experiments	BL4-Analyze	2
8	Extraction of pomace from fruits	Experiments	BL3-Apply	2
9	Extraction of pigments from fruits and vegetables	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	0

Part E

Books	Potter, N. N., & Hotchkiss, J. H. (2012, December 6). Food Science. Springer Science & Business Media.
Articles	
References Books	Lal, G., Siddappa, G. S., & Tandon, G. L. (1986, January 1). Preservation of Fruits and Vegetables. Sanjeev, S. R. P. K., & Kumar, S. (2002, November 30). Fruit and Vegetable Preservation.
MOOC Courses	https://nptel.ac.in/courses/126103017
Videos	https://www.youtube.com/watch?v=F8jhoaV-nsE&t=1s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	-	1	-	1	-	1	-	-	3	1	1
CO2	3	1	1	-	-	1	-	-	-	-	1	-	3	1	1
CO3	3	2	1	1	-	1	1	-	-	-	-	-	3	1	2
CO4	3	1	3	-	-	1	-	1	-	1	-	-	3	1	2
CO5	3	2	3	-	-	1	-	-	-	-	1	-	3	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Safety Management [T]
Course Code	BSFT-0503 [T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student should have studied food laws and regulations in previous semester.			**Co-Requisite/s**	Student should have basic knowledge of food born safety and handling principles			
Course Outcomes & Bloom's Level	**CO1-** CO1: Comprehend the practical application of food safety and quality assurance in raw and processed foods **(BL1-Remember)** **CO2-** CO2: Conduct the quality assessment of food products using various instruments**(BL2-Understand)** **CO3-** CO3: Recognize the sensory evaluation techniques**(BL3-Apply)** **CO4-** CO4: Illustrate the detection methods of the adulterants in food products**(BL4-Analyze)** **CO5-** CO5: Monitor the implementation of HACCP.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✕ Professional Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	Food Quality: Introduction to food quality management – Definition, quality concepts & attributes-safety, health, sensory, shelf life, extrinsic attributes, factors affecting food behavior, their measurement and evaluation; Sensory and instrumental methods for testing quality Food adulteration and food safety	Lecture method, class presentation, quiz	8
2	~~Food contamination: Contamination in Food Physical, chemical (Heavy metals, pesticide residues, antibiotics, veterinary drug residues, dioxins, environmental pollutants, radio nuclides, solvent residues, chemicals) Natural toxins~~ Quality assurance, Total Quality Management; GMP, GHP; GLP, GAP; Sanitary and hygienic practices; Food Safety and Quality Requirements – BRC, HACCP - critical control points, reliability and recall; Quality manuals, Risk assessment, Contamination and illness. Handling of food, Process validation.	Lecture method, quiz, Illustrate with analogies	8
3	~~The importance and the needs of ethics; Ethical business practices; Laws and ethics; Environmental protection; Creating awareness and safeguarding health of consumers; Fair trade practices. History, concept & evaluation of IPR, Distinction among various forms of IPR, Copyrights and related rights. Patent rights/protection and procedure; Infringement or violation; Properties of Biological materials; Indian Patent Act 1970 and TRIPS; Geographical indication and Industrial design.~~ Indian & International quality systems and standards like ISO; ISO-9000, ISO- 22000, ISO-14000, ISO certification, planning, application, Implementation criteria, requirements, benefits, structure etc.	Lecture method, expert Lecture	8
4	~~Food Laws, standards and regulations :History, National and International laws and Regulations USFDA, EU,Codex alimantarious, World Trade Organization (Sanitary and Phyto Sanitary agreement, Technical Barriers in Trade), Standards of Identity, Standards of Quality, Standards of fill of the container.~~ Food Safety and Standards Act of India, 2006; FSS Rules and Regulations, Global Food safety Initiative; inspection, traceability	Audio/Video clips, group discussion, lecture with ppt, quiz	8

	and authentication, certification and quality assurance, documentation and audits		
5	~~Basic principles and application of processing techniques: Microwave processing, high fructose corn syrup, extrusion cooking, vacuum evaporation, cryogenic freezing, reverse osmosis, electro dialysis, ultrafilteration, microfiltration, supercritical fluid extraction, fat mimetic, flavor encapsulation, use of nano technology in foods etc.~~ International Food Control Systems/Laws, Regulations and Standards/Guidelines with regard to Food Safety– (i) Overview of CODEX Alimentarius. Commission (Members, Standard setting and Advisory mechanisms: JECFA, JEMRA, JMPR): EFSA, WTO agreements (SPS/TBT).	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Luning, P. A., & Marcelis, W. J. (2020, January 1). Food Quality Management. Brill Wageningen Academic.
Articles	
References Books	Branen, A. L., Davidson, P. M., Salminen, S., & Thorngate, J. (2001, November 1). Food Additives. CRC Press. Fortin, N. D. (2016, October 25). Food Regulation. John Wiley & Sons.
MOOC Courses	https://nptel.ac.in/courses/110101010
Videos	https://youtu.be/h5NpTku5BGc?si=yJ2vI7colx6fR5cr

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	-	1	-	1	1	-	3	1	1
CO2	3	1	1	-	-	1	-	-	-	1	-	-	3	1	1
CO3	3	2	1	1	1	1	1	-	1	1	-	-	3	1	1
CO4	3	2	2	-	-	2	-	-	-	1	-	-	3	1	2
CO5	3	2	2	1	1	2	1	1	1	1	1	-	3	1	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Extrusion Technology [T]
Course Code	DSE I- BSFT-0504a

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Knowledge of food processing technologies			**Co-Requisite/s**	Processing of different extruded products and selection of food extrusion equipment.			
Course Outcomes & Bloom's Level	**CO1-** To remember the fundamentals, design considerations, processing of different extruded products and selection of food extrusion equipment.**(BL1-Remember)** **CO2-** To understand the suitability of raw materials, preconditioning, process variables and extruder types for extrusion and its impact on extrusion process, rheological behaviour and product quality**(BL2-Understand)** **CO3-** To analyse the chemical and nutritional changes occurring in extrusion process and packaging requirement of extruded products**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as value added healthy extruded products**(BL4-Analyze)** **CO5-** To apply the subject knowledge in future perspectives i.e. such as value added healthy extruded products**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Food Extrusion: Definition, introduction to extruders, principles and types, Uses of extruders in the food industry, Pre-conditioning of raw materials used in extrusion process, structural changes during process, Extruder Selection, Design, and Operation for industrial food applications	Lecture method, quiz, seminar	10
2	Single screw extruder: Principle of working, Net Flow, Operations, manufacturing of pasta and vermicelli. Twin screw extruder: Counter rotating and co-rotating twin screw extruder, Process characteristics of the twin screw extruder, Rheological Properties of Materials During the Extrusion Process, Advantages of Twin Screw Extruder.	Lecture method, group discussion,	10
3	Breakfast cereals by extrusion technology: Classification of Breakfast cereals: Raw materials, process and quality testing for Ready to eat breakfast cereals, defects Texturized vegetable protein: Definition, Manufacturing process and quality parameters of TVP, defects	Lecture method,Illustrate with analogies	10
4	Effect of extrusion on food products: Chemical and nutritional changes in food during extrusion, factors affecting extrusion, Packaging materials for extruded product	Audio/videos, Quiz, Illustrate with analogies, expert lecture	06
5	Recent Advances in extrusion technology: Carbon dioxide or Nitrogen assisted extrusion technology, Extrusion in confectionary technology, Non-thermal Extrusion of Protein Products	Audio/videos, Quiz, Illustrate with analogies, expert lecture	09

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Introduction of food extruders components and their functions	Experiments	BL3-Apply	2
2	Determination of starch content in cereal flour	Experiments	BL4-Analyze	2
3	Determination of degree of gelatinization in cereal extrudates	Experiments	BL4-Analyze	2
4	Determination of quality parameters for available commercial extruded snack product	Experiments	BL4-Analyze	2
5	Effect of feed moisture content on extrudate food product characteristic	Experiments	BL4-Analyze	2
6	Effect of extruder screw speed and barrel temperature on extrudate food product characteristics	Experiments	BL4-Analyze	2
7	Effect of fiber rich ingredient on extrudate food product characteristics	Experiments	BL4-Analyze	2
8	Effect of fat addition on extrudate product characteristics	Experiments	BL4-Analyze	2
9	Texture profile analysis of extruded product	Experiments	BL4-Analyze	2
10	Studies on development of weaning food by extrusion technology	PBL	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	30	40	

Part E

Books	N.D. Frame; Technology of Extrusion Cooking
Articles	
References Books	Maskan and Altan; Advances in Food Extrusion Technology
MOOC Courses	https://nptel.ac.in/courses/126105015
Videos	https://youtu.be/k1a2PSEXahM

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1	-	1	1	1	-	-	-	3	2	1
CO2	2	2	1	2	-	1	1	1	-	1	-	-	3	2	2
CO3	3	2	1	2	1	1	2	1	-	1	-	-	3	3	3
CO4	3	2	2	2	-	1	2	2	-	1	-	-	3	3	3
CO5	3	2	2	3	1	-	2	2	1	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Processing of fish and Marine Products [T]
Course Code	DSE I- BSFT-0504b

