

Program Structure Program: B.Sc. Honours (Food Science and Technology) Program Code: SBR0411 Batch: 2019-22 Department of Life Sciences School of Basic Sciences and Research



### 1. TITLE: Bachelor of Science (Hons.) in Food Science and Technology

#### 2. DURATION OF THE COURSE: 3 YEARS

#### **3. YEAR OF IMPLIMENTATION**

This syllabus will be implemented for the session 2019-2022onwards.

#### 4. PREAMBLE

Total Credits- 143 Total Number of Semesters – 6 (Two semesters per year) Total Number of Theory Papers – 31 Total Number of Practical courses – 12 Total Number of Minor Projects/Dissertations- 02 Number of papers (theory) per semester – 05/06 Number of Laboratory courses per semester – 03/02



### 1. Standard Structure of the Program at University Level

1.1 Vision, Mission and Core Values of the University

# Vision of the University

To serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship.

### **Mission of the University**

- **1.** Transformative educational experience
- 2. Enrichment by educational initiatives that encourage global outlook
- **3.** Develop research, support disruptive innovations and accelerate entrepreneurship
- 4. Seeking beyond boundaries

### **Core Values**

- Integrity
- Leadership
- Diversity
- Community



# **1.2 Vision and Mission of the School**

# Vision of the School

Achieving Excellence in the Realm of Basic and Applied Sciences to Address the Global Challenges of Evolving Society

# **Mission of the School**

- 1. To equip the students with knowledge and skills in basic and applied sciences.
- 2. Capacity building through advanced training and academic flexibility.
- **3.** To establish centre of excellence for ecologically and socially innovative research.
- 4. To strengthen inter institutional and industrial collaboration for skill development and global employability.

# **Core Values**

- 1. Passion
- 2. Perseverance
- 3. Scientific nature
- 4. Yearning for truth



1.2 Vision and Mission of the Department

# Vision of the Department

To acquire and impart knowledge of Food Science and Technology so as to build capacity for addressing current global challenges

#### **Mission of the Department**

- **1.** To train and transform students into technical researchers/ professionals who are able to integrate theoretical knowledge and analytical skills in diverse areas of Food Science.
- 2. To make students and faculties updated with advance techniques and to introduce the students to dynamic environment of food science.
- 3. To conduct cutting-edge interdisciplinary research.
- 4. Introduction of various skill development and entrepreneurship courses to enhance the employability and providing opportunities for industryacademia collaboration.



### **1.3** Programme Educational Objectives (PEO)

#### **1.3.1** Writing Programme Educational Objectives (PEO)

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

- PEO1: The graduate students will understand of various food preservation techniques and concepts and phenomena in the minds of students through theoretical and practical knowledge.
- PEO2: Graduate students will upgraded with new discoveries in Food Science and inculcate continuous learning and self-improvement so that students are motivated for higher studies and research.
- PEO3: Graduate students will be taught various Food Standards and techniques as well as applications of these techniques for betterment of society and environment.
- PEO4: Graduate students will industry- or academia-ready by developing independent thinking, good communication and scientific skills and to acquaint them with professional ethics so that they can work well in an industrial or academic environment.
- PEO5: Graduate students will understand interdisciplinary nature of research in Food Sciences/Food Safety by assigning them different research projects/ case studies/ presentations.



PEO Statements	School Mission 1	School Mission 2	School Mission 3	School Mission 4
	1011551011 1	IVIISSIUII 2		1011551011 4
PEO1:	3	2	-	-
PEO2:	3	2	2	-
PEO3:	3	3	2	1
PEO4:	2	3	2	2
PEO5:	3	2	2	2

### **1.3.2 Map PEOs with Mission Statements:**

**1.3.2.1** Map PEOs with Department Mission Statements:

PEO Statements	Department Mission 1	Department Mission 2	Department Mission 3	Department Mission 4
PEO1:	3	1	1	1
PEO2:	3	3	2	2
PEO3:	2	2	2	2
PEO4:	3	-	2	3
PEO5:	3	2	3	2



### **1.3.3** Program Outcomes (PO's)

**PO1: Knowledge:** Students will develop a sound understanding the Food Preserve Techniques and processes.

**PO2: Skill Set Development:** The student will be skilled in various Food Quality Analysis techniques that will enhance the employability of the students.

**PO3: Oral Communication and Scientific Writing:** The students will be able to demonstrate good oral communication. Students will also be knowledgeable about writing technical (project report and reviews) content.

**PO4: Environment and Sustainable Development:** Student will be able to realize the effect of human malpractices on environment and the need and importance of sustainable development.

**PO5: Ethics, Independent Thinking and Team Work:** The students will develop professional ethics and also gain knowledge about various ethical issues associated with Food Science and Technology. Students will learn to think and analyze a problem independently while at the same time realizing the importance of team work in carrying out successful research/projects/ presentations.

Mapping	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	3	2	2	2	2
PO2	3	2	2	3	2
PO3	1	1	-	3	2
PO4	1	2	3	-	2
PO5	1	2	-	3	2

#### 1.3.4 Mapping of Program Outcome Vs Program Educational Objectives



# **1.3.5 Program Outcome Vs Courses Mapping Table:**

### **1.3.5.1 COURSE ARTICULATION MATRIX**

Cos	PO1	PO2	PO3	PO4	PO5
BFS101	3	1	1	-	1
BSP101	3	1	1	-	1
BSB103	2	1	1	1	1
BFS102	3	1	1	-	1
BFP102	3	1	1	-	1
BSB105	3	2	2	-	2
BFS201	3	1	1	-	-
BFS209	3	1	1	-	1
BFS204	3	3	1	1	1
BFS210	3	3	1	1	1
BFS202	3	3	1	-	1
BFP201	3	3	1	-	-
BFP202	2	3	1	-	1
BFS205	3	3	2	2	2
BFS206	3	3	2	2	2
BFS203	3	3	1	1	1
BFS207	3	3	1	2	1
BFS208	3	2	1	-	1
BFP205	-	-	1	3	3
BFP206	3	3	1	-	1
BFS301	3	3	2	2	2
BFS302	3	2	2	-	2
BFS303	3	3	3	1	3
BFS304	3	3	1	-	1
BFP301	-	-	1	3	3
BFP302	3	3	1	1	1
BFS305	3	3	1	-	1
BFS306	3	3	1	1	1
BFS307	3	3	2	-	2
BFS308	3	3	2	1	2
BFS311	3	3	3	1	3
BFP305	3	3	2	1	2
BFP308	3	3	2	1	2





### School: SBSR

### Batch: 2020-23

### Program / Branch/Specialization: B.Sc. Food Science and Technology

Sem.: I

S. No.	Paper ID	Course	Course Name	Т	eachir	ng	
		Code			Load		Credits
				L	Т	Р	
THEORY COURS	ES						
1	30577	BSL 101	Essentials of Chemistry	4	0	0	4
			for Biosciences				
2	30214	BFS 101	Principles of Nutrition	4	0	0	4
			Science (C)				
3	30066	BSB103	Biomolecules	4	0	0	4
4	16254	APR101	Communicative	4	0	0	4
			English				
PRACTICAL COU	RSES				1	1	
5	30578	BSL 151	Chemistry Lab for	0	0	2	1
			Biosciences-1				
6	30606	BSP 101	Principles of Nutrition	0	0	2	1
			Science Lab				
			Total Credits	16	0	4	18
			ТО	TAL	CREI	DITS	18





School: SBSR

### Program / Branch/Specialization: B.Sc. (H) Food Science and Technology

S.	Paper ID	<b>Course Code</b>	e Course Name Teaching Load		Cradita				
No.			-		Т	P	Creans		
THEORY COURSES									
1		PHY115	Physics V9 (GE)	4	0	0	4		
2		MSM 104	Probability and Statistics	4	0	0	4		
3		BFS 102	Introduction to Food Technology (C)		0	0	4		
4		EVS 103	Environmental Sciences		0	0	3		
5		BSB 105	Microbiology		0	0	4		
6		OPE	University Elective	2	0	0	2		
PRA	CTICAL C	OURSES							
7.		PHY151	Physics Lab (GE)	0	0	2	1		
8.		BFP 102	Introduction to Food Technology Lab	0	0	2	1		
			Total Credits	21	0	4	23		
TOTAL CREDITS							23		

Sem.: II





### School: SBSR

### Program / Branch/Specialization: B.Sc. Food Science and Technology

#### Sem.: III

S. No.	Paper ID	Course Code	Course Name	T	Teaching Load		Credits
				L	Т	P	
THEORY COURSES							
1	30333	BFS 201	Food Chemistry	4	0	0	4
2	30334	BFS 202	Food Biotechnology	4	0	0	4
3	30601	BFS209	Human Health and Diseases	4	0	0	4
4	30336		Food Microbiology40		0	0	4
5	30602	BFS 210	Nutrition Science and Human400Physiology		4		
PRACTICA	L COURS	ES					
6	30337	BFP 201	Food Biotechnology and Food Microbiology Lab	0	0	3	2
7	30338	BFP 202	Food Chemistry and Processing Lab	0	0	3	2
			TOTAL CREDITS	20	0	6	24
			TO	TAL C	REL	DITS	24





### School: SBSR

### Program / Branch/Specialization: B.Sc. Food Science and Technology

#### Sem.: IV

S.	Paper ID	Course Code	Course Name	Теас	hing Lo	ad	Credite		
No.				L	Т	Р	CIEUIS		
THEORY COURSES									
1	30425	BFS 205	Food Quality Analysis	4	0	0	4		
2	30426	BFS 206	Processing Technology of Cereals, Pulses Legumes and Oilseeds	4	0	0	4		
3	30335	BFS-203	Unit Operations in Food Processing	4	0	0	4		
4	30427	BFS 207	Principles of Food Preservation	4	0	0	4		
5	30428	BFS 208	Food Enzymology	4	0	0	4		
6		OPE	University Elective	2	0	0	2		
PRACTICAL	COURSES								
1	30430	BFP 205	Food Preservation Lab	0	0	3	2		
2	30429	BFP 206	Processing Technology of Cereals, Pulses Legumes, Oilseeds and Enzymes technology Lab	0	0	3	2		
			TOTAL CREDITS	22	0	6	26		
				тс	OTAL CR	EDITS	26		





### School: SBSR

### Program / Branch/Specialization: B.Sc. Food Science and Technology

Sem.: V

S.	Paper ID	Course	Course Name	Teaching		ng	Credite
110.		Coue		L	T	Р	Creuits
THEORY COU	RSES						
1	30502	BFS301	Technology of Fruits and Vegetables	4	0	0	4
2	30503	BFS302	Technology of Spices and Functional Foods	4	0	0	4
3	30504	BFS303	Food Packaging	4	0	0	4
4	30505	BFS304	Food Engineering	4	0	0	4
5	45640	CCU401	Community Connect	0	0	8	2
PRACTICAL C	COURSES			1	1		
1	30506	BFP 301	Technology of Fruits and Vegetables Lab	0	0	3	2
2	30507	BFP 302	Technology of Spices and Functional Foods lab	0	0	3	2
3	30985	BFP 312	Project Training	0	0	4	3
			Total Credit	16	0	18	25
			TO	TAL (	CREI	DITS	25





### School: SBSR

### Program / Branch/Specialization: B.Sc. Food Science and Technology

Sem.:	VI
	-

S.	Paper ID	Course	Course Name	Т	Teaching		a III
No.		Code		-	Load		Credits
				L	Т	P	
THEORY COURS	ES						
1	30571	BFS305	Dairy Technology	4	0	0	4
2	30572	BFS306	Technology of Meat, Poultry and Sea Foods	4	0	0	4
3	30573	BFS307	Food Safety and Regulations	4	0	0	4
4	30574	BFS308	Waste Management in Food Industries	4	0	0	4
5	30984	BFS311	Research Methodology In Food Science	4	0	0	4
6	31082	BFP313	Project				3
PRACTICAL COU	JRSES						
1	30575	BFP305	Dairy Technology Lab	0	0	3	2
2	30576	BFP 308	Technology of Animal Foods Lab	0	0	3	2
			Total Credit	20	0	14	27
	TOTAL CREDITS						27



Principles of Nutrition Sciences: BFS101

Scho	ool: SBSR	Batch : 2019-2022	
Prog	gram: B.Sc	Current Academic Year: 2019-20	
Brai	nch: Food	Semester: 01	
Scie	nce and		
tech	nology(H)		
1	Course Code	BFS101	
2	Course Title	Principles of Nutrition Sciences	
3	Credits	4	
4	Contact	4-0-0	
	Hours		
	(L-T-P)		
	Course Status	Compulsory	
5	Course	To develop basic knowledge of food as nutritional component, its r	elated disorders,
	Objective	food hygiene and regulatory laws.	
6	Course	After successfully completion of this course students will be able to	):
	Outcomes	1. Define food and its nutritional value.	. 1
		2. Provide an overview of the major macro and micronutrients	relevant to numan
		3. Comprehend the importance of nutrition in health and disease.	
		4. Discuss the scientific rationale for defining nutritional requirem	ents in healthy
		individuals and populations, with reference to specific conditions s	uch as pregnancy,
		lactation, and older age. 5 Describe the role of microbes in food industry	
		6. Identify and understand the role personal hygiene and food sani	tation in food
		processing.	
7	Course	This course has been designed to make student understan	d the value
	Description	nutritional requirements and the role of food sanitation, sa	afety in food
0		manufacturing.	COM :
8	Outline syllabu		CO Mapping
		Components of food	01,002,004
	A	Introduction of Food	-
	В	Major nutrition in food: Carbohydrates, Lipids,	
		proteins	-
	C	Micro components of Food including minerals and	
		trace elements	
	Unit 2	Food Disorders	CO3,CO4
	А	Food proteins disorders;	
	В	Food Carbohydrate and lipids disorders;	
	С	Food trace elements disorders	
	Unit 3	Growth of Microorganisms in Food	CO5
	А	Food as a substrate for microorganisms;	
	В	Factors affecting growth of microbes;	
	С	Use of Microbes in Food industry	
	Unit 4	Food Safety Aspects	CO6
	A	Personal Hygiene procedures	



В	Food Safety	Food Safety guidelines					
С	Food regulat	ory agencies	and laws				
Mode of	Theory						
examination							
Weight age	CA	CA MTE ETE					
Distribution	30%	30% 20% 50%					
Text book/s*	1. Food Sc	cience - Fifth	Edition   Norman N. Potter				
	Springer						
Other	2. Essentials	of Food &	Nutrition by Swaminathan,				
References	Vol. 1 & 2 (2	Vol. 1 & 2 (2012).					
	3. Frazier, V						
	Microbiolog	y. Tata McGr	aw Hill Publishing				
	Company Lte	d. New Delhi	_				

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

# Principles of Nutrition Science Lab: BSP101

School: SBSR		Batch: 2019-2022			
Prog	gram: B.Sc.	Current Academic Year: 2019-20			
Brai	nch: Food	Semester: 1			
Scie	nce and				
Tech	nnology				
1 Course Code		BSP101			
2 Course Title		Principles of Nutrition Science Lab			
3	Credits	1			
4	Contact Hours	0-0-2			
	(L-T-P)				
Course Status		Compulsory			
5 Course		• To develop practical knowledge about different food nutrition.			
Objective		• To demonstrate the importance of food nutrition in human.			
6	Course	After successfully completion of this course students will be able to:			



	Outcomes	CO1: Identify the starch foods.				
		CO2: Identify	CO2: Identify the sugary foods.			
		CO3: Identify	the presence o	f fat and protein in food produc	ets.	
		CO4: Estimat	e the moisture	and ash content of food produc	ts.	
		CO5: Compar	CO5: Compare the different food products on the basis of :			
		CO6: Underst	tand the princip	les of nutrition science.		
7	Course	This course	This course presents the fundamental scientific princi			
	Description	nutrition. Stu	dents will become	me familiar with food sources;	recommended	
		intake levels,	disorder relate	ed to food deficiency, microb	ial spoilage of	
		food and safe	ty aspects of fo	od.		
8	Outline syllabus					
	Unit 1	Practical rela	Practical related to starch.			
	А	Identify the pro-	Identify the presence of starch in the given sample.			
	В	Identify the ad	ulteration of food	d product with starch.		
	С	Isolation of sta	Isolation of starch from cereals/legumes			
	Unit 2	Practical related to presence of sugar.			CO2, CO6	
	А	Identify the presence of reducing sugar in given sample.				
	В	Estimation of non-reducing sugar in given sample.				
	С	Estimation of total sugar in given sample.				
	Unit 3	Practical related to presence of fat and protein.			CO3, CO6	
	А	Estimation of f	at in given samp	le.		
	В	Estimation of p	protein in given a	any flour sample.		
	С	Estimation of p	protein in milk sa	imple.		
	Unit 4	Practical relat	ted to moisture	content and ash content.	CO4, CO6	
	А	Determination	of moisture cont	ent in given sample.		
	В	Determination	of ash content in	given sample.		
	С	Determination	of ash content in	given sample.		
	Unit 5	Practical relat	ted to comparise	on of different food products.	CO5, CO6	
	А	Compare the	level of vitamir	C in different food products.		
	В	Compare the s	weetness of diffe	rent varieties of apples.		
	С	Compare the	level of iron in	different breakfast cereals.		
	Mode of	Practical and	Viva			
	examination					
	Weightage	СА	MTE	ETE		
	Distribution	60%	0%	40%		
	Text book/s*	<b>1.</b> Bevier, I. (	1914). Food an	d Nutrition Laboratory		
		Manual. Bo	ston: Whitcom	b & Barrows.		
	Other					
	References					



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### **Biomolecules: BSB103**

Sch	ool : SBSR	Batch : 2019-2022			
Prog	gram : B.Sc.	Current Academic Year: 2019-20			
Branch : Food		Semester: 01			
Scie	nce				
1	Course Code	BSB103			
2	Course Title	Biomolecules			
3	Credits	4			
4	Contact	4-0-0			
	Hours				
	(L-T-P)				
	Course Status	Compulsory /Elective/Open Elective			
5	Course	1. To study the structure and function of macromolecules present in			
	Objective	biological systems.			
		2. Understanding the general properties of lipids, amino acids and			
		carbohydrates.			
		3. To learn the hierarchical level of proteins			
6	0	4. To study the mechanism of biosynthesis of purines and pyrimidines			
6	Course	After studying this course, students will be able to			
	Outcomes	1: Summarize structural chemistry and general properties of lipids			
		2: Distinguish the structure, classification and significance of			
		carbohydrates			
		3: Analyze the structure and properties of amino acids and proteins			
		4: Evaluate the structure of nucleosides and nucleotides and stability of			
		DNA backbone			
		5: Illustrate the biosynthesis of purines and pyrimidines and structure as			
		well as properties of DNA and RNA			
		6: Summarize the structure, properties and significance of biological			
		macromolecules			
7	Course	This course comprises of the structure, function, properties and			
	Description	significance of various macromolecules found in biological systems.			



		Several different macromolecules viz. lipids, carbohydrates, amino				
		acids, protein	s, and nucleic	acids will be studied in details.		
8	Outline syllabu	15			CO Mapping	
	Unit 1	Lipids			CO1, CO6	
	А	Structure and	chemistry of f	atty acids		
	В	Saturated and	unsaturated fa	atty acids		
	С	General prope	erties and struc	tures of phospholipids,		
		sphingolipids	and cholestere	bl		
	Unit 2	Carbohydrat	tes		CO2, CO6	
	А	A Carbohydrate classification, Monosaccharides; D- and L-				
	designation, Open chain and cyclic structures					
	В	Structure and	biological imp	portance of disaccharides		
	C Structural polysaccharides and storage polysaccharides					
	Unit 3 Proteins				CO3, CO6	
	А	Amino Acids				
	В	Classification	, Structure and	l Properties; Proteins:		
		Primary, Seco	Primary, Secondary,			
	C	Tertiary and C	Quaternary Str	ucture; Biological functions		
		of proteins				
	Unit 4	Nucleic Acid	S		CO4, CO6	
	А	Nature of nuc	leic acids, Stru	cture of purines and		
		pyrimidines				
	В	Nucleosides a	nd Nucleotide	S		
	С	Stability and t	formation of p	hosphodiester linkages		
	Unit 5	Structure of	DNA		CO5, CO6	
	Α	Biosynthesis	of purines and	pyrimidines		
	В	Structure of E	NA and RNA	-		
	С	Watson-Crick	model, Types	s of DNA		
	Mode of	Theory				
	examination		_			
	Weightage	tage CA MTE ETE				
	Distribution	30%	20%	50%		
	Text book/s*	Nelson D.L.,	and Cox M.M.	., Lehninger Principles of Bioc	hemistry, 6 <sup>th</sup>	
		Edition. W. H. Freeman (2012).				
	Other	1. Berg J.M.,	Tymoczko J.L.,	and Stryer L., Biochemsitry, 7 <sup>th</sup>	Edition. W. H.	
	References	Freeman (2010	)).			
		2. Voet D., and	2. Voet D., and Voet J.G., <i>Biochemistry, 4<sup>th</sup> Edition</i> . Wiley (2010).			



CO/PO	PO1	PO2	PO3	PO4	PO5
C01	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
C05	3	2	2	2	2
CO6	3	2	2	2	2

### Introduction to Food Technology: BFS102

Sch	ool: SBSR	Batch : 2019-2022
Pro	gram: B. Sc.	Current Academic Year: 2019-20
Branch: Food		Semester: 02
Scie	nce and	
Tec	hnology (H)	
1 Course Code		BFS102
2	Course Title	Introduction to Food Technology
3	Credits	4
4	Contact	4-0-0
	Hours	
	(L-T-P)	
	Course Status	Compulsory
5	Course	The course is designed to prepare students with a basic understanding of
	Objective	food processing and preservation techniques involved in food sciences.
		The course provides a foundation for introduction of various important
		topics of food sciences.
6	Course	After the successful completion of this course students will be able to:
	Outcomes	1. Discuss historical development of food science, technology, and the
		effects of processing on foods.
		2. Explain the processing of cereals, pulses, milk and meat products.
		3. Recognize the thermal and non-thermal methods of food processing.
		4. Review potential applications of processing and preservation in food
		technology.
		5. Describe use of microbes in food industries.
		6. Explain the processing, nutritional values and packaging of food
		products.
7	Course	The aim of the course is to take a multidisciplinary approach by
	Description	integrating advances in food science and food processing in order to



		introduce students to the main principles of science and t				
		their implementation in the food industry.				
8	Outline syllabu	IS	CO Mapping			
	Unit 1	General Introduction	CO1, CO2			
	A	Historical development of food science and technology				
	В	Evolution of Food Processing				
	C	Introduction to various branches of Food Science and				
		Technology				
	Unit 2	Introduction to Plant and Animal derived foods				
	А	Classification, processing and nutritional value:	CO2, CO4			
		Plant derived: Cereals, pulses, fruits, vegetables				
	В	Classification, processing and nutritional value:				
		fats and oils; Animal derived: Meat, poultry, fish, milk				
		and milk products;				
	C Beneficial microbes in Food					
	Unit 3	Introduction to Food processing and preservation	CO3, CO4			
	А	Minimal processing of foods with thermal and non				
		thermal methods. Ohmic heating and Llich Dressure				
		inermal methods; Onmic heating and High Pressure				
		processing; Freezing, drying and dehydration and				
	irradiation procedures					
	B Safety criteria in minimally processed foods					
	C Minimal processing in practice fruits and vegetables,					
	seafood-effect on quality. Future developments					
	Unit 4	Introduction to Food packaging	CO6			
	А	Objectives of packaging				
	B	flexible packaging				
	C	Brief description of packaging of frozen products, dried				
	-	products fats and oils and thermally processed foods				
	TI:4 5	Products, faits and ons and merinary processed roods	COG			
		Properties of the packaging materials	000			
	A	Use of low density polyethylene, ethylene acrylic acid, ethylene methacrylic acid, ionomers				
	В	High density polyethylene, polypropylene ,polyvinyl				
		chloride, polyvinylidene chloride, ethylene vinyl				
	alcohol, polystyrene					
	C Polyethylene terephthalate or nylon, ethylene vinyl					
	acetate for food packaging					
	Mode of	Theory				
	examination					
	Weightage	CA MTE ETE				
	Distribution	30% 20% 50%				
	Text book/s*	1. Manay, S. & Shadaksharaswami, M., Foods: Facts				
		and Principles, NewAge Publishers, 2004				
	Other 1. B. Srilakshmi, Food science, New Age					



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References	Publishers,2002	
	2. Essentials of Food & Nutrition by Swaminathan,	
	Vol. 1 & 2 (2012)	
	3. Marriott, Norman G. Principles of Food Sanitation,	
	AVI, New York, 1985	

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### Introduction to Food Technology Lab: BFP102

Sche	ool: SBSR	Batch: 2019-2022				
Prog	gram: B. Sc	Current Academic Year: 2019-20				
Branch: Food		Semester: 02				
Scie	nce and					
Tecl	hnology					
1 Course Code		BFP102				
2	Course Title	Introduction to Food Technology Lab				
3	Credits	1				
4	Contact Hours	0-0-2				
	(L-T-P)					
	Course Status	Compulsory				
5	Course	• To understand the sampling of milk products.				
	Objective	• To learn the importance of proximate analysis.				
6	Course	After successful completion of this course, students will be able to:				
	Outcomes	1: Learn the quality assessment of milk.				
		2: Understand the importance of testing procedures for cereal and				
		related products.				
		3: Demonstrate common food testing techniques				
		4: Explain the importance of various chemicals preservatives in				
		preservation.				