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">3rd</td><td rowspan="2">Semester</td><td rowspan="2">5th</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>1</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Embedded theory and lab</td></tr>
<tr><td>Course Category</td><td colspan="8">Discipline Specific Elective</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Knowledge of livestock product technology</td><td>Co-Requisite/s</td><td colspan="4">To understand handling of fresh fish and principles of fish preservation and processing</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- To recognize the handling of fresh fish and principles of fish preservation and processing(BL1-Remember)
CO2- To describe the quality control standards, packaging requirements and safety guidelines followed in marine products' processing industry. (BL2-Understand)
CO3- To analyse the chemical and nutritional changes occurring in marine foods processing and utilization of by-products(BL3-Apply)
CO4- To illustrate the subject knowledge in future perspectives i.e. such as skills for the preparation of various fish value added and by-products(BL4-Analyze)
CO5- To appraise the practical knowledge gained and implement the same to create sea foods based novel products for healthier lifestyle.(BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="2">Skill Development ✓
Entrepreneurship ✕
Employability ✓
Professional Ethics ✕
Gender ✕
Human Values ✕
Environment ✕</td><td>SDG (Goals)</td><td colspan="5">SDG3(Good health and well-being)
SDG6(Clean water and sanitation)
SDG9(Industry Innovation and Infrastructure)
SDG12(Responsible consuption and production)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Fish, crustaceans, molluscs, algae and others: their composition and types; Fish muscle structure, myofibriller protein and their role in elasticity formation, handling, sanitation and post mortem changes; status of marine food products industry in India and world, and MPEDA, Major fisheries industries.	Lecture Method	08
2	Fish and shellfish: - Cleaning, chilling, freezing, canning, drying, curing, use of fish preservatives, exposure to gamma rays, marinating, canning, fermentation, Hurdle technology in fish preservation and processing	Lecture Method, Quiz, Illustrate with analogies	09
3	By-products Fish meal –production methods, packaging and storage. Fish oil – body oil and liver oil: extraction, purification and preservation, Fish protein concentrate, Fish hydrolysate, partially hydrolyzed and deodorized fish meat, functional fish protein concentrate and their incorporation to various products. Introduction to Inland Fish Studies: Importance of inland fisheries, Overview of freshwater ecosystems, Fisheries management and conservation	Lecture Method, Quiz, Illustrate with analogies	10
4	Value added products Diversified fish products: Fish and prawn pickles, fish sauce, fillets, fish ham, etc., Battered and braided products like fish finger, fish cutlet, fish wafer, and fish soup powder etc. and imitation products. Packing and labeling of marine products, their cold storages and export of products	Lecture Method, Quiz, Illustrate with analogies	09
5	Safety HACCP in safe marine products production, Determining the quality assurance of marine products, Microbiological and biological hazards associated with fish and fishery products-marine toxins-shellfish toxins, scombroid toxins, ciguatera toxins and puffer fish toxins; mycotoxins, parasites and viruses	Lecture Method, Quiz, Illustrate with analogies	09

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Estimation of moisture and ash (including acid soluble) content in fish sample	Experiments	BL4-Analyze	2
2	Estimation of crude protein in fish sample	Experiments	BL4-Analyze	2
3	Estimation of fat content and determination of energy value of fish.	Experiments	BL4-Analyze	2
4	Estimation of salt content in canned fish	Experiments	BL4-Analyze	2
5	Estimation of freshness quality indices of fish	Experiments	BL4-Analyze	2
6	Determination of in-vitro digestibility of fish	Experiments	BL4-Analyze	2
7	Preparation of dried and smoked fish	PBL	BL6-Create	2
8	Preparation of fermented fish sauce	PBL	BL6-Create	2
9	Preparation of surimi and surimi based products	PBL	BL6-Create	2
10	Extraction of fish body oil	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	

Part E

Books	
Articles	
References Books	Gopakumar K.- Text Book of Fish Processing Technology. ICAR Chandran, K.K; Post Harvest Technology of Fish and Fishery Products
MOOC Courses	https://nptel.ac.in/courses/110105139
Videos	https://youtu.be/i5VwdkggtWU?si=cj7YxKM2pdpsbU2R

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	-	1	-	-	1	-	2	2	1
CO2	2	2	2	2	1	1	-	-	1	1	-	-	2	2	1
CO3	2	2	2	2	1	1	1	-	1	-	-	-	3	2	2
CO4	3	3	2	2	2	1	1	-	-	-	-	-	3	3	2
CO5	3	3	3	2	2	1	-	1	-	-	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Industrial training
Course Code	IAPC I

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					0	0	4	4
Course Type	Project							
Course Category	Projects and Internship							
Pre-Requisite/s	Deep knowledge of all disciple core subject of Food Technolgy program			**Co-Requisite/s**	Presentation of research project/ internship			
Course Outcomes & Bloom's Level	**CO1-** Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility**(BL1-Remember)** **CO2-** Identify the needs and problem of the community and involve them in problem solving.**(BL2-Understand)** **CO3-** Utilize their knowledge in finding practical solution to individual and community problem**(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
300	0	300	0	0	0

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	3	2	2
CO2	-	-	-	-	-	-	-	-	-	-	-	-	3	2	3
CO3	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO4	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Cooperation Marketing & Finance
Course Code	SEC V

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Specialization Elective Courses							
Pre-Requisite/s	Student Should acquainted with the basic knowledge of entrepreneurship and supply chain			**Co-Requisite/s**	Student Should acquainted with the basic knowledge of business and startups			
Course Outcomes & Bloom's Level	**CO1-** CO1: Communicate with required clarity ensuring that the information communicated is clear and accurate**(BL1-Remember)** **CO2-** CO2: Comprehend and apply basic computer working, basic operating system and uses internet services to get accustomed & take benefit of IT developments in the industry. **(BL2-Understand)** **CO3-** CO3: To demonstrate knowledge of entrepreneurship and identify establishment for supporting the development of businesses/entrepreneurship.**(BL3-Apply)** **CO4-** CO4: To illustrate procedures to achieve a safe working environment in line with occupational health, safety, environment regulations.**(BL4-Analyze)** **CO5-** CO5: Comply time management technique in day-to-day work**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Concept of Entrepreneurship Definition of Entrepreneurship given by various economists the ideal definition –The conceptual model of Entrepreneurship given by John Kao. Views given by Schumpeter Walker & Drucker on Entrepreneurship - Entrepreneur and Manager -Enterprise and Entrepreneur. Managing Creativity Issues to be addressed in working the definition of creativity –Definition -Attributes of a creative person - Creative Thinking and Motivation - Managing Creativity - Organizational Actions that enhance and hinder Creativity - Organizational priorities and Creativity - Managerial responsibilities in a creative organization	Lecture method, audio/Video clips, group discussion, quiz	8
2	Definition of Small Business - Composition of Small Business- Economic Contribution of Small Business. Strategic Planning for Small Business -Steps in Strategic Planning - Develop a clear Mission Statement -Assess Organization Strengths - Conduct a thorough Market Segment Analysis -Analyze Competitors - Create Company Goals - Formulate Strategic Options and Select appropriate Strategies (Focus, Cost leadership & Differentiation) - Translate Strategic Plans into Action Plans-Establish accurate Controls. Why Strategic Planning fails in Small Business. Forms of Ownership: Sole Proprietorship, Partnership& Corporation form of Organization - Advantages and Disadvantages, Franchising- What is Franchising - Advantages and Disadvantages to Franchising - Franchise Evaluation Checklist –Franchise contracts - Types of Franchise arrangements.	lecture method, audio/video clips, group discussion, quiz	8
3	Introduction: Project - definition, features, types, infrastructure creation-a special type of projects, significance of infrastructure in economic development, bottlenecks in the infrastructure creation, Project Identification: Idea generation, Project screening, Feasibility study. The advantages and disadvantages of starting your business – The advantages and disadvantages of buying all existing business – Critical areas to be examined while buying all existing business - Determining the value of a business – Financial Record Keeping – Profit Planning & Cost Control, Project costing: Breakdown structure of the project, cost estimation of the project, factor affecting the cost of the project, Costing with alternative configurations/specifications. Project Appraisal: technical appraisal, marketing appraisal, legal and environment appraisal, financial appraisal- cost estimation of the project and evaluating	Audio/Video clips, group discussion, lecture with ppt, quiz	8