		5: Recognize	e the importa	nce of microbiological ana	lysis in fruits			
		and vegetabl	and vegetables.					
		6: Study the	packaging and	labelling requirements of p	rocessed			
		foods.	F					
7	Course	In this course	e, students wil	l deal with various quality a	spects of food			
	Description	products.	,	1 5	1			
8	Outline syllabus	8			CO			
	5				Mapping			
	Unit 1	Practical ba	sed on effect	of heat and pH on color	CO1			
		and texture	of green vege	tables.				
	А	To study the	effect of heat	on colour/texture of fruit				
	В	To evaluate t	To evaluate the texture of effect of heat on					
		colour/textur	colour/texture of vegetables					
	С	To estimate t	the pH of heat	processed food sample				
	Unit 2	Practical re	lated to estim	ation of gluten content	CO2			
		present in a						
	А	To analyse the wet gluten content of wheat						
	В	To analyse the						
	С	To analyse th						
	Unit 3	Practical re	CO3					
	А	To test the fa	t content in m	ilk products				
	В	To check the	protein conte	nt in milk products				
	С	To estimate t	he acidity/pH	of the milk product				
	Unit 4	Practical rel	ated to devel	opment of different types	CO4			
		of fruit and	vegetable ba	sed products				
	А	Developmen	t of Jam					
	В	Developmen	t of ketchup					
	С	Developmen	t of tomato pu	ree				
	Unit 5	Practical rel	lated to estim	ation of carbohydrates in	CO5			
		different for	od samples.					
	А	To estimate of	carbohydrates	in cereals				
	В	estimation of	f carbohydrate	s in fruits/vegetables				
	С	Estimation o	f CHO conten	t in legumes				
	Mode of	Practical and	Viva					
	examination							
	Weightage	CA	MTE ETE					
	Distribution	60%	0%	40%				
	Text book/s*	FSSAI Manu	al for Analysi	s for Food Products.				
	Other							
	References							



CO/PO	PO1	PO2	PO3	PO4	PO5
C01	3	2	3	3	1
CO2	3	2	3	3	2
СОЗ	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
<b>CO6</b>	3	2	2	2	2

#### **Microbiology: BSB105**

WIIC		
Sch	ool: SBSR	Batch : 2019-2022
Prog	gram: B.Sc	Current Academic Year: 2019-20
Bra	nch: Food	Semester:02
Scie	nce and	
Tecl	hnology (H)	
1	Course Code	BSB105
2	Course Title	Microbiology
3	Credits	4
4 Contact Hours		4-0-0
(L-T-P)		
	Course Status	Core
5	Course	This course has been designed to make students understand the basic
	Objectives	characteristics of microbes.
		2. To know about basis principle and to understand the methods of
		sterilization.
		3. Students understand the basic structure of Bacteria
6	Course	After successfully completion of this course students will be able to:
	Outcomes	1: To study the history of microbiology and its basic concepts.
		Structure and nutrition of bacteria.
		2: Growth, multiplication, factors affecting growth of bacteria and
		techniques related to its isolation.
		3: Principles of physical and chemical methods used in the control of
		microorganisms.
		4: Prevention and control of microbial diseases.
		5: Elaborate Structure and life cycle of bacteriophage and virus.
		6: Application of microorganisms in different industries that can benefit
		human



7	Course	Microbiology course outlines the general characteristics of different					
	Description	microorganis	of significance of				
		different mici	obes affecting	the hum	an beings.	C	
8	Outline syllabus					CO Mapping	
	Unit 1	Introduction	to Microbiol	ogy		CO1, CO6	
	А	History of Microbiology & contribution of					
		microbiologis	sts				
	В	Spontaneous	generation; Ko	och Postu	ılates		
	С	Whittaker's 5	kingdom con	cept; Pas	teurization.		
	Unit 2	Morphology	and Nutrition	n of Bact	teria	CO2, CO6	
	А	Morphology a	and fine struct	ure of Ba	cteria; outer		
		surface of bac	cteria; Cell wa	ll of Gra	m +ve and Gram -		
		ve bacteria					
	В	Nutritional cl	assification of	Bacteria			
	С	Brief overvie	w on Archea;	Cyanoba	cteria, PPLO		
	Unit 3	Growth and	Sporulation i	n Bacter	ria	CO3 , CO6	
	А	Modes of cell	division (Bin	ary fissic	on; budding and		
		Septum forma	ation); Normal	l growth	of bacteria;		
		Growth curve	•				
	В	Pure culture,	Method of iso	lating pu	re culture (Streak		
		method, Pour	-plate and spre	ead plate	technique);		
	Synchronous and asynchronous						
	C Growth inhibitory substances (temperature, acidity,						
		alkalinity, wa	ter availability	, oxygen	ı)		
	Unit 4	Control of M	licrobial Grov	wth		CO4, CO6	
	А	Microbes and	Human welfa	re (medi	cal and chemical		
		industry)					
	В	Microbes in f	ood industry				
	С	Physical and	d chemical	methods	s of control of		
		microorganis	ms				
	Unit 5	Virus and Its	s Control			CO5, CO6	
	A	Ultra-structur	e of Virus				
	В	Life Cycle an	d its control				
	С	Life cycle of	Bacteriophage	;			
	Mode of	Theory					
	examination						
	Weightage	CA	MTE	ETE			
	Distribution	30%	20%	50%			
	Text book/s*	1. Microbiolo	gy - Pelezar,	M.J. Rei	d, R.D. and E.C.S.		
	0.1	Chan, Tata Mo	c Graw Hill, Ne	w Delhi.1	1977 (4 <sup>th</sup> Edition)		
	Other	1. Prescott, Ha	rleyand Kelvin	– Microb	10logy, 2nd ed.		
	Keterences	I MH Publicat	ion	oger P	Strainar at al DIU		
		2. General M Publication	nerobiology: R	loger &	Suamer et.al. PHL		
	Publication						



CO/PO	PO1	PO2	PO3	PO4	PO5
C01	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### Food Chemistry: BFS201

Scho	ol: SBSR	Batch : 2019-2022				
Pros	gram: B.Sc	Current Academic Year: 2020-21				
Branch: Food		Semester: 3				
Scie	nce and					
Tech	nnology					
1	Course Code	BFS 201				
2	Course Title	Food Chemistry				
3	Credits	4				
4	Contact Hours (L-T-P)	4-0-0				
	Course Status	Compulsory				
5	Course	1. To introduce the Food Chemistry and its industrial application.				
	Objective	2. To develop the knowledge of Food Chemistry.				
		3. To set up appropriate examples for food chemistry in terms of use in				
		food products				
		4. To develop the knowledge of chemistry behind food.				
6	Course	After successfully completion of this course students will be able to:				
	Outcomes	CO1: Comprehend the basic chemistry concept of carbohydrates, proteins				
		and fat. Basic understanding chemistry with food				
		CO2: Develop idea for chemistry of gums, polysaccharides for industrial				
		CO3: Different parameters use to evaluate carbohydrates, proteins and fat.				
		CO4: Carbohydrate and their role in food. Anti-nutritional factors				
		CO5: Differentiation among enzymes and enzyme activity				
		CO6. Recognize the importance and utility of Food chemistry in food. Food				
		chemistry used in food preservation and chemicals				
7	Course	Food Chemistry is an application of various nutrient and non-nutrients found in				
	Description	food and their end use till digestion. The types of molecules separated from				



		plant introduce beneficial as additives in food preservation. In the future Food						
		Chemistry coul	ld offer foods w	ith higher vitamin levels, longer s	shelf lives or the			
		ability to retai	n as fresh ever	n in the face of climate change.	In this course,			
		students will 1	earn about the	different bimolecular and techn	iques/ methods			
		used as ingredi	ents/ material a	nd their use.				
8	Outline syllabus				CO Mapping			
	Unit 1	Carbohydr	ates		CO1, CO2			
	А	Introduction, D	Definition and fu	inctions	CO1, CO3			
	В	Classification of	of Carbohydrate	es	CO1, CO3			
	С	Carbohydrates	Carbohydrates function, types and use					
	Unit 2	Proteins and	Amino acids		CO3			
	A	Protein types, o	classification		CO3			
	В	Physical and cl	Physical and chemical functions					
	С	Protein denatur	ration, Milk, me	at and Egg proteins	CO3			
	Unit 3	Lipids (oil and	Lipids (oil and fats)					
	А	Lipids classific	Lipids classification					
	В	Physico-Chem	CO4					
	С	Chemistry, fun	Chemistry, functions and application of emulsifiers					
	Unit 4	Anti-nutrition	Anti-nutritional factors of foods					
	А	Antioxidants, s	tabilizers and a	dditives	CO5			
	В	Chemistry and compounds (Fl	Chemistry and functional properties of pigments and flavour compounds (Flavanoids)					
	С	Enzyme inhibit	tors, Trypsin an	d chymotrypsin inhibitor	CO5			
	Unit 5	Enzymes and	starches		CO5,CO6			
	А	Enzymes-Modi of starches	ified starches, re	esistant starches, gelatinization	CO5			
	В	Alpa-Beta amy	lase, Reactions	of aldehydes and Ketones with	CO6			
		amino compou	nd					
	С	Oxidative chan	iges of polypher	nols and their application	CO6			
	Mode of	Theory						
	examination		MTE	PTP				
	Weightage		MIE	EIE				
	Distribution	30%	20%	50%				
	Text book/s*	1. Meyer, I Reinhold	L.H.(1998) Fo Company Publi	od Chemistry, Van Nostrand, ication, New York , London.				
	Other	2. Pomeranz	z, Y and Mel	on, R. (1995) Food Analysis:				
	References	Theory an New Yor	nd Practice, We k. Sydney, Toro	stport, An AVI Publication,				
		3. Fernnema	a. R.O (1997) F	Food Chemistry, Second Edition				
		Food Sci	ience & Techr	nology series Marcel Dekker.				
		INC., Ne	INC., New York					



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### HUMAN HEALTH AND DISEASE: BFS209

Sch	ool: SBSR	Batch : 2019-2022
Pro	gram: B. Sc	Current Academic Year: 2020-21
Branch: Food		Semester: 3
Sci	ence and	
Tec	hnology	
1	Course Code	BFS209
2	Course Title	Human Health and Disease
3	Credits	4
4	Contact Hours	4-0-0
	(L-T-P)	
	Course Status	Compulsory
5	Course	1. Understanding about human physiology.
	Objective	2. Importance and need of health.
		3. Basic concepts of nutrition and its role in health.
		4. Types of diseases
		5. New initiative in promoting health.
6	Course	After successfully completion of this course students will be able to:
	Outcomes	CO1: Comprehend the basic concept of health.
		CO2: Nutritional methods and. Recognized methodology for assessment of
		health
		CO3: Role of nutrients to measures energy.
		CO4: Types and various nutritional programmes
		CO5: Dietary management
7	Course	Health and Disease is an application of food science and nutrition. The types of
	Description	methods applied during identification, characterization are beneficial in
		development of growth and health. In depth knowledge with its applicable
		techniques. In this course, students will learn about the role of food Quality in
		maintains of health .
8	Outline syllabus	CO Mapping



Unit 1	Basics of Health	CO1,
Α	Definition, concept and dimensions of health, Disease- concepts, classification,	C01,
В	Food and Its Role, Factors influencing health: Causes and risk factors for developing illness,	CO1, CO2
С	Maintenance of health. Digestion, Absorption and transport and excretion of nutrients.	CO1
Unit 2	Nutrition and health	CO2, CO3
А	Elements of nutrition (Macro and micro nutrients), role of nutrition in maintaining health Balanced diet and its composition,	CO2
В	Classification of foods (Body building, energy giving and protective foods),	CO2
С	Calorific value, Recommended Dietary Allowances (RDA)	CO2
Unit 3	Nutrition Related Disorders	CO3, CO6
Α	Nutritional problems in India, National Nutrition policy, Factors affecting food and nutrition	
В		
С		
Unit 4	Nutrition Programmes	CO4
А	Nutrient Deficiency Control, ICDS, Supplementary Feeding Programme,	CO4
В	Assessment of Nutritional Status, Health Promotion and levels of disease Prevention,	CO4
С	Hygiene practices, importance of Hygiene for disease prevention and factors influencing hygiene practice	CO4
Unit 5	Nutrition and Infection	CO5,CO6
А	Dietary Management of Obesity	CO5,CO6
В	Coronary Heart Disease and Diabetes Mellitus, Maternal Malnutrition	CO5,CO6
С	Nutritive value of Indian Foods	CO5,CO6
Mode of examination	Theory	
Weightage	CA MTE ETE	
Distribution	30% 20% 50%	
Text book/s*	Food and Nutrition Vol-1 and Vol- 2, Dr. M.Swami Narthan.	
Other References	NIN- Nutritive value of Indian Foods.	



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

# Food Microbiology: BSF204

School: SBSR		Batch : 2019-2022			
Program: B.Sc		Current Academic Year: 2020-21			
Branch: Food		Semester: 03			
Scie	nce and				
Tecl	nnology (H)				
1	Course Code	BSF204			
2	Course Title	Food Microbiology			
3	Credits	4			
4	Contact	4-0-0			
	Hours				
	(L-T-P)				
	Course Status	Compulsory			
5 Course		To develop knowledge of different groups of microbes and getting an overall idea of			
Objective		food-borne microbes involved in beneficial and harmful activities			
6	Course	After successfully completion of this course students will be able to	o:		
	Outcomes	CO1. Identify migrohas associated with food their classification a	nd factors offecting		
		their growth	nu factors affecting		
		CO2: Describe fermented foods and their microflora			
		CO3: Compare food spoilage in different classes of food			
		CO4: Examine and detect food-borne pathogens			
		CO5: Recognize microbial destruction methods			
		CO6: Develop an overall idea of food-borne microbes involved in beneficial and			
		harmful activities and methods of influencing their growth and	l survival.		
7	Course	This course has been designed to make student understand the microbes			
Description		involved in food production and for causing the food-borne	microbes		
8 Outline syllab		15	CO Mapping		



Unit 1	Microorganisms of Food			C01,C06
А	History of Fe			
В	Microorgani			
fungi, viruses, protozoa, toxic algae, Microbia				
	grouping in	practice		
С	Extrinsic an	d Intrinsic H	Factors affecting Microbial	
	Growth			
Unit 2	Fermented a	and microbia	l foods	CO2,CO6
А	Fermented a	nd microbial	foods: Fermented Milk and	
	milk product	ts, Single cell	protein,	_
В	Fermented	fruits and vo	egetables, Fermented fish,	
	Fermented n	neats		_
С	Fermented	beverages- I	Beer, Vinegar and Wine,	
 	Concept of	Probiotics and	health benefits	
Unit 3	Food Spoila	ge		CO3
А	Spoilage of	different to	ods types- Cereal and its	
<b>D</b>	products, Ve	getables, fruit	ts, and its products	_
B	Milk and its	products		_
C	Meat and m	eat products,	poultry, fish and sea foods	
 TT •4 4	and Drinking	gwater		
Unit 4	Diagnosis	_ CO4; CO6		
A	Detection of	-		
В	Concept of I	vietabolically	injured organisms their	
C	Discourse for	-		
	Bioassays for detecting microbes			CO5. CO6
Unit 5	Destruction of microorganisms			005; 006
	microorgania			
	Destruction	-		
	chemical me	thods Heating	process Irradiation I ow	
	temperature	storage	process, intadiation, Low	
	Bioassays fo	_		
 Mode of				
examination				
Weight age	CA			
Distribution	30%	20%	50%	
Text book/s*	1. Frazier, V			
	Microbiolog			
	Company Lt			
	2. Adams,			
	Microbiolog			
	Chemistry Publication, Cambridge.			
Other	3. Jay, J.M. (2008) Modern Food Microbiology (Sixth			
References	Edition).Asp			
	Maryland.			