	project using pay back and NPV, Detailed project report – introduction, Introduction to SCBA.		
4	Arrangement of funds: Traditional sources of financing – Equity shares, preference shares, Debentures/bonds, loan from financial institutionsLoan syndication and consortium finance; Alternative sources of financing- Foreign Issue, FDI & FII, ECB, Private equity, Securitization, BOT projects, PPP, Venture capital / Incubation fund, Franchising etc;	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Role played by various Financial Institutions like IDBI, ICICI and IFCI: Special Role played by SIDBI and Commercial Banks – Approval of term loan applications by Commercial Banks – How to decide about a suitable agency for assistance Role played by SFCR and NSIC; Project Implementation: Project contracts – Principles, practical aspects of contacts, legal aspects of project management, global tender, Negotiation for projects, Project insurance, Human resource management, network analysis	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Scarborough, N. M., Wilson, D. L., & Zimmerer, T. (2009, January 1). Effective Small Business Management.
Articles	
References Books	Desai, V. (2001, January 1). Dynamics of Entrepreneurial Development and Management.
MOOC Courses	https://nptel.ac.in/courses/110106141
Videos	https://www.youtube.com/watch?v=N3-FZn_iQFU&t=3s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	2	-	1	1	-	1	-	3	1	1
CO2	3	1	1	-	1	2	1	1	-	1	-	-	3	1	2
CO3	3	1	1	2	-	1	-	1	-	1	2	-	3	1	2
CO4	3	2	1	-	-	-	1	2	1	-	-	-	3	1	3
CO5	3	2	2	2	1	1	1	2	1	2	2	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Supply chain Management [T]
Course Code	SEC V [T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Specialization Elective Courses							
Pre-Requisite/s	Student Should acquainted with the basic knowledge of entrepreneurship and supply chain			**Co-Requisite/s**	Student Should acquainted with the basic knowledge of business and startups			
Course Outcomes & Bloom's Level	**CO1-** CO1: Communicate with required clarity ensuring that the information communicated is clear and accurate**(BL1-Remember)** **CO2-** CO2: Comprehend and apply basic computer working, basic operating system and uses internet services to get accustomed & take benefit of IT developments in the industry. **(BL2-Understand)** **CO3-** CO3: To demonstrate knowledge of entrepreneurship and identify establishment for supporting the development of businesses/entrepreneurship.**(BL3-Apply)** **CO4-** CO4: To illustrate procedures to achieve a safe working environment in line with occupational health, safety, environment regulations.**(BL4-Analyze)** **CO5-** CO5: Comply time management technique in day-to-day work**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours
1	Concept of Entrepreneurship Definition of Entrepreneurship given by various economists the ideal definition –The conceptual model of Entrepreneurship given by John Kao. Views given by Schumpeter Walker & Drucker on Entrepreneurship - Entrepreneur and Manager -Enterprise and Entrepreneur. Managing Creativity Issues to be addressed in working the definition of creativity –Definition -Attributes of a creative person - Creative Thinking and Motivation - Managing Creativity - Organizational Actions that enhance and hinder Creativity - Organizational priorities and Creativity - Managerial responsibilities in a creative organization	Lecture method, audio/Video clips, group discussion, quiz	8
2	Definition of Small Business - Composition of Small Business- Economic Contribution of Small Business. Strategic Planning for Small Business -Steps in Strategic Planning - Develop a clear Mission Statement -Assess Organization Strengths - Conduct a thorough Market Segment Analysis -Analyze Competitors - Create Company Goals - Formulate Strategic Options and Select appropriate Strategies (Focus, Cost leadership & Differentiation) - Translate Strategic Plans into Action Plans-Establish accurate Controls. Why Strategic Planning fails in Small Business. Forms of Ownership: Sole Proprietorship, Partnership& Corporation form of Organization - Advantages and Disadvantages, Franchising- What is Franchising - Advantages and Disadvantages to Franchising - Franchise Evaluation Checklist –Franchise contracts - Types of Franchise arrangements.	lecture method, audio/video clips, group discussion, quiz	8
3	Introduction: Project - definition, features, types, infrastructure creation-a special type of projects, significance of infrastructure in economic development, bottlenecks in the infrastructure creation, Project Identification: Idea generation, Project screening, Feasibility study. The advantages and disadvantages of starting your business – The advantages and disadvantages of buying all existing business – Critical areas to be examined while buying all existing business - Determining the value of a business – Financial Record Keeping – Profit Planning & Cost Control, Project costing: Breakdown structure of the project, cost estimation of the project, factor affecting the cost of the project, Costing with alternative configurations/specifications. Project Appraisal: technical appraisal, marketing appraisal, legal and environment appraisal, financial appraisal- cost estimation of the project and evaluating	Audio/Video clips, group discussion, lecture with ppt, quiz	8

	project using pay back and NPV, Detailed project report – introduction, Introduction to SCBA.		
4	Arrangement of funds: Traditional sources of financing – Equity shares, preference shares, Debentures/bonds, loan from financial institutionsLoan syndication and consortium finance; Alternative sources of financing- Foreign Issue, FDI & FII, ECB, Private equity, Securitization, BOT projects, PPP, Venture capital / Incubation fund, Franchising etc;	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Role played by various Financial Institutions like IDBI, ICICI and IFCI: Special Role played by SIDBI and Commercial Banks – Approval of term loan applications by Commercial Banks – How to decide about a suitable agency for assistance Role played by SFCR and NSIC; Project Implementation: Project contracts – Principles, practical aspects of contacts, legal aspects of project management, global tender, Negotiation for projects, Project insurance, Human resource management, network analysis	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

Part E

Books	Scarborough, N. M., Wilson, D. L., & Zimmerer, T. (2009, January 1). Effective Small Business Management.
Articles	
References Books	Desai, V. (2001, January 1). Dynamics of Entrepreneurial Development and Management.
MOOC Courses	https://nptel.ac.in/courses/110106141
Videos	https://www.youtube.com/watch?v=N3-FZn_iQFU&t=3s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	2	-	1	1	-	1	-	3	1	1
CO2	3	1	1	-	1	2	1	1	-	1	-	-	3	1	2
CO3	3	1	1	2	-	1	-	1	-	1	2	-	3	1	2
CO4	3	2	1	-	-	-	1	2	1	-	-	-	3	1	3
CO5	3	2	2	2	1	1	1	2	1	2	2	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food product/processing waste management [T]
Course Code	BSFT-0601 [T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Student should have studied subjects- processing of cereals and pulses, fruits and vegetables, technology of flesh foods, dairy technology in the previous semesters			**Co-Requisite/s**	Student should have basic knowledge of waste generation and managemnet from different sectors of food industry			
Course Outcomes & Bloom's Level	**CO1-** CO1: Identify various wastes and by-products from food industries and understand their characteristics **(BL1-Remember)** **CO2-** CO2: To describe the various methods of waste treatment and disposal as well as utilization of by-products in food and non-food sectors**(BL2-Understand)** **CO3-** CO3: To analyze the importance of recycling, disposing methods and valorization of food industry waste **(BL3-Apply)** **CO4-** CO4: To apply the legal aspects related to food and packaging waste disposal.**(BL4-Analyze)** **CO5-** CO5: To design and develop a functional ETP or waste utilization approaches to suit requirement of food and environment. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Classification and characterization of food industrial wastes from fruit and vegetable processing industry, beverage industry, fish, meat and poultry industry, sugar industry and dairy industry.	Lecture method, Quiz, group discussion	8
2	Waste disposal methods –physical, chemical and biological; Economical aspects of waste treatment and disposal.	lecture method, Quiz	8
3	Treatment methods for liquid wastes from food process industries; Design of activated sludge process, Rotating biological contactors, Trickling filters, UASB, Biogas plant.	Lecture ethod, expert lecture, Quiz	8
4	Treatment methods of solid wastes: Biological composting, drying and incineration; Design of solid waste management system: Landfill digester, Vermicomposting pit.	Audio-video clips, lecture method quiz	8
5	Bio filters and bio clarifiers, Ion exchange treatment of waste water, Drinking-water treatment, Recovery of useful materials from effluents by different methods.	Lecture method, audio-video clips, industrial visit	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Production of Banana fiber from banana pseudo-stem	Experiments	BL3-Apply	2
2	Production of ethyl alcohol from molasses	Experiments	BL4-Analyze	2
3	Extraction of polyphenols from fruit and vegetable peels	Experiments	BL4-Analyze	2
4	Isolation of starch from mango kernels	Experiments	BL4-Analyze	2
5	Extraction of pectin from fruit waste	Experiments	BL4-Analyze	2
6	Extraction of oil from citrus peel	Experiments	BL4-Analyze	2
7	Preparation of candied orange peel	Experiments	BL3-Apply	2
8	Preparation of fiber rich cookies	PBL	BL3-Apply	3

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	18	40	0

Part E

Books	Wang, L. K., Hung, Y. T., Lo, H. H., & Yapijakis, C. (2005, September 29). Waste Treatment in the Food Processing Industry.
Articles	
References Books	Green, J. H., & Kramer, A. (1979, January 1). Food Processing Waste Management. A V I Publishing Company.
MOOC Courses	https://nptel.ac.in/courses/105105350
Videos	https://www.youtube.com/watch?v=Ee8RqLKgGUg&t=1s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	-	1	1	2	1	1	1	-	3	1	1
CO2	2	1	1	1	1	-	1	-	1	-	-	-	3	1	2
CO3	3	1	1	-	-	1	-	2	1	1	-	-	3	1	2
CO4	3	2	1	1	1	2	1	-	-	-	2	-	3	2	3
CO5	3	2	1	1	1	2	-	1	-	1	1	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Laws and Regulations [T]
Course Code	BSFT-0602 [T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Knowledge of food laws and regulations			**Co-Requisite/s**	Understand the different Indian and International food laws and their importance			
Course Outcomes & Bloom's Level	**CO1-** To understand the different Indian and International food laws and their importance **(BL1-Remember)** **CO2-** To learn the different adulterants and hazards and their safety measures **(BL2-Understand)** **CO3-** To provide the students a specialized knowledge about implementation of different safety tools and regulation in food industry to produce safe products **(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. Retail standards and other regulatory agencies and their importance in controlling the operations. **(BL4-Analyze)** **CO5-** To evaluate the theoretical knowledge in Food safety regulations and their implementation in food industry to ensure the quality and safety of the foods **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Concept and meaning trends in Food quality and food Safety, food adulteration, food hazards, Natural toxins. Concept, need and importance of food laws, standards and regulations. Food labelling	Lecture method, Quiz, Illustrate with analogies	06
2	Food Safety and Standards (FSS) Act, 2006, FSSA Rules and Regulations-2011, Provision, definitions and different sections of the Act and implementation, Role, Functions, Structure, Initiatives- Eat Right India, Food Fortification, Clean Street Food Hub, RUCO and various other social and behavioural change initiatives	Lecture method, Quiz, Illustrate with analogies	10
3	Essential Commodities Act, 1955, Export (Quality Control & Inspection) Act, 1963, Foreign Trade Policy, Plant and Animal Quarantine, Bureau of Indian Standards (BIS) and Agricultural Produce (Grading and Marketing) Act, (1937) - Implementation criteria, requirements, structure, jurisdiction, and applications, Atomic Energy (Radiation. Processing of Food and Allied Products) Rules, 2012	Lecture method,Expert Lecture	10
4	International Organizations – FAO (Food & Agriculture Organization), WHO (World Health Organization), Codex Alimentarius Commission (CAC), WTO and its agreements - Role of these agencies in trade, food control, food supply managements, tariff etc	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	Food and BRC/IOP standards and International Food standards. Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), AOAC, OIE, EU	Audio/Video clips, group discussion, lecture with ppt, quiz	09