	4. Ray, B. (2005) Fundamental food microbiology
	(Third edition). CRC Press, New York, Washington.

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### Nutrition Science and Human Physiology: BFS210

School: SBSR		Batch : 2019-2022
Program: B.Sc		Current Academic Year: 2020-21
Branch: Food		Semester: 03
Science and		
tech	nology(H)	
1	Course Code	BFS210
2	Course Title	NUTRITION SCIENCE AND HUMAN PHYSIOLOGY
3	Credits	4
4	Contact	4-0-0
	Hours	
(L-T-P)		
	Course Status	Compulsory
5 Course		To develop Knowledge of the Structure and Function of cardio, Gastriointestinal
	Objective	Reproductive system and Relevance of Food with Physiology.
6	Course	After successfully completion of this course students will be able to:
	Outcomes	CO1: Illustrate the Structure and Function of the Heart, Cardiac cycle, Blood
		Pressure, and BMR Concept.
		CO2: Summarize Structure and Function of Gastriointestinal Physiology.
		CO3: Describe the Actions and Disorders of Exocrine and Endocrine System.
		CO4: Knowledge of the Structure and Function of Reproductive Physiology and
		Relevance of Food with Physiology.
		CO5: Explain the concepts of Health, Disease, and its Prevention and the Basic
		Concept of Disease.
		CO6: Knowledge of the general terminology of WHO, Disease Prevention and
		Transmission.
7 Course		This course has been designed to make student understand the Relevance of



	Description				
8	Outline syllabus				CO Mapping
	Unit 1	Human Physiol	ogy		CO1
	А	Cardio- Respiratory Physiology			
	В	Blood -Composition and function, Anemia, Jaundice,			
		Blood circulation			
		and portal), Ca			
		pressure			
	С	Structure of lung	gs and its	function, Lung volume and	
		Capacities. Conc			
	Unit 2	Gastrointestinal Physiology			CO2
	А	Structure of stor	nach, live	er, gallbladder, pancreas and	
		their functions			
	В	Composition,	function	and regulation of GI	
	~	secretions			
	С	Neuro- Endocrin	e Physiol	ogy	
	Unit 3	<b>Organization O</b>	f Nervou	s System	CO3
	А	Actions and diso	orders of P	Pituitary	
	В	Thyroid and Para	athyroid		
	С	Adrenal and Pan	creatic ho	ormones.	
	Unit 4	Renal And Rep	CO4		
	AStructure of kidney and its functionBPhysiology of Pregnancy and lactation				
	С	Mental Health,			
	Unit 5	Promotive Health			CO5; CO6
		Concept of health, Disease and its Prevention			
		WHO definition	of Health	h, Basic concept of Disease	
		and Disease tran			
		Definition of Pul	blic Healt	h and Disease Prevention	
	Mode of				
	examination			L	
	Weight age	CA MT	ΓE	ETE	
	Distribution	30% 209	%	50%	
	Text book/s* 1) Ganong WF (2003). Review of Medical				
		Physiology,			
		K. Park (200			
		2) Park's Text			
		Medicine, 20			
		Jabalpur			
	Other	3) Ross and Wi			
	References	and Physiology,			



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### Food Biotechnology: BFS202

School: SBSR		Batch : 2019-2022			
Program: B.Sc.		Current Academic Year: 2020-21			
Branch: Food		Semester: 3			
Scie	nce and				
Tec	hnology				
1	Course Code	BFS202			
2	Course Title	Food Biotechnology			
3	Credits	4			
4	Contact Hours	4-0-0			
	(L-T-P)				
	Course Status	Compulsory			
5	Course	1. To train the students about the basic principles, application of food			
	Objectives	biotechnology.			
		2. To develop knowledge of downstream processing in food industry.			
		3. To acquaint students with biotechnology and industrial production of			
d		different food product			
6	Course	CO1: Understand the basic principles, application, safety, regulations and			
	Outcomes	Food authentication methods of food biotechnology.			
		CO2: Understand fundamentals of downstream processing and			
		biosensors in food industry			
		CO3: Understand natural control of micro-organism and production with			
		control of Aflatoxin			
		CO4: Understand all about GMOs and Protein Engineering applications			
		in food industry			
		CO5: Understand the biotechnology and industrial production of			
		different food product			
		CO6: Biotechnology is tool for various quality measurements in food			
		products like PCR, Immunological methods and DNA based methods.			



	1						
		Biotechnology offers various purification operations for food products.					
		Fermented food products manufacturing are based on biotechnology.					
7	Course	Biotechnology is tool for various quality measurements in food products					
	Description	like PCR, Immunological methods and DNA based methods. Fermented					
		food products manufacturing are based on biotechnology.					
8	Outline syllabus		CO Mapping				
	Unit 1	Food Biotechnology	CO1, CO6				
	А	Introduction to Food Biotechnology, basic principles	CO1, CO6				
		industry.					
	В	Food safety and biotechnology- Impact of	CO1, CO6				
		Biotechnology on foods					
	С	Impact of Biotechnology on foods .Real time PCR	CO1, CO6				
		based methods					
	Unit 2	Downstream processing	CO2, CO6				
	А	Principle and types of downstream processing of food	CO2, CO6				
		products, General types and stages in downstream					
		processing					
	В	Bacterial starter culture, Methods of inoculation,	CO2, CO6				
		media preparation, Slurry processing and product					
	isolation.						
	С	CO2, CO6					
	Unit 3	Industrial Application	CO3, CO6				
	А	Biotechnology and industrial production of enzymes	CO3, CO6				
	В	Industrial production of beer, wine, amino acids,	CO3, CO6				
	С	Industrial production of baker's yeast, brewer's yeast	CO3, CO6				
		and single cell protein.					
	Unit 4	Other Applications of Bio-Technology	CO4, CO6				
	А	Applications of bacteriocins in food systems.	CO4, CO6				
	В	Various Fermentative Products	CO4, CO6				
	C	Other applications	CO4, CO6				
	Unit 5	МО	CO5, CO6				
	A Transgenic plants and animals : Current status		CO5,CO6				
		transgenic Plants and animals, methods, concept,					
	В	Ethical issues	CO5,CO6				
	С	Protein engineering in Food technology –objectives.	CO5,CO6				
		methods, limitations and applications (e.g.					
	Lactobacillus, $\beta$ -galactosidase, nisin and Glucose						
		isomerase).					
	Mode of						


examination					
Weightage	CA	MTE	ETE		
Distribution	30%	20%	50%		
Text book/s*	1. VK Joshi a	nd Ashok Pan	dey (1999). Biot	echnology-	
	Food ferm	entation, Vo	olume 1&2 E	ducational	
	publishers an	d Distributors			
	2. Tombs,	M.P. (1991).	Biotechnology	in Food	
	Industry, Ope	en University I	Press, Milton Key	ynes	
Other	3. Lee, B.	Н. (1996).	Fundamentals	of Food	
References	Biotechnolog	y, VCH Publish	ners		
	4. Schwartzb	erg, A & Rad	o (1990). Biotec	hnology &	
	Food Process	Engineering			

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### Food Biotechnology and Food Microbiology Lab: BFP201

Sch	ool: SBSR	Batch : 2019-2022
Prog	gram: B.Sc.	Current Academic Year: 2020-21
Bra	nch: Food	Semester: 3
Scie	nce and	
Tecl	hnology	
1	Course Code	BFP 201
2	Course Title	Food Biotechnology and Food Microbiology Lab
3	Credits	2
4	Contact Hours	0-0-3
	(L-T-P)	
	Course Status	Compulsory
5	Course	1. To train the students about the basic principles, application of food
	Objectives	biotechnology and microbiology.



		3. To acquaint students with biotechnology and industrial production of different food and dust					
6	Course	After the successful completion of this course students is	will be able to.				
0	Outcomes	After the successful completion of this course students v					
	Outcomes	• CO1: To gain knowledge of general microbio	logy laboratory				
		practices.					
		• CO2: To gain hands-on experience with the use	of a microscope				
		and microscopic examination.					
		• CO3: To teach students about various staining and culturing/sub-					
		culturing techniques.	_				
		• CO4: To learn the protocol for estimating the prese	ence of microbes				
		in specific food commodities					
		• CO5. To apply industrial histochnology know	uladaa in food				
		• COS: To appry industrial biotechnology know	vieuge in 1000				
	~	production.					
7	Course	Biotechnology is tool for various quality measurements	in food products.				
	Description	Microbiology course outlines the general characteris	stics of different				
		microorganisms and also provides the basic knowledge	of significance of				
0	Orathing and the hora	different microbes affecting the human beings.	CO Manaina				
8	Utiline syllabus	Introduction to bosis mismobiology. Laboratomy	CO Mapping				
	Unit I	Introduction to basic microbiology Laboratory	COI				
		Practices					
	A D	Equipment's and Classing and Starilization of					
	D	glassware's					
	С	Solution preparation					
	Unit 2	Practical related to the study of compound	CO2				
		microscope/microscopic examination of microbes					
	А	To study the different parts of compound microscope					
	В	Microscopic examination of microbes in curd					
	С	Microscopic examination of microbes milk					
	Unit 3	Practical related to Staining Techniques	CO3				
	А	Principle of staining					
	В	Simple staining					
	C	Gram staining					
	Unit 4	Estimation of microbial count	CO4				
	А	To determine the total plate count					
	В	To determine the yeast and mould count					
	C	To determine E. coli count					
	Unit 5	Biotechnology and Industrial production of food	CO5				
		products					
	А	Development of cheese					
	В	Development of paneer					
	C	Development of yogurt					
	Mode of						



examination				
Weightage	CA	MTE	ETE	
Distribution	60%	0%	40%	
Text book/s*				
Other References	<ol> <li>Dubey, (2012). P Limited.</li> <li>Pelczar, Microbio Publication</li> </ol>	R. C., & ractical Micr M. J., Chan, logy. (1993 on, New Delhi,	Maheshwari, D. K. <i>cobiology</i> . S. Chand Pvt. E. C. S., & Krieg, N. R. B). <i>Tata McGrow Hill</i> <i>India</i> .	

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### Food Chemistry and Processing Lab: BFP202

Sch	ool: SBSR	Batch : 2019-2022
Pro	gram: B.Sc.	Current Academic Year: 2020-21
Bra	nch: Food	Semester: 3
Scie	ence and	
Tec	hnology	
1	Course Code	BFP202
2	Course Title	Food Chemistry and Processing Lab
3	Credits	2
4	Contact Hours	0-0-3
	(L-T-P)	
	Course Status	Compulsory
5	Course	1. To introduce the Food Chemistry and its industrial application.
	Objectives	2. To develop the knowledge of Food Chemistry.
		3. To set up appropriate examples for food chemistry in terms of use in
		food products
		4. To develop the knowledge of chemistry behind food.
6	Course	After the successful completion of this course students will be able to:



	Outcomes	• CO1: To educate the students on the significant	ice, purpose and				
		principle of Food Chemistry					
		• CO2: To estimate total carbohydrates protein	in starch Ash				
		Moisture Content from different food samples					
		• CO2: To estimate reducing and non reducin	a an an a fram				
		• COS: 10 estimate reducing and non-reducin	ig sugars from				
		different food samples.					
		• CO4: To understand the method for determination	ation of pH and				
		acidity from different food samples.					
		• CO5: To understand preparation of Primary	and Secondary				
		solutions.					
		• CO6: To understand method of estimation of	ascorbic acid in				
		food samples					
7	Course	Food Chemistry is an application of various nutrient and nor	n-nutrients found in				
	Description	food and their end use till digestion. The types of molecu	les separated from				
		plant introduce beneficial as additives in food preservation.	In the future Food				
		Chemistry could offer foods with higher vitamin levels, long	er shelf lives or the				
		students will learn about the different himolecular and te	chniques/ methods				
		used as ingredients/ material and their use.	eninques, methods				
8	Outline syllabus		CO Mapping				
	Unit 1	General Laboratory practices/Principle/working of	CO1				
		equipment's used in Laboratory					
	А	Principle of general equipment's used in food processing Laboratory					
	В	Working of general equipment's used in food processing					
		Laboratory					
	С	General Laboratory practices and rules					
	Unit 2	Analysis of proximate composition of food	CO2				
	A	Determination of moisture content in sample					
	В	Determination of fat content in sample					
	С	Determination of protein content in sample					
	Unit 3	Practical related to Analysis of pH/acidity	CO3				
	А	Determination of pH of the food sample					
	В	Solution preparation related to the experiment					
	С	Determination of acidity of the food sample					
	Unit 4	Preparation of Primary and Secondary molar/normal	CO4				
		solution					
	А	Preparation of Primary and Secondary solutions					
	В	Preparation of molar solutions					
	С	Preparation of normality solutions					
	Unit 5	Analysis of ascorbic acid content	CO5				
	А	Ascorbic acid content in fruits sample					
	В	Ascorbic acid content in vegetable sample					
	C	Ascorbic acid content in food product					



				~	🥜 Beyond Boundaries
Mode of examination					
Weightage	CA	MTE	ETE		
Distribution	60%	0%	40%		
Text book/s*	1. Serna-Salo	livar, S. O	. (2012). Cereal	grains:	
	Laboratory	Reference and	Procedures manua	al. CRC	
	Press.				
	2. Pomeranz,	, Y and Melor	, R. (1995) Food A	nalysis:	
	Theory and	Practice, Wes	tport, An AVI Pub	lication,	
	New York, S	ydney, Toront	0.		
Other					
References					

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### FOOD QUALITY ANALYSIS: BFS205

School: SBSR		Batch : 2019-2022
Prog	gram: B. Sc	Current Academic Year: 2020-21
Brar	ich: Food	Semester: 4
Scier	nce and	
Tech	nology	
1	Course Code	BFS205
2	Course Title	FOOD QUALITY ANALYSIS
3	Credits	4
4	Contact Hours	4-0-0
	(L-T-P)	
	Course Status	Compulsory
5	Course	1. To introduce the Food Quality Attributes and its industrial
	Objective	application.