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Patricia A. Curtis; Food Laws and Regulations by Blackwell publisher
Articles	
References Books	Kiron Prabhakar; A Practical Guide to Food Laws and Regulations ISA; HACCP & ISO-22000. ISO9000-01
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	1	1	1	1	1	-	1	2	1
CO2	1	2	1	2	1	1	2	1	2	1	-	-	1	2	1
CO3	2	2	2	2	2	1	2	2	2	1	1	-	2	3	2
CO4	2	3	2	2	2	2	1	1	2	1	-	-	2	3	2
CO5	3	3	3	2	3	2	1	2	1	1	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food Packaging [T]
Course Code	BSFT-0603 [T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have studied about different food products, and their physiochemical properties			**Co-Requisite/s**	Student should have basic knowledge of food and its types.			
Course Outcomes & Bloom's Level	**CO1-** CO1: comprehend advance knowledge on the properties and production of various packaging materials and effect of various indicators used in supply chain management to indicate the food quality **(BL1-Remember)** **CO2-** CO2: Generalize various types of scavengers and emitters for improving the food shelf life.**(BL2-Understand)** **CO3-** CO3: Demonstrate new packaging systems and safety and legislative requirements**(BL3-Apply)** **CO4-** CO4: Acquaint about food-package interaction between package-flavour, gas storage systems for food storage, recycling and use of green plastics for reducing the pollution and their effect on food quality.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	~~Different packaging materials- paper, glass, plastics and metal. Cans and canning process~~ Concept and meaning trends in Food quality and food Safety, food adulteration, food hazards, Natural toxins. Concept, need and importance of food laws, standards and regulations. Food labelling	Lecture method, audio/video clips, group discussion, quiz	8
2	Rotatable plastic packaging. Modified atmospheric packaging- reasons, requirement, application for different food, limitation. Control atmospheric packaging. Vacuum packaging.	Lecture method, audio/video clips, group discussion, quiz	8
3	Packaging of different foods: requirement and application; Red meat, fish, poultry, eggs, milk and milk products, cereal product, bakery and confectionary products, fruits and vegetables: fresh and processed, oils and fats.	Lecture method, audio/video clips, group discussion, quiz	8
4	Edible packaging, Microwavable packaging, Intelligent packaging, Active packaging, Aseptic packaging: principles and requirements.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Testing of packaging material, Designing of Food Packages. Barcode labeling. Informant printing on the package. Packaging laws and regulation.	Audio/Video clips, group discussion, lecture with ppt, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Identification of different types of packaging and packaging materials	Experiments	BL3-Apply	2
2	To perform different destructive tests for glass containers	Experiments	BL4-Analyze	2
3	Measurement of thickness of packaging materials	Experiments	BL4-Analyze	2
4	Determination of water-vapour transmission rate	Experiments	BL4-Analyze	2
5	Testing of chemical resistance of packaging materials	Experiments	BL4-Analyze	2
6	To perform sterilization of different packaging materials	Experiments	BL4-Analyze	2
7	To determine leakage of plastic pouches	Experiments	BL4-Analyze	2
8	To determine the basis weight, density and grammage of paper and paper board	Experiments	BL4-Analyze	2
9	To determine the wax content in given sample of wax paper	Experiments	BL4-Analyze	2
10	Visit to relevant industries	Industrial Visit	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	0
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	30	40	

Part E

Books	Paine, F. A., & Paine, H. Y. (2012, December 6). A Handbook of Food Packaging. Springer Science & Business Media.
Articles	
References Books	Sacharow, S., & Griffin, R. C. (1980, January 1). Principles of Food Packaging. Avi Publishing Company.
MOOC Courses	https://nptel.ac.in/courses/127106237
Videos	https://www.youtube.com/watch?v=0b3As1QHvk8

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	-	-	1	-	1	-	1	-	3	1	1
CO2	3	1	1	1	1	-	1	-	-	1	-	-	3	1	1
CO3	3	1	1	-	-	-	2	1	-	2	2	-	3	1	2
CO4	3	2	1	1	1	-	2	-	1	-	-	-	3	1	2
CO5	3	2	1	-	-	1	2	1	2	1	2	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Flavor Technology [T]
Course Code	DSE II- BSFT-0604a

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Knowledge of food chemistry and food additives			**Co-Requisite/s**	Study of flavour compounds present in different food products			
Course Outcomes & Bloom's Level	**CO1-** To understand the flavour compounds involved in development of flavor**(BL1-Remember)** **CO2-** To learn the applications of the analytical techniques involved in flavor analysis**(BL2-Understand)** **CO3-** To provide the students a specialized knowledge about synthesis and formulation of flavours from natural sources and chemical reactions**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in food processing and sensorial evaluation of flavors.**(BL4-Analyze)** **CO5-** To evaluate the theoretical knowledge in different commercialized products and implement the same to create processed and value added food products.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being)				

Part B

Modules	Contents	Pedagogy	Hours
1	Flavour: Introduction, Sources of flavours (natural, processed and added), Flavour composites (natural, semi-synthetic and synthetic), chemical compounds responsible for flavor in food	Lecture method, Quiz, Illustrate with analogies	05
2	Chemical compound classes and their flavour responses; flavour development during biogenesis, flavour development during food processing from carbohydrates, proteins and lipids (Maillard reaction and oxidation); use of biotechnology to develop flavours.	Lecture method, Quiz, Illustrate with analogies	08
3	Spices and spice-based products as flavours, Plantation crops as flavours, tea, coffee, cocoa and vanilla. Formulations of flavours, Flavour emulsions, Flavours production in fermented foods, bakery products and fruits and vegetables, Off-flavours in foods.	Lecture method, Expert Lecture	11
4	Microcapsule system and Encapsulation techniques for flavours; Analysis of flavours, GC, E-nose, E-tongue; Instrumental analysis; sample handling and artifacts; data handling, packaging and flavor compounds interactions	Audio/Video clips, group discussion, lecture with ppt, quiz	11
5	Sensory evaluation of flavours, selection of flavourist, Gustation and Olfaction, gustatory receptors, Types of taste and their perception, perception of odour in mouth and nose	Audio/Video clips, group discussion, lecture with ppt, quiz	05

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To extract the flavor from different spices and condiments	Experiments	BL3-Apply	
2	To perform different sensory evaluation tests to examine the extracted flavors	Experiments	BL4-Analyze	
3	To study the biochemical composition of flavor extract using FTIR.	Experiments	BL4-Analyze	
4	To formulate the flavor and use in value added food product.	Experiments	BL4-Analyze	
5	To encapsulate the flavor compounds using gums or protein concentrates.	Experiments	BL4-Analyze	
6	To study the off-flavours in fruits,vegetables and meats.	Field work	BL4-Analyze	
7	To prepare oleoresins and essential oil from food sources.	PBL	BL6-Create	
8	To determine the antioxidant properties of essential oil and oleoresins.	Experiments	BL5-Evaluate	
9	To visit a commercial perfumery/food flavors production plant.	Industrial Visit	BL3-Apply	

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	

Part E

Books	Burdock GA.,Fenaroli's Handbook of Flavor Ingredients.. CRC Press.
Articles	
References Books	Deibler D & Delwiche J., Handbook of Flavor, Characterization: Sensory Analysis, Chemistry and Physiology by Marcel Dekker Taylor A., Food Flavour Technology by Sheffield Academic Press.
MOOC Courses	https://nptel.ac.in/courses/126105027
Videos	https://youtu.be/Dm3yP7FF4nI?si=r8-_Sr9sCIf8HpkQ

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	1	1	1	1	-	-	1	1	1
CO2	1	2	1	1	2	1	1	1	-	1	1	-	2	2	1
CO3	2	2	2	2	2	1	2	1	1	1	-	-	2	2	1
CO4	2	3	2	2	1	2	1	1	-	1	2	-	3	3	2
CO5	3	3	3	2	1	2	1	1	1	1	2	-	3	3	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Vegetable & dairy fat rich product [T]
Course Code	DSE II- BSFT-0604b

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Knowledge of fat rich food products			**Co-Requisite/s**	To understrand production, classification, and packaging parameters of fat based food products			
Course Outcomes & Bloom's Level	**CO1-** To remember various fat-rich dairy products in India and abroad**(BL1-Remember)** **CO2-** To study the lipid profile of dairy products **(BL2-Understand)** **CO3-** Understanding the production, classification, and packaging parameters of cream-based products**(BL3-Apply)** **CO4-** Recall the butter making process and understanding the compositional difference among butter, fat spread and margarine **(BL4-Analyze)** **CO5-** To evaluate the quality of fat rich dairy products based on lipid profile**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consuption and production)					

Part B

Modules	Contents	Pedagogy	Hours
1	Status and types of vegetable and dairy fat rich products in India and abroad: Cream, Butter, Fat spreads, Cream and butter powder, Ghee, Butteroil, Vegetable Oils, Margarine, Shortening, Vegan Butter, Vegetable Cream, Vegetable-based Spreads. Status of lipids in milk- General Composition of Milk Fat, Fatty acid profile of milk fat, Cholesterol, Phospholipids, physico-chemical properties of buffalo and cow milk fat	Lecture method	06
2	Traditional Indian Dairy Products- Khoa and khoa based sweets, Chhana and Chhana based sweets, Dahi/Misti Dahi, Chakka/Maska and Shrikhand, Kheer and Payasam, basundi, Product description methods of manufacture, and packaging processes	Lecture method, Quiz, Illustrate with analogies	10
3	Vegetables fat Products- Vegetable Oils: Olive oil, Canola oil, Sunflower oil, Soybean oil, Corn oil, Coconut oil, Palm oil. Margarine, Shortening, Vegan Butter, Vegetable Cream, Vegetable-based Spreads Product description methods of manufacture, and packaging processes.	Lecture method, Quiz, Illustrate with analogies	08
4	Butter- Composition and Classification of butter, Processing, Packaging, Storage and Distribution. Butter related products- Whipped Butter, Whey Butter, Flavoured Butter, processing, packaging and storage. Fat spreads- Classification, manufacturing process, applications. Margarine- Definition, manufacturing process and uses.	Audio/Video clips, group discussion, Lecture method	08
5	Ghee- Definition, standards and composition, Methods of Preparation, packaging, and storage. Butter oil- Definition, Methods of Preparation, Packaging and Storage Adulteration in fat-rich vegetable & dairy products	Audio/Video clips, group discussion, Lecture method	08

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To study the working principle of cream separator	Experiments	BL4-Analyze	2
2	Production of table cream	Experiments	BL4-Analyze	2
3	Analysis of cream	Experiments	BL6-Create	2
4	Neutralization of sour cream for butter-making	Experiments	BL5-Evaluate	2
5	Preparation of Khoa	Experiments	BL6-Create	2
6	Preparation of kulfi	PBL	BL6-Create	2
7	Preparation of ghee from cream	PBL	BL6-Create	2
8	Chemical analysis of ghee	Experiments	BL4-Analyze	2
9	Detection of adulteration in dairy products	PBL	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	30	40	

Part E

Books	Thompkinson, D.K.- Fat Rich Dairy Products
Articles	
References Books	Adriano Gomes Da Cruz, Chaminda Senaka Ranadheera, Filomena Nazzaro, Amir Mortazavian; Dairy Foods: Processing, Quality, and Analytical Techniques
MOOC Courses	https://nptel.ac.in/courses/126105027
Videos	https://youtu.be/Dm3yP7FF4nI?si=WdEESMsiMAV1iGpP

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	1	-	1	-	1	-	-	-	2	2	2
CO2	2	2	1	2	1	1	-	-	-	1	-	-	2	3	2
CO3	3	2	2	2	1	1	1	1	-	-	1	-	3	3	2
CO4	3	3	2	2	1	-	1	-	-	1	-	-	3	3	3
CO5	3	3	3	2	1	1	1	-	1	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Industrial training
Course Code	IAPC II

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					0	0	4	4
Course Type	Project							
Course Category	Projects and Internship							
Pre-Requisite/s	Deep knowledge of all disciple core subject of Food Technolgy program			**Co-Requisite/s**	Presentation of research project/ internship			
Course Outcomes & Bloom's Level	**CO1-** Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility**(BL1-Remember)** **CO2-** Identify the needs and problem of the community and involve them in problem solving.**(BL2-Understand)** **CO3-** Utilize their knowledge in finding practical solution to individual and community problem**(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
300	0	300	0	0	0

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	-	1	-	-	-	-	3	2	2
CO2	1	2	1	1	-	1	-	-	-1	-	-	-	3	2	3
CO3	1	2	1	1	1	-	-	-	-	-	-	-	3	3	3
CO4	2	2	1	1	-	-	1	-	-	-	-	-	3	3	3
CO5	2	2	1	1	1	-	-	1	1	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Introduction to CAD and CAM
Course Code	SEC VI

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Studied computer application in previous semester			**Co-Requisite/s**	To study computer graphics and its tools in a generic framework			
Course Outcomes & Bloom's Level	**CO1-** To understand fundamental concepts of computer graphics and its tools in a generic framework.**(BL1-Remember)** **CO2-** To impart the parametric fundamentals to create and manipulate geometric models using curves, surfaces and solids.**(BL2-Understand)** **CO3-** To impart the parametric fundamentals to create and manipulate geometric models using NURBS and solids**(BL3-Apply)** **CO4-** To provide clear understanding of CAD systems for 3D modeling and viewing.**(BL4-Analyze)** **CO5-** To create strong skills of assembly modeling and prepare the student to be an effective user of a standards in CAD system.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Boothroyd, G, “Assembly Automation and Product Design” Marcel Dekker, New York, 1997
Articles	
References Books	Chitale A.K and Gupta R.C “ Product design and manufacturing “ PHI learning private limited, 6th Edition, 2015. David Rogers, James Alan Adams “Mathematical Elements for Computer Graphics” 2 nd Edition, Tata McGraw-Hill edition.2003
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	1	-	-	1	1	-	-	1	1	1
CO2	1	1	1	-	1	-	-	-	-	1	1	-	2	1	1
CO3	1	1	1	1	-	1	1	-	1	1	-	-	2	1	2
CO4	2	1	1	-	1	-	-	-	-	1	-	-	2	2	2
CO5	2	2	1	1	-	1	-	-	-	1	1	-	2	2	2
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Introduction to Good Laboratory practices [T]
Course Code	SEC VI [T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Skill Enhancement Courses							
Pre-Requisite/s	Knowledge of food laboratory euipments and testing protocols			**Co-Requisite/s**	To study guidelines on good laboratory practices and SOPs and calibration procedure of different instruments.			
Course Outcomes & Bloom's Level	**CO1-** to learn the regulations and various guidelines on good laboratory practices and SOPs and calibration procedure of different instruments.**(BL1-Remember)** **CO2-** to gain the knowledge of the various hazards and safety procedures to be followed in laboratory. **(BL2-Understand)** **CO3-** To provide the students a specialized knowledge about implementation of laboratory standard practices, their records and analyze laboratory data with accuracy.**(BL3-Apply)** **CO4-** To apply the subject knowledge in minimization of errors related with handling of laboratory accessories and equipment's**(BL4-Analyze)** **CO5-** To evaluate the theoretical knowledge of good laboratory practices and its implementation in food industry laboratories to ensure the quality and safety of the foods**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Concept and evolution and scopes of Quality Control and Quality Assurance; Good laboratory practices (GLP) - Introduction, history, definition, principles and WHO guidelines on GLP. Levels of Laboratories,	Lecture method, group discussion, seminar	06
2	General Rules/Protocols for Lab Safety measures, Precaution and Safety in handling of chemicals, laboratory tools, glasswares, food ingredients/raw materials, and instruments; Biosafety in laboratory - Laboratory associated infections and other hazards, assessment of biological Hazards and levels of biosafety, fire prevention methods	Lecture method, group discussion, seminar, Quiz, Illustrate with analogies	07
3	Food laboratory sanitation, Control of rats, rodents, birds, insects and microbes. Cleaning and Disinfection: Physical and Microbiological Approach, cleaning of glasswares and utensils, Basic SOPs for instrument handling and maintenance and raw material/ingredients storage	Quiz, Illustrate with analogies	07
4	Internal and External Audit, Log Book Maintenance, Keeping data records, its analysis by using statistical and mathematical tools. Result analysis and its interpretation; Arrangement of chemicals, reagents, glasswares, etc in laboratory.	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	05
5	Calibration of common food technology instruments: pH meter, spectrophotometer, water bath, moisture analyzer, hot air oven, pipettes, scales and balances, centrifuge, etc.; Quality management in industry and laboratory, Laboratory Design & Layout of food technology laboratory	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	05

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	World health organization (WHO); Handbook Good Laboratory Practices
Articles	
References Books	Indian council of medical research, New Delhi; Guidelines for good laboratory practices B.W.Wenclawiak, M.Koch E. Hadjicostas; Quality Assurance in Analytical Chemistry.
MOOC Courses	https://nptel.ac.in/courses/126105020
Videos	https://youtu.be/h5NpTku5BGc?si=U-GL_p3nLe4_7pZM