		2. To develop the knowledge and techniques of eval	uation of food				
		products and packaging material used.					
		3. To set up appropriate examples for techniques/me	thods material				
		selection for food products assessment.					
		4. To develop the knowledge of evaluation and appli	cations in food				
		quality					
6	Course	After successfully completion of this course students will be able	e to:				
	Outcomes	CO1: Comprehend the basic concept of food quality asses	ssment and the				
		requirements necessary for its application.					
		CO2: Develop an idea for the appropriate methodologies types of techniques					
		for food quality evaluation purpose. Study of Diffe	rent parameters				
		use to evaluate sensory attributes of food.	Demonstrate				
		experimentally among various scales used for sensory					
		CO3. Application of variation and techniques in Food. Differe	entiation among				
		CO4: Recognize the importance and utility of Food attributes					
		CO5: Improved techniques used in industry					
		CO6: Various merits and demerits in modern and traditional to	echniques				
7	Course	Food Quality Analysis is an application of food safety in Food	manufacturing.				
	Description	The types of techniques used in quality assurance. In the futur	re Food safety l				
	_	could possible without use of these modern techniques. In this course, students					
		will learn about the different techniques / methods used for qu	ality assurance				
		and its efficient use in product development.					
8	OUTLINE OF SY	(LLABUS	CO Mapping				
	Unit 1	Quality attributes	CO1 ,CO6				
	А	General aspects of Food Qualty	CO1				
	В	Food Quality Attributes	CO1,				
	С	Food Quality Factors and their test	CO1				
		• Colour					
		• Flavour					
		• Texture					
		• Taste					
	Unit 2	Chromatography	CO2,				
	А	Chromatography Techniques; Different types of	CO2				
		Chromatography Techniques					
	В	Applications of Chromatography Techniques	CO2				
	С	HPLC,GC and GC and GC-MS,MS-MS	CO2				
	Unit 3	Food Rheology and Viscosity	CO3				
	А	Food Rheology and Viscosity determination	CO3				
	В	Measurement of viscosity. viscometer	CO3				
	С	Measurement of Physical Characteristics of food	CO3				
	Unit 4	Sensory evaluation	CO4				
	A	Panel selection and panel training	CO4				
	B	Sensory Scores and data analysis	CO4				
	С	Measurement of texture using different instrument and their	CO4				
	TT	working principle					
		I radiionai and iviodern Analytical Techniques	CO5,CU6				
	A	Uv-visible spectroscopy	C05				
1	Б	Ultrasonic equipments					



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C	Magnetic Resonance (NMR);NIR			CO6
Mode of	Theory			
examination				
Weightage CA MTE ETE				
Distribution	30%	20%	50%	
Text book/s*	1. Handbook			
	M.L. Nollet M	arcel Dekker, U	ISA.	
	2. Handbook o			
Other	3. Eram S.Rao, 2013.Food Quality Evaluation.ISBN:9789			
References	381156216 Gruenwedel DW A7 Whitaker JR.1984.			
	4. Food Analysis Principles and Technique. Vol I, II, III, IV			
	.Biological Teo	chniques Marce	l Dekker.	

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### Processing Technology of Cereals, Pulses and Oilseeds: BFS206

Scho	ool: SBSR	Batch : 2019-2022
Program: B.Sc		Current Academic Year: 2020-21
Branch: Food		Semester: 04
Scie	nce and	
tech	nology (H)	
1	Course Code	BFS206
2	Course Title	Processing Technology of Cereals, Pulses and Oilseeds
3	Credits	4
4	Contact	4-0-0
	Hours	
	(L-T-P)	
	Course Status	Compulsory
5	Course	To develop the knowledge of structure, processing and importance of major cereals,
	Objective	legumes and oilseed crops
6	Course	After successfully completion of this course students will be able to:
	Outcomes	CO1: Students will be to understand the structural nutritional and processing
		importance of wheat grain.



		CO2: Students will be able to understand the physico-chemical pro-	operties of rice grain
		and importance of parboiling based on its advantages and disa	dvantages.
		CO3: To enable the students to gather an overview of other importa-	ant cereals and their
		processing aspects	
		CO4: Students will be able to describe about processing of various	pulses
		CO5: Students will be able to have overall idea of oilseeds	and processing of
		vegetable oils and fats.	
		CO6: Students will be able to have overall the importance of maj	jor cereals, legumes
		and oilseed crops	
7	Course	Cereals, legumes and oilseeds are important source of food	l and feed in
	Description	human life. Therefore overall of these aspects are important to	facilitate their
	_	better utilization.	
8			CO Mapping
	Unit 1	Wheat	CO1, CO6
	А	Introduction, Structure and composition to cereals,	
		pulses and oilseeds	
	В	Wheat types, physicochemical characteristics, milling	
		of wheat, quality of flour and flour treatment.	
	С	Additives used in bakery products -bleaching agents	
	-	and flour improvers. Bakery products: bread, biscuits	
		cakes, extruded products (noodles and pasta).	
	Unit 2	Rice	CO2 CO6
	A	Rice- physicochemical characteristics Rice Milling :	
	71	Parboiling of rice- traditional methods and their	
		drawbacks	
	B	CETRI process of parboiling Properties of parboiled	
	D	rice Changes during parboiling Advantages and	
		disadvantages of parboiling	
	C	By products of rice milling Rice aging and rice	
	C	based processed products	
	Unit 2	Minor Corola	CO3 CO6
		Parlay Oats Sorghum and Millets processing and	005,000
	A	their important products	
	D	Com milling wat and dry mathed	
	D C	Commence ductor commence flokes and hudrolumed	
	C	Corn products: corn starch, flakes, and hydrolyzed	
	TT . • 4 . 4	syrups, corn nour, corn on and baby corn	
	Unit 4	Pulses	CO4, CO6
	A	Types and processing of Legumes (Pulses), Storage	
	P	and cooking losses	
	В	Sprouting of legumes for nutritional benefits	
	C	Anti-nutritional factors in legumes and methods of	
	<b></b>	removal	
	Unit 5	Oilseeds	CO5; CO6
		Processing- oil extraction/expression and solvent	
		extraction. Refining of crude oil- degumming,	
		bleaching, deodorizations	



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	Preparation	of protein con	centrates and isolates and	
	their use in l			
	Hydrogenati	on and Interes	sterification, Shortening-	
	introduction	, manufacturir	ng and uses of shortening,	
	types of shore	rtening. Marga	arine	
Mode of				
examination				
Weight age	CA	MTE	ETE	
Distribution	30%	20%	50%	
Text book/s*	1) Chakrave	erty, A. 1988.	Postharvest Technology of	
	Cereals, Pul	lses and oilse	eds. Oxford and IBH, New	
	Delhi.			
	2) Kent, N.I	L. 1983. Tech	nology of Cereals. 3rd Edn.	
	Pergamon Pr	ress, Oxford, 1	UK.	
	3) Salunkhe	, D. and Desp	pande, S.S (2001) Foods of	
	Plant origin	: Production, '	Technology & Human	
	4) Nutrition	An AVI Publi	ications, New York.	
	Pomeranz,	Y. 1987. M	odern Cereal Science and	
	Technology.	VCH Pub., N	lew York.	
Other				
References				

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### **Unit Operation in Food Processing: BFS203**

Sche	ool: SBSR	Batch : 2019-2022
Program: B.Sc.		Current Academic Year: 2020-21
Branch: Food		Semester: 4
Scie	nce and	
Tecl	hnology	
1	Course Code	BFS203
2	Course Title	Unit Operation in Food Processing