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	1	1	-	1	1	1	-	1	1	1
CO2	2	2	1	1	1	1	1	1	-	1	-	-	2	1	1
CO3	2	2	1	2	1	2	-	-	1	1	-	-	2	1	2
CO4	2	3	2	2	1	2	1	1	-	1	1	-	3	2	2
CO5	3	3	2	2	1	2	-	1	1	1	1	-	3	2	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Product Development and Formulation [T]
Course Code	BSFT-0701 [T]

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	students to pass 10+2 with a minimum aggregate of 50% from the science stream with mandatory subjects like PCMB (Physics, Chemistry, Maths, Biology).			**Co-Requisite/s**	Students should have basic knowledge of food processing and preservation methods. Shelf life study, storage and transportation of food products.			
Course Outcomes & Bloom's Level	**CO1-** To understand the latest consumer demand for novel food products.**(BL2-Understand)** **CO2-** To learn and develop novel technology to develop new products.**(BL2-Understand)** **CO3-** To understand the Cost analysis and feasibility of new product development.**(BL3-Apply)** **CO4-** Thorough knowledge of sensory and shelf-life evaluations foods.**(BL4-Analyze)** **CO5-** Toapply the subject knowledge in future perspectives i.e., such as in research and development in new products**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Food needs and consumer preferences, Need for new products, Innovations in product development, need, classification, characterization, Needs and types of foods consumption trends. Factors to be considered new product development – social concerns, health concerns, impact of technology, market influence, market sector perspective and market research. Consumer research and the market. Trends in social change and its role in diet pattern.	Lecture, PPT and discussion	12
2	Phases of food product development-introductory phase, growth phase, maturity phase and decline phase. Developing standard products, Process control parameter, Types of products and logistics. Processing- primary and secondary, various food ingredients used, use of food additives. Standardization and scale up, Safety and regulatory aspects, sanitation and waste disposal.	Quiz, Illustrate with analogiesInteractive videos	10
3	Chemical and physical properties of foods, Shelf-life studies and shelf-life prediction. Planning for the food product to be developed. Drawing up a working plan and time schedule.	Summarizing, Quiz, Tutorials sessions, Expert Lecture	7
4	Packaging - Development of suitable packaging material, management. Design and package graphics. Labelling, and testing. Storage and transportation-Types and mode of transportation, optimization of transport taking into account the type of product, distance, storage facilities.	Lecture methods,Audio/Video clips, group discussion, quiz	9
5	Product costing, Advertising and marketing, Entrepreneurship, plant location, Investment and financing of project	Lecture with ppt, quiz	7

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preparation of high fibre bread.	Experiments	BL6-Create	2
2	Preparation of high fibre biscuits	Experiments	BL6-Create	2
3	Preparation of high fibre cake	Experiments	BL6-Create	2
4	Preparation of nutritious beverages	Experiments	BL6-Create	2
5	Preparation of functional foods for obese person.	Experiments	BL6-Create	2
6	Preparation of functional foods for aged persons	Experiments	BL6-Create	2
7	Preparation of hypocholesterolmic foods	Experiments	BL6-Create	2
8	Preparation of low sodium foods	Experiments	BL6-Create	2
9	Preparation of foods for underweight persons	Experiments	BL6-Create	2
10	Preparation of fortified atta	PBL	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	12
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	20

Part E

Books	New food product development: From concept to market place.-Gordon W. Fuller
Articles	https://www.sciencedirect.com/science/article/abs/pii/0924224494900175
References Books	Basic Food Preparation-A complete Manual-Raina et.al. Foods: Facts and Principles-Manay, S. and Shadaksharaswami, M. Breakfast Cereals and How They are Made?-R.B. Fast and E.F.Caldwell
MOOC Courses	https://nptel.ac.in/courses/126105015
Videos	https://www.youtube.com/watch?v=k1a2PSEXahM

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	3	2	2	1	-	1	-	-	1	1	3	1
CO2	3	3	2	3	3	3	-	-	1	-	-	-	2	3	1
CO3	3	2	2	3	3	2	-	-	1	-	-	-	2	3	1
CO4	2	2	3	3	3	3	2	-	1	-	2	3	3	3	3
CO5	2	3	3	2	2	2	2	-	1	-	2	3	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Fermentation technology [T]
Course Code	BSFT-0702 [T]

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Disciplinary Minor							
Pre-Requisite/s	Student must have studied food microbiology and dairy technology in previous semester.			**Co-Requisite/s**	Study of production of various fermented foods.			
Course Outcomes & Bloom's Level	**CO1-** To understand the principles of food fermentations**(BL1-Remember)** **CO2-** To study the production of various fermented foods**(BL2-Understand)** **CO3-** To gain knowledge about different downstream methods**(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as in research and development in fermentation technolo**(BL4-Analyze)** **CO5-** To evaluate the real-life knowledge gained and properties and implement the same to create fermented products**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to Industrial Fermentations: Types of fermentation processes (submerged/ solid state and semi-solid) and Range of products, Fermenter, Fermentation media, carbon and nitrogen sources.	Lecture method, discussion	08
2	Screening, isolation and maintenance of industrially important microorganisms, Microbial growth, metabolism, death, membrane transport, fermentation kinetics and fermentation modelling.	Lecture method, discussion	08
3	Different types of fermenters, scaling up of fermentation, sterilization, agitation; pH, Eh, temperature measurement and control, Up-Stream & downstream processing and product recovery, immobilization in fermentation	Lecture method, Summarizing, Quiz, Tutorials sessions, Expert Lecture	11
4	Food fermentations: Fermented milk foods: Cheese and Butter. Fermented vegetable foods- Sauerkraut, fermented pickles and soya sauce and Tofu. Single cell protein-Production of Baker's yeast and Commercial Production of bread	Audio/Video clips, lecture with ppt, quiz	10
5	Industrial production of microbial cell biomass, organic acids, enzymes, antibiotics, micro-nutrients, amino acids, vitamins, ethanol, SCP and alcoholic beverages	Group discussion, lecture with ppt, quiz	08

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Preparation of Yoghurt	Experiments	BL4-Analyze	2
2	Preparation of whey based fermented beverage	Experiments	BL4-Analyze	2
3	Preparation of pickles	Experiments	BL4-Analyze	2
4	Preparation and maintenance of starter cultures	Experiments	BL4-Analyze	2
5	Preparation of Sauerkraut	Experiments	BL4-Analyze	2
6	Preparation of Bread	Experiments	BL4-Analyze	2
7	Preparation of wine	PBL	BL5-Evaluate	3
8	Preparation of Cheese	PBL	BL5-Evaluate	3
9	Preparation of tofu	Experiments	BL4-Analyze	2
10	Preparation of vinegar	Experiments	BL4-Analyze	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	30	40	

Part E

Books	Industrial Microbiology by A. H. Patel
Articles	https://www.sciencegate.app/document/10.1016/b978-0-12-821292-9.00026-1
References Books	Microbial Biotechnology: Fundamentals of Applied Microbiology - A. N. Glazer and H. Nikaido Principles of Fermentation Technology by PF Stanbury Dr Whitaker
MOOC Courses	https://nptel.ac.in/courses/102105087
Videos	https://youtu.be/m27ouF6xfZg?si=ywIB2EfJDtUFuCek

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	1	-	1	-	-	-	2	1	1
CO2	2	2	1	1	1	-	1	-	-	-	-	-	2	2	2
CO3	2	2	2	2	1	1	-	1	-	1	1	-	3	2	3
CO4	3	3	2	2	1	-	1	-	-	-	-	-	3	2	3
CO5	3	3	2	2	1	-	1	-	1	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Food refrigeration and cold storage [T]
Course Code	BSFT-0703a [T]

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Student must have studied food processing and preservation in previous semester			**Co-Requisite/s**	knowledge of refrigeration science and cold storage for prolonging food's shelf-life.			
Course Outcomes & Bloom's Level	**CO1-** To provide an understanding of the refrigeration science and cold storage for prolonging food's shelf-life. **(BL1-Remember)** **CO2-** To learn the mechanisms of refrigeration and freezing and their related equipments**(BL2-Understand)** **CO3-** To provide the students a specialized knowledge about cold storage technology with controlled or modified atmospheres for maintaining food quality **(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as industrial applications in food processing and distribution.**(BL4-Analyze)** **CO5-** To evaluate the theoretical knowledge to create innovative frozen foods and develop cost-effective low temperature technology.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG3(Good health and well-being) SDG7(Affordable and clean energy) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Principles of Refrigeration, Refrigeration cycles, Vapour compression and vapour absorption cycles, refrigerants, characteristics of different refrigerants, Components of a Refrigeration system: compressor, condenser, Evaporator, Expansion valves piping and different controls. Atmospheric air and its properties	Lecture method, discussion	07
2	Chilling of Foods: Chilling equipment for liquid foods. Secondary refrigerants and direct expansion techniques in chilling. Chilled foods transport and display cabinets – Basics of Chilled foods microbiology – Hygienic design considerations for chillers and chilled storages. Cool storage and their applications. Evaporative cooling and its applications. Application of chilling in different foods, chill injury	Lecture method, discussion	10
3	Cold Storage Design and Construction - Small and large commercial storages, Cold Room temperatures, Insulation, Properties of insulating materials, Air diffusion equipment, Doors and other openings. Cold load estimation; prefabricated systems, walk-in coolers and refrigerated container truck: Freezer Storages, Freezer room temperatures, insulation of freezer rooms: Pre-cooling and pre freezing. Cold storage practice, Stacking and handling of material in and around cold rooms, Optimum temperatures of frozen storage for different food materials.	Quiz, Illustrate with analogies, expert lecture	12
4	Controlled atmosphere and modified atmosphere storages: Principles and basics of their construction, Operation and maintenance, cleanliness, defrosting practices, preventive maintenance and safety measures	Quiz, Illustrate with analogies, expert lecture	08
5	Freezing of Foods: Freezing equipment, Freezing rates, growth rate of ice crystals size and its effect of texture and quality of foods, Freezer types (blast freezers, contact plate freezers, conveyorized quick freezers, Individual quick freezing), Freezing application to different food products, freezer burn, retrogradation, and thawing	Audio/Video clips, group discussion, lecture with ppt, quiz	08