4       Contact Hours (L-T-P)       4-0-0         5       Course Status       Compulsory         5       Course       1. To train the students for the cleaning methods and material handling systems for foods.         6       Course       2. To develop knowledge for size reduction and mixing unit operation of foods, filtrations and expressions of foods, high and low temperature preservation operations for foods         6       Course       After successfully completion of this course students will be able to: CO1: Identify cleaning methods and material handling systems for foods CO2: Describe size reduction and mixing unit operation of foods CO3: Apply different methods of filtrations and expressions of foods CO3: Loderstand Low temperature preservation outi operations CO6: To have broader idea to the student about Unit operations CO6: To have broader idea to the student about Unit operations CO6: To have broader idea to the student about Unit operations CO6: To have broader idea to the student about Unit operations for foods, machinery, or packaging.         7       Course Description       Food engineers use computers extensively to produce and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operates; and to generate specifications for foods, machinery, or packaging.         8       Outline syllabus       CO Mapping         C       Material handling       CO1, CO6         A       Theory, classification. Cleaning – Types of contaminants found on raw foods, methods of cleaning and abrasive cleaning.       CO1, CO6         8       Dry c	3	Credits	4	
(L-T-P)         Course Status         Compulsory           5         Course         1. To train the students for the cleaning methods and material handling systems for foods.           6         Course         2. To develop knowledge for size reduction and mixing unit operation of foods, filtrations and expressions of foods, high and low temperature preservation operations for foods           6         Course         After successfully completion of this course students will be able to:           0utcomes         CO1: Identify cleaning methods and material handling systems for foods           CO2: Describe size reduction and mixing unit operation of foods         CO3: Apply different methods of filtrations and expressions of foods           CO3: Apply different methods of filtrations and expressions of foods         CO4: Describe high temperature preservation operations for foods           70         Course         Food engineers use computers extensively to produce and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operates; and to generate specifications for foods, machinery, or packaging.           8         Outline syllabus         CO Mapping           Christ 1         Material handling         CO1, CO6           A         Theory, classification. Cleaning – Types of contaminants found on raw foods, methods.         CO1, CO6           B         Dry cleaning methods: soaking, spray washing, flotation washing and ultrasonic washing. Sorting and grading – advantages, methods of sor	4	Contact Hours	4-0-0	
Course Status         Compulsory           5         Course         1. To train the students for the cleaning methods and material handling systems for foods.           6         Course         2. To develop knowledge for size reduction and mixing unit operation of foods, filtrations and expressions of foods, high and low temperature preservation operations for foods           6         Course         After successfully completion of this course students will be able to: CO1: Identify cleaning methods and material handling systems for foods CO2: Describe size reduction and mixing unit operation of foods CO3: Apply different methods of filtrations and expressions of foods CO4: Describe high temperature preservation operations for foods CO5: Understand Low temperature preservation operations in food processing           7         Course         Food engineers use computers extensively to produce and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operates; and to generate specifications for foods, machinery, or packaging.           8         Outline syllabus         CO Mapping           4         Material handling or to adsign ad brasive cleaning.         CO1, CO6           8         Dry cleaning methods: aspiration, screening, magnetic cleaning and abarsive cleaning.         CO1, CO6           6         Wet cleaning methods: soaking, spray washing, flotation washing and ultrasonic washing. Sorting and grading – advantages, methods of size reduction, criteria of size reduction, equipment selection (mechanical structure of feed, moisture content and hardness of feed and temperature sensitivity of		(L-T-P)		
5       Course Objectives       1. To train the students for the cleaning methods and material handling systems for foods.         6       Course Outcomes       2. To develop knowledge for size reduction and mixing unit operation of foods, filtrations and expressions of foods, high and low temperature preservation operations for foods         6       Course Outcomes       After successfully completion of this course students will be able to: CO1: Identify cleaning methods and material handling systems for foods CO2: Describe size reduction and mixing unit operation of foods CO3: Apply different methods of filtrations and expressions of foods CO4: Describe high temperature preservation operations for foods CO5: Understand Low temperature preservation unit operations CO6: To have broader idea to the student about Unit operations CO6: To have broader idea to the student about Unit operations for foods processing         7       Course Description       Food engineers use computers extensively to produce and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operates; and to generate specifications for foods, machinery, or packaging.         8       Outline syllabus       CO Mapping         Unit 1       Material handling       CO1, CO6         A       Theory, classification. Cleaning – Types of cleaning and abrasive cleaning.       CO1, CO6         8       Dry cleaning methods: sapiration, screening, magnetic cleaning and abrasive cleaning.       CO1, CO6         A       Nature of forces used in size reduction, criteria of size reduction washing and ultrasonic washing. Sorting and gra		Course Status	Compulsory	
Objectives         systems for foods.           2. To develop knowledge for size reduction and mixing unit operation of foods, filtrations and expressions of foods, high and low temperature preservation operations for foods           6         Course         After successfully completion of this course students will be able to: CO1: Identify cleaning methods and material handling systems for foods CO2: Describe size reduction and mixing unit operation of foods CO3: Apply different methods of filtrations and expressions of foods CO4: Describe high temperature preservation operations for foods CO5: Understand Low temperature preservation unit operations CO6: To have broader idea to the student about Unit operations CO6: To have broader idea to the student about Unit operations in food processing           7         Course Description         Food engineers use computers extensively to produce and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operates; and to generate specifications for foods, machinery, or packaging.           8         Outline syllabus         CO Mapping <b>Unit 1</b> Material handling Atterial mathematication. Cleaning – Types of contaminants found on raw foods, methods of cleaning-dry, wet and combination methods.         CO1, CO6           8         Dry cleaning methods: aspiration, screening, magnetic cleaning and abrasive cleaning.         CO1, CO6           6         Wet cleaning methods: of sorting and grading.         CO2, CO6           7         Size reduction and Mixing and wet milling.         CO2, CO6           8         Dry c	5	Course	1. To train the students for the cleaning methods and i	naterial handling
8       Outline syllabus       CO Mapping         7       Course Description       Food engineers use computers extensively to produce and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operate; and to generate specifications for foods, machinery, or packaging.         8       Outline syllabus       CO Mapping         0       Coll cleaning methods: approximation, step and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operates; and to generate specifications for foods, collaming and abrasive cleaning.         8       Outline syllabus       CO Mapping         C       Wet cleaning methods: aspiration, screening, magnetic cleaning and abrasive cleaning.       CO1, CO6         A       Theory, classification, criteria of size reduction, criteria of size reduction, equipment selection (mechanical structure of feed, moisture content and hardness of feed and temperature and temperature and temperature and temperature and temperature and temperature processing.       CO1, CO6         8       Outline syllabus       CO Mapping         C       Material handling       CO1, CO6         A       Theory, classification. Cleaning - Types of cleaning and abrasive cleaning.       CO1, CO6         B       Dry cleaning methods: aspiration, screening, magnetic cleaning and abrasive cleaning.       CO1, CO6         A       Nature of forces used in size reduction, criteria of size reduction, equipment selection (mechanical structu		Objectives	systems for foods.	
6       Course       foods, filtrations and expressions of foods, high and low temperature preservation operations for foods         6       Course       After successfully completion of this course students will be able to:         CO1: Identify cleaning methods and material handling systems for foods       CO2: Describe size reduction and mixing unit operation of foods         CO2: Describe high temperature preservation operations of foods       CO3: Apply different methods of filtrations and expressions of foods         CO5: Understand Low temperature preservation unit operations in food processing       CO6: To have broader idea to the student about Unit operations in food processing         7       Course       Food engineers use computers extensively to produce and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operates; and to generate specifications for foods, machinery, or packaging.         8       Outline syllabus       CO Mapping         Unit 1       Material handling       CO1, CO6         A       Theory, classification. Cleaning – Types of cleaning and abrasive cleaning.       CO1, CO6         B       Dry cleaning methods: aspiration, screening, magnetic cleaning and abrasive cleaning.       CO1, CO6         C       Wet cleaning methods: soaking, spray washing, flotation washing and ultrasonic washing. Sorting and grading.       CO2, CO6         A       Nature of forces used in size reduction, criteria of size reduction, equipment selection (mechanical structu			2. To develop knowledge for size reduction and mixing	unit operation of
Image: Construct of the synthesis of the synthesynthesis of the synthesis of the synthesis of the synt			foods, filtrations and expressions of foods, high and	low temperature
6       Course Outcomes       After successfully completion of this course students will be able to: CO1: Identify cleaning methods and material handling systems for foods CO2: Describe size reduction and mixing unit operation of foods CO3: Apply different methods of filtrations and expressions of foods CO4: Describe high temperature preservation operations for foods CO5: Understand Low temperature preservation unit operations CO6: To have broader idea to the student about Unit operations in food processing         7       Course Description       Food engineers use computers extensively to produce and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operates; and to generate specifications for foods, machinery, or packaging.         8       Outline syllabus       CO Mapping         Unit 1       Material handling       CO1, CO6         A       Theory, classification. Cleaning – Types of cleaning and abrasive cleaning.       CO1, CO6         B       Dry cleaning methods: aspiration, screening, magnetic cleaning and abrasive cleaning.       CO1, CO6         C       Wet cleaning methods: soaking, spray washing, flotation washing and ultrasonic washing. Sorting and grading – advantages, methods of sorting and grading.       CO2, CO6         A       Nature of forces used in size reduction, criteria of size reduction, equipment selection (mechanical structure of feed, moisture content and hardness of feed and temperature sensitivity of feed), open circuit and closed circuit grinding.       CO2, CO6         B       Size reduction of fibrous foods, solid foods, and liquid foods. Effects			preservation operations for foods	
Outcomes         CO1: Identify cleaning methods and material handling systems for foods CO2: Describe size reduction and mixing unit operation of foods CO3: Apply different methods of filtrations and expressions of foods CO4: Describe high temperature preservation operations for foods CO5: Understand Low temperature preservation unit operations CO6: To have broader idea to the student about Unit operations in food processing           7         Course Description         Food engineers use computers extensively to produce and analyze products, processes, or plant designs; to simulate and test how a machine, or food system operates; and to generate specifications for foods, machinery, or packaging.           8         Outline syllabus         CO Mapping           Init 1         Material handling         CO1, CO6           A         Theory, classification. Cleaning – Types of contaminants found on raw foods, methods.         CO1, CO6           B         Dry cleaning methods: aspiration, screening, magnetic cleaning- dry, wet and combination methods.         CO1, CO6           C         Wet cleaning methods: soaking, spray washing, flotation washing and ultrasonic washing. Sorting and grading – advantages, methods of sorting and grading.         CO2, CO6           A         Nature of forces used in size reduction, criteria of size reduction, equipment selection (mechanical structure of feed, moisture content and hardness of feed and temperature sensitivity of feed), open circuit and closed circuit grinding, free crushing, choke feeding and wet milling.         CO2, CO6           B         Size reduction of fibrous foods, solid foods, and liquid f	6	Course	After successfully completion of this course students with	ll be able to:
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Imachinery, or packaging.       CO Mapping         8       Outline syllabus       COI, CO6         A       Theory, classification. Cleaning – Types of contaminants found on raw foods, methods of cleaning- dry, wet and combination methods.       CO1, CO6         B       Dry cleaning methods: aspiration, screening, magnetic cleaning and abrasive cleaning.       CO1, CO6         C       Wet cleaning methods: soaking, spray washing, flotation washing and ultrasonic washing. Sorting and grading – advantages, methods of sorting and grading.       CO2, CO6         A       Nature of forces used in size reduction, criteria of size reduction, equipment selection (mechanical structure of feed, moisture content and hardness of feed and temperature sensitivity of feed), open circuit and closed circuit grinding, free crushing, choke feeding and wet milling.       CO2, CO6         B       Size reduction of fibrous foods, solid foods, and liquid foods. Effects of size reduction on food. Mixing –       CO2, CO6			or food system operates; and to generate specifica	tions for foods,
8         Outline syllabus         CO Mapping           Unit 1         Material handling         CO1, CO6           A         Theory, classification. Cleaning – Types of contaminants found on raw foods, methods of cleaning- dry, wet and combination methods.         CO1, CO6           B         Dry cleaning methods: aspiration, screening, magnetic cleaning and abrasive cleaning.         CO1, CO6           C         Wet cleaning methods: soaking, spray washing, flotation washing and ultrasonic washing. Sorting and grading – advantages, methods of sorting and grading.         CO2, CO6           A         Nature of forces used in size reduction, criteria of size reduction, equipment selection (mechanical structure of feed, moisture content and hardness of feed and temperature sensitivity of feed), open circuit and closed circuit grinding, free crushing, choke feeding and wet milling.         CO2, CO6           B         Size reduction of fibrous foods, solid foods, and liquid foods. Effects of size reduction on food. Mixing –         CO2, CO6		<u> </u>	machinery, or packaging.	
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B       Size reduction of fibrous foods, solid foods, and liquid foods. Effects of size reduction on food. Mixing –       CO2, CO6		A	Nature of forces used in size reduction, criteria of size	C02, C00
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foods. Effects of size reduction on food. Mixing –		B	Size reduction of fibrous foods solid foods and liquid	CO2 CO6
Todds. Effects of size reduction of food. Whixing –		D	foods Effects of size reduction on food Mixing -	002,000
Agitating kneading blending and homogenizing			Agitating kneading blending and homogenizing	
C Mixing equipment's – Paddle agitators turbine CO2 CO6		C	Mixing equipment's _ Paddle agitators turbine	CO2 CO6
agitators propeller agitators Pan mixer horizontal		$\sim$	agitators propeller agitators Pan mixer horizontal	0.02,000
mixer and dough mixer tumbler mixer & vertical			mixer and dough mixer tumbler mixer & vertical	
screw mixer, effects of mixing on foods			screw mixer, effects of mixing on foods	
Unit 3     Filtration and Expression     CO3. CO6	<u> </u>	Unit 3	Filtration and Expression	CO3, CO6



А	Filtration methods/equipments – pressure filtration,	CO3, CO6
	vacuum filtration, & centrifugal filtration. Feed slurry,	
	filtrate, filter medium, filter cake and filter	
В	Methods of expressing the liquid from solid-liquid	CO3, CO6
	food system – hydraulic pressing, roller pressing and	
	screw pressing. Factors affecting efficiency of	
	expression.	
С	Mode of heat transfer – Conduction, Convection,	CO3, CO6
	Radiation, Classification, contact type heat exchange	
	and Non-contact type heat exchanger.	
Unit 4	Preservation Unit operations (High Temperature	CO4, CO6
	Operations)	
A	Pasteurization- General concept, Pasteurizing equipments	CO4, CO6
В	Evaporation – functions of evaporation, factors	CO4, CO6
	affecting the rate of heat transfer and economics of	,
	evaporation, evaporation equipments – open pans,	
	horizontal tube evaporators, vertical tube evaporator	
	and plate evaporator. Single and multiple effect	
	evaporators.	
С	Dehydration theory. Drying curves. Dehydration	CO4, CO6
	systems Tray drier, tunnel drier. Drying time	
	calculations.	
Unit 5	Low temperature Processing	CO5,CO6
Unit 5 A	Low temperature Processing Refrigeration: Introduction, components of	CO5,CO6 CO5,CO6
Unit 5 A	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and	CO5,CO6 CO5,CO6
Unit 5 A	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system.	CO5,CO6 CO5,CO6
Unit 5 A	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system. Principle of refrigeration, Vapour compression	CO5,CO6 CO5,CO6
Unit 5 A	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system. Principle of refrigeration, Vapour compression refrigeration cycle	CO5,CO6 CO5,CO6
Unit 5 A B	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system. Principle of refrigeration, Vapour compression refrigeration cycle Freezing: Principle of freezing & freezing rate,	CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system. Principle of refrigeration, Vapour compression refrigeration cycle Freezing: Principle of freezing & freezing rate, Freezing – Technological principles of freezing	CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system. Principle of refrigeration, Vapour compression refrigeration cycle Freezing: Principle of freezing & freezing rate, Freezing – Technological principles of freezing operations. Freezing time calculations	CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B C	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system. Principle of refrigeration, Vapour compression refrigeration cycle Freezing: Principle of freezing & freezing rate, Freezing – Technological principles of freezing operations. Freezing time calculations Freeze drying – Conventional drying vs freeze drying,	CO5,CO6 CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B C	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system. Principle of refrigeration, Vapour compression refrigeration cycle Freezing: Principle of freezing & freezing rate, Freezing – Technological principles of freezing operations. Freezing time calculations Freeze drying – Conventional drying vs freeze drying, equipments used and effects of freeze drying on food	CO5,CO6 CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B C	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system. Principle of refrigeration, Vapour compression refrigeration cycle Freezing: Principle of freezing & freezing rate, Freezing – Technological principles of freezing operations. Freezing time calculations Freeze drying – Conventional drying vs freeze drying, equipments used and effects of freeze drying on food quality.	CO5,CO6 CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B C Mode of	Low temperature Processing Refrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system. Principle of refrigeration, Vapour compression refrigeration cycle Freezing: Principle of freezing & freezing rate, Freezing – Technological principles of freezing operations. Freezing time calculations Freeze drying – Conventional drying vs freeze drying, equipments used and effects of freeze drying on food quality. Theory	CO5,CO6 CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B C Mode of examination	Low temperature Processing         Refrigeration: Introduction, components of         refrigeration systems – compressor, condenser, and         expansion valve, Mechanical refrigeration system.         Principle of refrigeration, Vapour compression         refrigeration cycle         Freezing: Principle of freezing & freezing rate,         Freezing – Technological principles of freezing         operations. Freezing time calculations         Freeze drying – Conventional drying vs freeze drying,         equipments used and effects of freeze drying on food         quality.         Theory	CO5,CO6 CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B C Mode of examination Weightage Distribution	Low temperature ProcessingRefrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system.Principle of refrigeration, Vapour compression refrigeration cyclePrinciple of refrigeration, Vapour compression refrigeration cycleFreezing:Principle of freezing & freezing rate, Freezing – Technological principles of freezing operations. Freezing time calculationsFreeze drying – Conventional drying vs freeze drying, equipments used and effects of freeze drying on food quality.CAMTE20%50%	CO5,CO6 CO5,CO6 CO5,CO6 CO5,CO6
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Unit 5 A B C C Mode of examination Weightage Distribution Text book/s*	Low temperature ProcessingRefrigeration: Introduction, components of refrigeration systems – compressor, condenser, and expansion valve, Mechanical refrigeration system.Principle of refrigeration, Vapour compression refrigeration cycleFreezing: Principle of freezing & freezing rate, Freezing – Technological principles of freezing operations. Freezing time calculationsFreeze drying – Conventional drying vs freeze drying, equipments used and effects of freeze drying on food quality.CAMTES0%20%1.Earle, R.L. (1983) Unit Operations in Food Processing, 2nd Edition, Pergamon Press, Oxford UK	CO5,CO6 CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B C Mode of examination Weightage Distribution Text book/s*	Low temperature ProcessingRefrigeration: Introduction, components ofrefrigeration: Introduction, components ofrefrigeration systems – compressor, condenser, andexpansion valve, Mechanical refrigeration system.Principle of refrigeration, Vapour compressionrefrigeration cycleFreezing: Principle of freezing & freezing rate,Freezing: Principle of freezing & freezing rate,Freezing - Technological principles of freezingoperations. Freezing time calculationsFreeze drying – Conventional drying vs freeze drying,equipments used and effects of freeze drying on foodquality.TheoryCAMTEETE30%20%50%1. Earle, R.L. (1983) Unit Operations in Food Processing, 2 <sup>nd</sup> Edition, Pergamon Press, Oxford, U.K.2Singh R P and Heldman D R (1984)	CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B C Mode of examination Weightage Distribution Text book/s*	Low temperature ProcessingRefrigeration: Introduction, components ofrefrigeration: Introduction, components ofrefrigeration systems – compressor, condenser, andexpansion valve, Mechanical refrigeration system.Principle of refrigeration, Vapour compressionrefrigeration cycleFreezing: Principle of freezing & freezing rate,Freezing: Principle of freezing & freezing rate,Freezing - Technological principles of freezingoperations. Freezing time calculationsFreeze drying – Conventional drying vs freeze drying,equipments used and effects of freeze drying on foodquality.TheoryCAMTES0%1. Earle, R.L. (1983) Unit Operations in FoodProcessing, 2 <sup>nd</sup> Edition, Pergamon Press, Oxford, U.K.Oxford, U.K.2. Singh, R. P. and Heldman, D. R. (1984). Introduction to Food Engr. Academic Press	CO5,CO6 CO5,CO6 CO5,CO6
Unit 5 A B C C Mode of examination Weightage Distribution Text book/s*	Low temperature ProcessingRefrigeration: Introduction, components ofrefrigeration: Introduction, components ofrefrigeration: systems – compressor, condenser, andexpansion valve, Mechanical refrigeration system.Principle of refrigeration, Vapour compressionrefrigeration cycleFreezing: Principle of freezing & freezing rate,Freezing – Technological principles of freezingoperations. Freezing time calculationsFreeze drying – Conventional drying vs freeze drying,equipments used and effects of freeze drying on foodquality.TheoryCAMTEETE30%20%50%1. Earle, R.L. (1983) Unit Operations in Food Processing, 2 <sup>nd</sup> Edition, Pergamon Press, Oxford, U.K.2. Singh, R. P. and Heldman, D. R. (1984). Introduction to Food Engg., Academic Press, INC I ondon	CO5,CO6 CO5,CO6 CO5,CO6