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Raymond R. Gunther- Refrigeration, Air Conditioning and Cold Storage
Articles	
References Books	Clive D.J. Dellino- Cold and Chilled Storage Technology S. Domkundwar & Subhash Arora- Cold Storage & Freezer Storage Technology
MOOC Courses	https://nptel.ac.in/courses/126105025
Videos	https://youtu.be/Y1oM3AYhtyA?si=5ZBDE0ow5kMWDExx

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	-	-	-	-	-	2	2	2	-
CO2	1	1	1	1	-	1	1	-	-	1	-	2	2	2	-
CO3	2	2	2	1	1	1	-	1	-	-	-	3	2	2	-
CO4	2	2	2	1	-	-	-	-	-	-	-	3	2	3	-
CO5	3	2	2	1	1	-	1	1	-	1	1	3	2	3	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Research methodology [T]
Course Code	BSFT-0704 [T]

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Interdisciplinary Major							
Pre-Requisite/s	The student must have completed 3 years BSc in Food Technology			**Co-Requisite/s**	Student should have basic knowledge of mean, median mode,sampling methods and probability			
Course Outcomes & Bloom's Level	**CO1-** To understand the basic concepts of Research Methodology, its applications in experimental design and data collect as well as analysis.**(BL1-Remember)** **CO2-** To describe the basic concepts of each and every division of the subject along with its technical writing aspects**(BL2-Understand)** **CO3-** To provide experimental basis, and to enable students to acquire a specialized knowledge and understanding of data and its applications in experimental verification.**(BL3-Apply)** **CO4-** To provide basis of analyzing the applications of Research Methodology in various fields of research and industries.**(BL4-Analyze)** **CO5-** To apply the understanding of statistical tools in evaluation in various samples.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Research: Definition and types, components and steps; Research Question, Research Problem identification, guidelines for selecting meaningful problem; Research Objective: Definition, broad and specific objectives, Hypothesis: Meaning and sources of research hypothesis Technology transfer: Introduction and procedure.	Lecture methods,Audio/Video clips,group discussion,quiz	05
2	Research Method: Principle, Scientific methods, steps in experimental research, types and problems in experimentation; Importance of survey method, Comparison of survey method with other methods Sampling – steps, size, types, merits and demerits, Data Collection: Sources and types of Data: Ways of data organization and summarization. Standard operating procedure (S.O.P): Introduction and procedure	Lecture methods,Audio/Video-clips	08
3	Data analysis - Estimation of population parameters, mean value, standard error, and variance analysis; Probability Theories; Hypothesis Tests, One Sample Test - Two Sample Tests / Chi-Square Test, t-test, Completely Randomized Design, Randomized Complete Block Design, Latin Square Design.	Lecture methods, Audio/Video-clips,group discussion	08
4	Computer application: Use of MS-Office and Excel, Library documentation and Scientific literature searching, Appropriate Statistical and other relevant packages. Research proposal and thesis writing: Purpose of research proposal, Academic/ Project/ Case study proposals, Steps for the preparing proposal and Common mistakes	Lecture methods,Audio/Video-clips,group discussion,quiz	09
5	Methods selecting relevant literature, Features of thesis, Structure of Thesis, Steps in thesis writing, Citation and Referencing: Different ways of work citation, Publication in Research journals: Introduction and its importance, Arrangement of the article; Difference between general and research article.	Lecture methods,Audio/Video-clips,group discussion,quiz	05

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Kothari, C. R. (2004, January 1). Research Methodology. New Age International.
Articles	
References Books	Panneerselvam, R. (2014, April 4). RESEARCH METHODOLOGY. PHI Learning Pvt. Ltd. Wilkinson, T. S., & Bhandarkar, P. L. (2003, January 1). Methodology and Techniques of Social Research. Young, P. V. (1956, January 1). Scientific Social Surveys and Research. Englewood Cliffs, N.J. : Prentice-Hall.
MOOC Courses	https://nptel.ac.in/courses/110105091
Videos	https://youtu.be/oXnjR0OtfBI

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	2	2	-	-	-	-	-	1	3	1	1
CO2	2	2	3	2	1	1	-	-	-	1	-	-	3	1	1
CO3	2	2	2	1	2	2	-	-	-	-	-	-	3	1	1
CO4	1	1	2	2	1	2	-	-	-	-	-	1	3	3	3
CO5	1	3	3	2	3	2	1	-	-	-	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	IAPC III [P]
Course Code	IAPC III [P]

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					0	0	8	8
Course Type	Project							
Course Category	Projects and Internship							
Pre-Requisite/s	Deep knowledge of all disciple core subject of Food Technolgy program			**Co-Requisite/s**	Presentation of research project/ internship			
Course Outcomes & Bloom's Level	**CO1-** Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility**(BL1-Remember)** **CO2-** Identify the needs and problem of the community and involve them in problem solving.**(BL2-Understand)** **CO3-** Utilize their knowledge in finding practical solution to individual and community problem**(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
400					

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	-	1	-	-	-	-	3	2	2
CO2	1	2	1	1	-	1	-	-	-1	-	-	-	3	2	3
CO3	1	2	1	1	1	-	-	-	-	-	-	-	3	3	3
CO4	2	2	1	1	-	-	1	-	-	-	-	-	3	3	3
CO5	2	2	1	1	1	-	-	1	1	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Functional Foods and Nutraceuticals [T]
Course Code	BSFT-0801 [T]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	students to pass 10+2 with a minimum aggregate of 50% from the science stream with mandatory subjects like PCMB (Physics, Chemistry, Maths, Biology).			**Co-Requisite/s**	Students should have basic knowledge of bio-active compounds prsent in various plants and animal products , processing methods.			
Course Outcomes & Bloom's Level	**CO1-** Recognize the importance and link between nutrition and diseases**(BL1-Remember)** **CO2-** Identify major types of health foods and nutraceutical products in the market**(BL2-Understand)** **CO3-** To understand the molecular basis of using micronutrients and phytochemicals in prevention of chronic diseases**(BL2-Understand)** **CO4-** Design and develop foods having health promoting properties**(BL6-Create)** **CO5-** Critically evaluate the safety and efficacy of using health foods and nutraceutical products. **(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG9(Industry Innovation and Infrastructure) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Nutraceuticals and Functional Food: An Introduction, Definition; the link between nutrition and medicine; classical nutrients; phytochemicals and other dietary health factors for disease prevention. Applied aspects of the Nutraceutical Science	Lecture methods, ppt	6
2	Nutraceuticals: Types of nutraceutical compounds – Phytochemicals, phytosterols and other bioactive compounds, peptides and proteins, dietary fibers, oligosaccharides and resistant starch, prebiotics, probiotics and synbiotics, Conjugated Linoleic Acid, omega-3 fatty acids, fat replacers; their sources and role in promoting human health	Lecture methods, Quiz, Illustrate with analogies	10
3	Functional Foods: Types of functional foods- Cereal and cereal products, Milk and milk products, egg, oils, meat and products, sea foods, nuts and oilseeds, functional fruits and vegetables, herbs and spices, beverages (tea, wine etc), Fermented foods – their health benefits and role in promoting health.	Lecture methods, PPT, Expert Lecture	11
4	Future prospects:Research development and trends in processing of functional foods. Formulation and fabrication of functional foods. Legal Aspects: Stability of nutraceuticals. Safety, Consumer acceptance and assessment of health claims, labeling, marketing, and regulatory issues related to nutraceuticals and functional foods.	Lecture methods, Audio/Video clips, group discussion, quiz	10
5	Anti-nutritional Factors present in Foods: Types of inhibitors present in various foods and how they can be inactivated. General idea about role of Probiotics and Prebiotics as nutraceuticals. Recent advances in techniques & feeding of substrates. Assessment of nutritional status and Recommended Daily allowances	Lecture methods, Group discussion, quiz	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Estimation of ascorbic acid from lemon & amla juice by titration method	Experiments	BL4-Analyze	2
2	To determine the antioxidant potential of functional foods	Experiments	BL5-Evaluate	2
3	TLC separation of Plant pigments – Curcumin and carotene	Experiments	BL3-Apply	2
4	Estimation of crude fiber/pectic substances from plant material	Experiments	BL4-Analyze	2
5	Estimation of total phenols and chlorogenic acid (Phenolic compound) in plant materials and animal foods	Experiments	BL4-Analyze	2
6	To estimate cholesterol content in given sample by Lievermann-Burchard method	Experiments	BL4-Analyze	2
7	Qualitative test for tannins, phenolics and alkaloids using TLC	Experiments	BL5-Evaluate	2
8	To prepare functional foods from plant foods	PBL	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	12
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	20

Part E

Books	
Articles	https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=f9c23dd60eea111659bd43b58ff763a70ff78824
References Books	Handbook of Nutraceutical and Functional Foods-Wildman REC Innovations in Healthy and Functional Foods-Ghosh D Handbook of nutraceuticals Volume 2-Pathak YV
MOOC Courses	https://onlinecourses.swayam2.ac.in/ugc19_hs33/preview#:~:text=The%20online%20course%20on%20Functional,implications%20and%20mechanisms%20of%
Videos	https://www.youtube.com/watch?v=R7BonXAiOE4&t=1s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	3	3	3	2	-	-	-	2	1	3	1	1
CO2	2	3	2	3	3	3	-	-	-	-	-	1	3	1	1
CO3	1	3	1	2	2	1	-	-	-	-	-	2	3	1	1
CO4	1	2	1	3	2	3	3	2	-	-	3	3	3	3	3
CO5	2	1	1	3	3	3	-	3	-	-	-	3	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Novel food processing techniques [T]
Course Code	BSFT-0802 [T]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					4	0	0	4
Course Type	Theory only							
Course Category	Disciplinary Major							
Pre-Requisite/s	Students must have studied food processing and preservation in previous semester			**Co-Requisite/s**	Knowledge of molecular basis of micronutrients and phytochemicals in prevention of chronic diseases			
Course Outcomes & Bloom's Level	**CO1-** Recognize the importance link between nutrition and diseases**(BL1-Remember)** **CO2-** Identify major types of health foods and nutraceutical products in the market**(BL2-Understand)** **CO3-** Understand the molecular basis of using micronutrients and phytochemicals in prevention of chronic diseases**(BL3-Apply)** **CO4-** Design and develop foods having health promoting properties**(BL4-Analyze)** **CO5-** Critically evaluate the safety and efficacy of using health foods and nutraceutical products. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG3(Good health and well-being) SDG6(Clean water and sanitation) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
1	Advances in membrane technology: Membrane Technology, membrane processing technology of liquid foods, different membrane modules, types of membrane 1G to 3G. Factors affecting flux and related equations, application of membrane in food processing & preservation. Concept and application of nanotechnology in food processing.	Lecture method, discussion	08
2	SCE process: Theoretical concept of super critical extraction process, mechanism, equipment used and its application in food processing & preservation. HPP: Theoretical concept of high-pressure technology, mechanism, equipment used and its application in food processing & preservation.	Lecture method, discussion, quiz	08
3	Microwave, Ohmic and Inductive Heating and RF technology: Introduction, instrumentations, mechanism, microorganism destruction, equipment used and its application in food processing & preservation, limitations	Lecture method, quiz, Illustrate with analogies	10
4	X-rays, Pulse Electric field, Pulse Light Technology, cold plasma and oscillating magnetic field: Introduction, instrumentations, mechanism, microorganism destruction, equipment used and its application in food processing & preservation, limitations	Audio/Video clips, group discussion, lecture with ppt, quiz	10
5	Ultrasonicator and Hurdle Technology: Theoretical concept of ultrasound/sonication technology, cavitation, equipment used and its application in food processing & preservation, limitations, Hurdle technology its concept and application in food preservation. Novel techniques in food analysis- DSC, SEM etc	Audio/Video clips, group discussion, lecture with ppt, quiz	09

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Da-Wen Sun- Emerging Technologies for Food Processing.
Articles	
References Books	M. P. Cano, M. S. Tapia, and G. V.- Novel Food Processing Technologies Howard Q. Zhang. et al., Nonthermal Processing Technologies for Food
MOOC Courses	https://nptel.ac.in/courses/126105015
Videos	https://youtu.be/k1a2PSEXahM?si=5fmJz3BaChiLsDGr

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	1	1	-	-	-	-	1	1	-	2	2	2
CO2	2	1	2	1	-	1	1	-	1	-	-	-	2	2	2
CO3	3	2	2	2	1	1	1	1	-	1	-	-	3	2	3
CO4	3	2	2	2	-	-	-	-	-	-	-	-	3	3	3
CO5	3	2	2	2	1	1	1	1	1	-	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	Legumes and oilseeds Technology [T]
Course Code	BSFT-0803a [T]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Students must have studied processing of cereals, pulses and oilseeds in previous semester.			**Co-Requisite/s**	Knowledge of composition, and processing technologies used for legumes and oil seeds			
Course Outcomes & Bloom's Level	**CO1-** To understand and identify the composition, and specific processing technologies used for legumes and oil seeds **(BL1-Remember)** **CO2-** To learn the processing methods for value addition of legumes and oilseeds and their by-products.**(BL2-Understand)** **CO3-** To provide the students a specialized knowledge about application of scientific principles in the processing soybean and peanut **(BL3-Apply)** **CO4-** To apply the subject knowledge in future perspectives i.e. such as applications in food processing using fermentation, extraction, milling, etc.**(BL4-Analyze)** **CO5-** To evaluate the theoretical knowledge in different commercialized legumes and oilseed products and implement the same to create innovative food products.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG3(Good health and well-being) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction to legumes and pulses and production trends in India and abroad. Morphology, pre and post harvest factors, Processing of legumes: Home scale, Cottage Scale and commercial methods of dehulling. Modern techniques in Dal mills. Processing of Red gram, Bengal gram, Green gram, Black gram. Dal milling – Principle, methods, equipments and effect on quality. Principle products, Dry and Wet milling of pulses, Anti-nutritional compounds and their removal.	Lecture method, discussion	12
2	Cooking quality of dhal – methods, factors affecting quality of dhal and cooking of dhal. Quick cooking dhal, Instant dhal. Fermented Products of legumes. Soaking – Principles, Methods of soaking - Sprouting, Puffing, Roasting and Parboiling of Legumes, Physical and Bio-chemical changes during these processes.	Lecture method, discussion	10
3	Introduction to oilseeds and production trends in India and abroad, Morphology, pre and post harvest factors, types of oilseeds and their nutritional value, Anti-nutritional compounds and their removal; Processing of oil seeds for direct use and consumption, Oil extraction methods-mechanical (Ghani and Expellers) and chemical methods (solvent extraction); factors affecting extraction process; Refining, hydrogenation and interesterification of extracted oil - their principles and process controls	Lecture method, discussion, quiz, Illustrate with analogies	10
4	Utilization of oilseed cake of different food uses, Processing of deoiled cake into protein concentrates and isolates, extraction of bioactive compounds, Texturized vegetable protein, Margarine and Spread, mustard sauce	Lecture method, discussion, quiz, Illustrate with analogies	9
5	Soya and peanut as a source of protein and oil; their processing– soya/peanut milk, soy/peanut protein Isolate, paneer, soya sauce; peanut butter, extrusion based food products from soya and peanut	Audio/Video clips, group discussion, lecture with ppt, quiz	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To determine the physical properties of legumes and oil seeds.	Experiments	BL4-Analyze	2
2	To determine the nutritional quality of selected pulses and oilseeds.	Experiments	BL4-Analyze	2
3	To study the preconditioning of pulses and oilseeds before milling	Experiments	BL4-Analyze	2
4	To study the removal of anti-nutritional compounds from selected pulses and oilseeds	Experiments	BL4-Analyze	2
5	To study the cooking quality of dhal	Experiments	BL5-Evaluate	2
6	To develop a composite legume mix and prepare a value added product.	Experiments	BL5-Evaluate	2
7	To prepare soya milk and groundnut milk	PBL	BL6-Create	3
8	To prepare soya sauce	PBL	BL6-Create	3
9	To prepare value added food products from deoiled cake	PBL	BL6-Create	3
10	To extract oil using solvent extraction method from oilseeds	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	30	40	

Part E

Books	Chakraverty A., Post harvest technology of cereals: pulses and oilseeds
Articles	
References Books	Kay DE, Food Legumes
MOOC Courses	https://nptel.ac.in/courses/103105460
Videos	https://youtu.be/eJBjEjnH4eo?si=vuiZ7dqrs1UU0Mc7

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1	-	1	1	-	-	1	1	-	3	2	1
CO2	2	2	1	1	1	-	1	1	-	-	-	-	3	2	1
CO3	2	2	1	1	1	1	1	1	-	1	-	-	3	3	2
CO4	3	3	2	1	1	-	1	-	1	-	-	-	3	3	3
CO5	3	3	2	1	-	1	1	1	1	1	1	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_FoodTechnology)

Title of the Course	IAPC IV [P]
Course Code	IAPC IV [P]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					0	0	10	10
Course Type	Project							
Course Category	Internships							
Pre-Requisite/s	Deep knowledge of all disciple core subject of Food Technolgy program			**Co-Requisite/s**	Presentation of research project/ internship			
Course Outcomes & Bloom's Level	**CO1-** Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility**(BL1-Remember)** **CO2-** Identify the needs and problem of the community and involve them in problem solving.**(BL2-Understand)** **CO3-** Utilize their knowledge in finding practical solution to individual and community problem**(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
500					

Part E

Books	
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	1	1	-	-	1	-	-	-	-	3	2	2
CO2	1	2	1	1	-	1	-	-	-1	-	-	-	3	2	3
CO3	1	2	1	1	1	-	-	-	-	-	-	-	3	3	3
CO4	2	2	1	1	-	-	1	-	-	-	-	-	3	3	3
CO5	2	2	1	1	1	-	-	1	1	-	-	-	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-