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			AVI Publ. Co., Westport, Connecticut.	
		4.	Toledo, R.T. (1980). Fundamentals of Food	
			Process Engg., AVI. Publ. Co., Westport,	
			Connecticut.	
		5.	Brennan, J.G., Buffers, J.R., Cowell N.D.,	
			Lilly, A.E.V. (1976). Food Engg. Operations,	
			2 <sup>nd</sup> Ed., Elsevier, New York.	
		6.	Food Processing Technology: Principles and	
			Practice by Peter Fellows (2009) Woodhead	
			Publishing	
		7.	Novel food processing technologies by	
			Gustavo V. Barbosa-Cánovas, María S. Tapia,	
			M. Pilar Cano (2005) CRC Press	
	Other		. ,	
	References			

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### **Principles of Food Preservation: BFS207**

School: SBSR		Batch : 2019-2022
Program: B.Sc.		Current Academic Year: 2020-21
Bra	nch: Food	Semester: 4
Science and		
Tecl	nnology	
1	Course Code	BFS207
2	Course Title	Principles of Food Preservation
3	Credits	4
4	Contact Hours	4-0-0
	(L-T-P)	
	Course Status	Compulsory
5	Course	1. The course is designed for understanding of student about the



	Objectives	various principles involve in food preservation.						
		2. This course demonstrates technology and various industrial						
		processes which involved in food preservation						
6	Course	After successfully completion of this course students will b	e able to:					
	Outcomes	<b>CO1.</b> Understand the principles and methods of food preser	vation,					
		Thermal processing equipment and calculate adequacy of h	eat					
		treatment.						
		<b>CO2.</b> Demonstrate the principles, technology, industrial mo	ethods and					
		application of preservation by low temperature.						
		<b>CO3.</b> Understand the principles, technology, industrial meth	ods and					
		application of preservation by moisture removal.						
		<b>CO4.</b> Understand the principles, technology, industrial methods and						
		application of preservation by irradiation and membrane						
		technology.						
		<b>CO5.</b> Understand the uses and effects of chemical preservatives in food						
		Industry with principle, mechanism and application of various						
		noveltechniques in food preservation.						
		<b>CO6.</b> Understand the various conventional and novel food preservation						
		techniques.						
7	Course	Food preservation is an important part of food industry.	Principles of					
	Description	food preservation describe various principles to be follo	wed for food					
		preservation. This course covers various methods like high temperature						
		treatment, low temperature treatment, drying/dehydrati	ion, chemical					
		preservation and novel techniques.						
8	Outline syllabus		CO Manuina					
L	,		CO Mapping					
	Unit 1	Principles of Preservation	CO Mapping					
	Unit 1 A	Principles of PreservationScope and importance of food processing, Historical	CO Mapping CO1, CO6					
	Unit 1 A	<b>Principles of Preservation</b> Scope and importance of food processing, Historical developments in food processing. `Types of foods and	CO1, CO6					
	Unit 1 A	<b>Principles of Preservation</b> Scope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilage	CO Mapping					
	Unit 1 A B	Principles of PreservationScope and importance of food processing, Historical developments in food processing. Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat	CO1, CO6					
	Unit 1 A B	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation and processing, heat resistance of	CO1, CO6					
	Unit 1 A B	Principles of PreservationScope and importance of food processing, Historical developments in food processing. Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value,	CO1, CO6					
	Unit 1 A B	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foods	CO Mapping					
	Unit 1 A B C	Principles of PreservationScope and importance of food processing, Historical developments in food processing. Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of	COMapping CO1, CO6					
	Unit 1 A B C	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetration	CO Mapping					
	Unit 1 A B C Unit 2	Principles of PreservationScope and importance of food processing, Historical developments in food processing. Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservation	COMapping CO1, CO6					
	Unit 1 A B C Unit 2 A	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservation and processing. Requirement of	CO1, CO6					
	Unit 1 A B C Unit 2 A	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservationCold preservation and processing. Requirement of refrigeration and Freezing, Difference between	CO Mapping CO1, CO6					
	Unit 1 A B C Unit 2 A	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservationCold preservation and processing. Requirement of refrigeration and Freezing, Difference between refrigeration and freezing	CO Mapping CO1, CO6					
	Unit 1 A B C Unit 2 A B	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservationCold preservation and processing. Requirement of refrigeration and freezing, Difference between refrigeration and freezingEffect of low temperature on fresh food, storage changes	CO Mapping CO1, CO6					
	Unit 1 A B C Unit 2 A B	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservationCold preservation and processing. Requirement of refrigeration and Freezing, Difference between refrigeration and freezingEffect of low temperature on fresh food, storage changes in food during refrigerated storage. Freezing and frozen	COMapping CO1, CO6					
	Unit 1 A B C Unit 2 A B	Principles of PreservationScope and importance of food processing, Historical developments in food processing. Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservationCold preservation and processing. Requirement of refrigeration and Freezing, Difference between refrigeration and freezingEffect of low temperature on fresh food, storage changes in food during refrigerated storage. Freezing and frozen storage, Slow and quick freezing	COMapping CO1, CO6					
	Unit 1 A B C Unit 2 A B C	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservationCold preservation and processing. Requirement of refrigeration and freezing, Difference between refrigeration and freezingEffect of low temperature on fresh food, storage changes in food during refrigerated storage. Freezing and frozen storage, Slow and quick freezingFreezing curves, Freezing methods, factors determining for the dark freezing	CO Mapping CO1, CO6					
	Unit 1 A B C Unit 2 A B C	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservationCold preservation and processing. Requirement of refrigeration and Freezing, Difference between refrigeration and freezingEffect of low temperature on fresh food, storage changes in food during refrigerated storage. Freezing and frozen storage, Slow and quick freezingFreezing curves, Freezing methods, factors determining freezing rate, changes in food during freezing, Frozen	CO Mapping CO1, CO6					
	Unit 1 A B C Unit 2 A B C	Principles of PreservationScope and importance of food processing, Historical developments in food processing. `Types of foods and causes of food spoilagePrinciples and methods of preservation. Heat preservation and processing, heat resistance of microorganisms, thermal death curve, D,F and Z value, types of heat treatments and effects on foodsCanning of foods, cans and container types, spoilage of canned foods, heat penetrationCold preservation refrigeration and Freezing, Difference between refrigeration and freezingEffect of low temperature on fresh food, storage changes in food during refrigerated storage. Freezing and frozen storage, Slow and quick freezingFreezing rate, changes in food during freezing, Frozen food storage	COMapping CO1, CO6					



		Beyond Boundaries		
A	Drying, Dehy solar dehydra type of dryers	dration and continuing of the design of the	oncentration, Sun drying and methods Drying curves, and	CO3, CO6
В	Food concent juices, Liquid dehydration a	tration, Metho food concentr nd concentratio	ds of concentration of fruit rates, Changes in food during on	
С	Water activity preservation, Principles, ch IM foods			
Unit 4	Irradiation			
A	Food Irradiat preservation, determination foods	ion, Use of i Sources, Unit , safety and	onization radiations in food ts, effects, limitations, dose wholesomeness of irradiated	CO4,CO6
В	Food irradiat	ion techniques food preservati	s and recent applications of ion	
С	Chemical Pre class II preser	eservation, Use vatives in food	es and effects of class I and ls, membrane technology	
Unit 5	Novel Techni	iques in Food	Preservation	
А	Hydrostatic p	ressure		CO5, CO6
В	Dielectric hea	ting, microway	ve processing,	_
C	Hurdle techn Application	ology- Proper of in food pr	ties, mechanism of heating, ocessing and its effects on	
 Mada af	nutrients.			
examination	Ineory			
Weightage	CA	MTE	ETE	
 Distribution	30%	20%	50%	
Text book/s*	1. Norma	an, N.P and $\overline{Jos}$	seph, H.H.(1997). Food	
	Scienc Delhi	e, Fifth editior	n, CBS Publication, New	
Other	1. Frazie	r, W. and	Westhoff, D. (2014). Food	
References	Micro	biology. 5th e	d. New Delhi: McGraw Hill	
	Educa			



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### Food Enzymology: BFS208

Scho	ol: SBSR	Batch : 2019-2022			
Program: B. Sc		Current Academic Year: 2020-21			
Brar	ich: Food	Semester: 4			
Scier	nce and				
Tech	nology				
1	Course Code	BFS 208			
2	Course Title	Food Enzymology			
3	Credits	4			
4	Contact Hours	4-0-0			
	(L-T-P)				
	Course Status	Compulsory			
5	Course	1. To introduce the Food Enzymology and its industrial application.			
	Objective	2. To develop the knowledge of Food Enzymes.			
		3. To set up appropriate examples for enzymes used as chemistry in terms			
		of food product development.			
		4.To develop the knowledge of chemistry behind enzymes			
6	Course	After successfully completion of this course students will be able to:			
	Outcomes	CO1: Comprehend the basic chemistry concept of enzymes and their role.			
		CO2: Develop idea for chemistry of enzymes action on food.			
		CO3: Different parameters use to evaluate enzyme activity in carbohydrates,			
		proteins and fat.			
		CO4: Various enzymes and their role in food. Enzymes as Additives.			
		Differentiation among enzymes and enzyme activity.			
		CO5: Recognize the importance and utility of Food enzyme chemistry in			
		food. Basic understanding chemistry with food.			
_		CO6: Food enzymes used in food preservation and chemicals			
7	Course	Food Enzymology is an application of various enzymes found in food and their			
	Description	end use in new product development. The types of molecules from plant after			
		fermentation introduce beneficial as additives in food preservation. In the			
		tuture Food Enzymology could offer foods with higher vitamin levels, longer			
		shelf lives or the ability to retain as fresh even in the face of climate change. In			
	1	this course, students will learn about the different bimolecular and techniques/			



		methods used as ingredients/material and their use.				
8	Outline syllabus				CO Mapping	
	Unit 1	Enzyn	nes		CO1,	
	А	Introduction, D	efinition and fur	nctions	CO1, CO6	
	В	characterization	n, kinetics and	immobilization; fermentative	CO1,	
		production of	enzymes (an	nylases, proteases, cellulases,		
		pectinases, xyla	anases, lipases)			
	С	Enzymes use	d in food in	dustry and their downstream	CO1	
		processing.	processing.			
	Unit 2	Enzymes in pr	ocessing of foo	d	CO2,	
	А	Role of enzy	nes in baking	(fungal $\alpha$ -amylase for bread	CO2	
		making; maltog				
		pentosanases as	s dough condition	oners		
	В	lipases or do	ough conditioni	ng; oxidases as replacers of	CO2	
	~	chemical oxida	nts; synergistic	effect of enzymes);	~~~	
	C	Enzymes in m	neat processing	(meat tenderization) and egg	CO2	
		processing.	• • • •			
	Unit 3	Role of enzym	es in fruit juice	<u>s</u>	<u>CO3</u>	
	A	Liquefaction,	clarification,	peeling, de bittering,	CO3	
	D	decolourization		• 1.• 1 1•	<u> </u>	
	В	Enzymes in t	orewing: Enzyn	nes in malting and mashing,	003	
	C	Annlightions	ocess improven	ient, starch- naze removal	CO2	
	t	Applications of	or enzymes: p	bloteni cross-miking and on	005	
	Unit 4	Enzyma proce	ssing for flovor		CO4	
		Enzyme_aided	extraction of pl	ant materials for production of	CO4	
	Π	flavours	extraction of pr	and materials for production of	04	
	B	Production of f	lavour enhancer	s such as nucleotides: flavours	CO4	
	D	from hydrolyze	d animal/veget	able protein	004	
	С	Role of enzyme	es in cheese mak	ring whey processing	CO4	
	Unit 5	Other applicat	tions	ing, they processing.	CO5 CO6	
	A	Enzymes for pr	oduction of prop	tein hydrolysates and bioactive	CO5	
		peptides	our of pro-		000	
	В	Enzyme safety	and regulations		CO5	
	C	Regulations of	enzyme product	S	CO6	
	Mode of	Theory	<b>J</b>			
	examination	5				
	Weightage	CA				
	Distribution	30%	20%	50%		
	Text book/s*	1) A Wiley-	Inter Science P	ubl. Kruger JE. et al. 1987.		
		Enzymes and	their Role in	Cereal Technology. American		
		Association of	Cereal Chemists	s Inc.		
		2) Nagodawith	nana T & Reed	d G. 1993. Enzymes in Food		
		Processing. Ac	ademic Press.	-		



CO/PO	PO1	PO2	PO3	PO4	PO5
C01	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### **Food Preservation Lab: BFP 205**

Sch	ool: SBSR	Batch : 2019-2022
Program: B.Sc.		Current Academic Year: 2020-21
Bra	nch: Food	Semester: 4
Scie	nce and	
Tecl	hnology	
1	Course Code	BFP205
2	Course Title	Food Preservation Lab
3	Credits	2
4	Contact Hours	0-0-3
	(L-T-P)	
	Course Status	Compulsory
5	Course	1. The course is designed for understanding of student about
	Objectives	the various principles involve in food preservation.
		2. This course demonstrates technology and various industrial
		processes which involved in food preservation
6	Course	After successfully completion of this course students will be able to:
	Outcomes	CO1.Understand the principles and methods of food preservation,
		Thermal processing equipment and calculate adequacy of heat
		treatment.
		CO2. Demonstrate the principles, technology, industrial methods and
		application of preservation by low temperature.
		<b>CO3.</b> Understand the principles, technology, industrial methods and
		application of preservation by moisture removal.
		<b>CO4.</b> Understand the principles, technology, industrial methods and
		application of preservation by irradiation and membrane
		technology.
		<b>CO5.</b> Understand the uses and effects of chemical preservatives in food
		Industry with principle, mechanism and application of various
		Novel techniques in food preservation.



		<b>CO6.</b> Understand the various conventional and novel food preservation						
		techniques.						
7	Course	Food preserva	ation is an im	portant part of food industry.	Principles of			
	Description	food preserva	tion describe	various principles to be follo	wed for food			
	-	preservation.	preservation. This course covers various methods like					
		treatment, lo	reatment, low temperature treatment, drying/dehydrat					
		preservation a	preservation and novel techniques.					
8	Outline syllabus	• =						
	Unit 1	Principles of	Preservation					
	А	Scope and im	portance of foo	od processing, Types of foods	CO1, CO6			
		and causes of	food spoilage					
	В	Heat preserva	Heat preservation and processing					
	С	Canning of fo	ods	-				
	Unit 2	Cold preserv	ation					
	А	Cold preserva	Cold preservation and processing					
	В	Effect of low	temperature or	n fresh food				
	С	Freezing curv	es, Freezing m	ethods				
	Unit 3	Moisture red	Moisture reduction in Preservation					
	А	Drying metho	Drying methods and type of dryers					
	В	Food concent	tration, Metho	ds of concentration of fruit				
		juices, Liquid	food concentry	ates				
	С	Water activi	ty; Role of	water activity in food				
		preservation,	Intermediate m	noisture foods (IMF)				
	Unit 4	Irradiation		· · · · · · · · · · · · · · · · · · ·				
	А	Food Irradiat	ion, Use of i	onization radiations in food	CO4,CO6			
		preservation						
	В	Food irradiat	ion techniques	s and recent applications of				
		irradiation in	food preservati	ion				
	С	Chemical Pre	servation, Use	es and effects of class I and				
		class II preser	vatives in food	ls				
	Unit 5	Novel Techni	ques in Food	Preservation				
	А	Hydrostatic pr	ressure		CO5, CO6			
	В	Dielectric hea	ting, microway	ve processing,				
	С	Hurdle techn	ology- Proper	ties, mechanism of heating,				
		Application in	n food processi	ng and effects on nutrients.				
	Mode of	Theory						
	examination							
	Weightage	CA	CA MTE ETE					
	Distribution	60%						
	Text book/s*	2. Norma	an, N.P and Jos	seph, H.H. (1997). Food				
		Scienc						
		Delhi						
	Other	<b>2.</b> Frazie	r, W. and	Westhoff, D. (2014). Food				
	References	Micro	biology. 5th e	d. New Delhi: McGraw Hill				
		Education (India) Private Limited						



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

## Processing Technology of Cereals, Pulses and Oilseeds Lab: BFP206

Scho	ool: SBSR	Batch : 2019-2022
Prog	gram: B.Sc	Current Academic Year: 2020-21
Bra	nch: Food	Semester: 04
Scie	nce and	
tech	nology(H)	
1	Course Code	BFP206
2	Course Title	Processing Technology of Cereals, Pulses and Oilseeds Lab
3	Credits	2
4	Contact	0-0-3
	Hours	
	(L-T-P)	
	Course Status	Compulsory
5	Course	To develop the knowledge of structure, processing and importance of major cereals,
	Objective	legumes and oilseed crops
6	Course	After successfully completion of this course students will be able to:
	Outcomes	
		importance of wheat grain.
		CO2: Students will be able to understand the physico-chemical properties of rice grain and importance of parboiling based on its advantages and disadvantages.
		CO3: To enable the students to gather an overview of other important cereals and their processing aspects
		CO4: Students will be able to describe about processing of various pulses
		CO5: Students will be able to have overall idea of oilseeds and processing of vegetable oils and fats.
		CO6: Students will be able to have overall the importance of major cereals, legumes
		and oilseed crops
7	Course	Cereals, legumes and oilseeds are important source of food and feed in



	Description	human life	t to facilitate					
8	Svllabus outline		utilization.		CO Mapping			
	Unit 1	Importance	of testing proc	edures for cereal and related	CO1, CO6			
		nroduote	81					
		products						
	A	Determinatio	n of water/oil a	bsorption properties of cereals				
	В	Determinatio	Determination of swelling power of cereals and legumes.					
	С	Determinatio	n of solubility i	ndex of cereals and legumes.				
	Unit 2	Identify adu	lteration in ce	reals grains and legumes	CO2, CO6			
	А	Detection of	f <i>kesari</i> dal p	powder (Lathyrus sativus) in				
		Besan.		· · · ·				
	В	Determination	on of foreign ma	atter in food grains.				
	С	Detection of st	tarch adulterant	in the food sample				
	Unit 3	Determinati oilseeds	ion of acid a	nd saponification value of	CO3, CO6			
	А	Determinatio	on of saponifica	tion value of oilseeds				
	В	Determinatio	on of acid value	in mustard oil.				
	С	Determinatio	on of saponifica	tion value in butter.				
	Unit 4	Dehulling a	nd milling of co	ereals and legumes	CO4, CO6			
	А	Principles an	d methods of d	ehulling				
	В	Dal milling p	process and visi	t to dal mill industry				
	С	De-husking	of rice/millets/n	najor cereals				
	Unit 5	Production products	of cereal a	and legumes based food	CO5; CO6			
		Production or	f fermented pro	ducts from careals/legumes				
		Production of	f sovmilk	ducts from cerears/regumes				
		Production of	f sov tofu					
	Mode of	1 Toddetion 0	1 30 y 1014					
	examination							
	Weight age	СА	MTE	ETE				
	Distribution	60%	0%	40%				
	Text book/s*	1) Chakrav	erty, A. 1988.	Postharvest Technology of				
	Other	Cereals, Pu Delhi. 2) Kent, N. Pergamon P 3) Salunkhe Plant origin 4) Nutrition Pomeranz, Technology						
	References							



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### **Technology of Fruits and Vegetables: BFS301**

Sch	ool: SBSR	Batch : 2019-2022
Pro	gram: B.Sc.	Current Academic Year: 2021-22
Bra	nch: Food	Semester: 5
Scie	ence and	
Tec	hnology	
1	Course Code	BFS301
2	Course Title	Technology of Fruits and Vegetables
3	Credits	4
4	Contact Hours	4-0-0
	(L-T-P)	
	Course Status	Compulsory
5	Course	1. To train the students for Fruit and Vegetable Processing industry.
	Objectives	2. To develop knowledge for the fruits and vegetables canning industry.
		3. To acquaint students with various spoilage associated with fruits and
		vegetables canning.
6	Course	After successfully completion of this course students will be able to:
	Outcomes	<b>CO1.</b> Understand the importance, canning and need of preservation for
		fruits and vegetables.
		<b>CO2.</b> Understand the processing and preservation of fruit juices.
		<b>CO3.</b> Understand the industrial method of making Jam , jellies and
		marmalades.
		CO4. Understand the making of pickles, chutneys, sauces with
		processing of tomatoes and their various products.
		<b>CO5.</b> Understand the drying and dehydration methods of fruits and
		vegetables.
		<b>CO6.</b> Understand the processing technology of fruits and vegetables
7	Course	Fruits and vegetables products are important part of our daily diet like
	Description	jam, jelly, marmalades, ketchup and sauces etc. Technology of fruits and



		vegetables processing provides knowledge about various products				
		manufacturin	manufacturing which can enhance the entrepreneurship for small scale or			
		even large sca	even large scale production of fruits and vegetables products.			
8	Outline syllabus				CO Mapping	
	Unit 1	Introduction			CO1, CO6	
	А	Importance of	fruits and veget	table ;history and need of	CO1, CO6	
		preservation ;R	Reasons of spoil	lage		
	В	Method of pres	servation ; Can	ning and bottling of fruits and	CO1, CO6	
		vegetables ;pro	cess of canning	g; factors affecting the		
	C	process- time a	and temperature	<u>.</u>	CO1 CO(	
	C	Lacquering sys	containers of p	for canning; spoilage in acking	CO1, CO6	
	Unit 2	Fruit Beverag	es and produc	ts	CO2 CO6	
	A	Processing of	fruit juices		CO2, CO6	
	R	Preservation of	f fruit juices (p	asteurization chemically	CO2, CO6	
	D	preserved with	sugars, freezin	g drving tetra packing	CO2, CO0	
		carbonation)		, , , , , , , , , , , , , , , , , , ,		
	С	Processing of s	squashes, cordia	als, nectors, concentrates and	CO2, CO6	
		powder	-			
	Unit 3	Jams, jellies a	CO3, CO6			
	А	A Jam: Constituents, selection of fruits, processing &			CO3, CO6	
		technology				
	В	Jelly: Essential	constituents (	Role of pectin, ratio);Theory	CO3, CO6	
	C	of jelly format	ion, Processing	; defects in jelly	<u> </u>	
	C Marmalade: Types, processing & technology, defects.			g & technology, defects.	CO3, CO6	
	Unit 4	Pickles, chutn	CO4, CO6			
	А	Processing and	d types of pic	ekles and chutney; causes of	CO4, CO6	
	P	Spollage				
	D C	Processing of	tomata jujaa	tomato purpas pasta katahuni	C04, C06	
	C	sauce and sour	iomato juice,	tomato puree, paste ketenup,	004,000	
	Unit 5	Dehydration (	, of foods and ve	ogetables	CO5 CO6	
	A	Sun drying &n	echanical deby	vdration	CO5 CO6	
	R	Process variati	on for fruits and	d vegetables	CO5 CO6	
	D C	Fffects of	dehydration	on fruits and vegetables	CO5,CO6	
	C	(Merits/Demer	its); packing an	id storage.	005,000	
	Mode of	Theory				
	examination	-				
	Weightage	CA	MTE	ETE		
	Distribution	30%	20%	50%		
	Text book/s*	1.Girdharilal,	Siddappaa,	G.S and Tandon, G.L.,		
		Preservation of	of fruits & Ve	getables, ICAR, New Delhi,		
		1998				
	Other	1. Manay, S.	& Shadakshara	swami, M., Foods: Facts and		
	References	Principles, New Age Publishers, 2004				



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

## **Technology of Spices and Plantation Crops: BFS302**

Sch	ool: SBSR	Batch : 2019-2022
Prog	gram: B.Sc	Current Academic Year: 2021-22
Bra	nch: Food	Semester: 5
Scie	nce and	
tech	nology	
1	Course Code	BFS302
2	Course Title	Technology of Spices and Plantation Crops
3	Credits	4
4	Contact	4-0-0
	Hours	
	(L-T-P)	
	Course Status	Compulsory
5	Course	The course will cover study of the types of spices, their origin, functions
	Objective	and processing techniques. Introduction to functional foods and their
		characteristics, recent advances in sugar based products and processing of
		miscellaneous foods.
6	Course	Upon completion of this course, students are expected to be able to:
	Outcomes	CO1. Recognize and describe the processing conditions of spices
		CO2. Analyze the role and significance of nutraceuticals
		CO3. Describe processing of sugar based products
		CO4. Utilize laboratory techniques to detect, quantify, and identify
		adulterations in spices
		CO5 Describe the manufacturing of Tea, Coffee and Chocolate.
		CO6. Discover, and apply the theories of spices in practical, real-world
		situations and problems.
7	Course	This course has been designed to make student understand the processing
	Description	technology used for manufacturing of Spices and Plantation crops and the



		role of them in nutraceuticals.				
8	Outline syllab	us			CO Mapping	
	Unit 1	SPICES				
	А	Classification	of spices ; Methe	od of manufacture of spices	C01,C04,C06	
	В	Processing and	d properties of n	najor and minor spices,		
		Essential oils &	& oleoresins			
	С	Different adulterations in spices, Uses of spices, fumigation				
		and irradiation	of spices.			
	Unit 2	Tea-Coffee an	d Cocoa			
	А	Coffee: Occurr	rence, chemical	constituents; harvesting,	CO5	
		fermentation o	f coffee beans; c	changes taking place during		
		fermentation; o	lrying; roasting;	;		
	В	Process flow sl	heet for the man	ufacture of coffee powder;		
		instant coffee t	echnology; chic	ory chemistry; quality grading		
		of coffee			-	
	C	Cocoa: Occur	rence, chemistr	y of the cocoa bean; changes		
		taking place di	aring fermentati	on of cocoa bean; processing of		
		cocoa bean. cl	nocolates - type	s, chemistry and technology of		
	Unit 3		uracture, quanty	control of chocolates.		
			a abamistry of	constituents, howesting, types	CO5 CO6	
	A	of tea green	colong and CT(	Constituents, narvesting, types	005,000	
		CTC tea		e, chemistry and technology of		
	B	Manufacturing	process for gree	en tea black tea manufacture		
	D	and instant tea.	process for gree			
	С	Ouality evalua	tion and grading	of tea	-	
	Unit 4	Functional foods				
	A Different functional foods and their sources along with			CO2.CO6		
	benefits; Introduction to nutraceuticals: definitions, bas			euticals: definitions, basis of	,	
		claims for a co	mpound as a nut	traceutical.		
	B Manufacturing aspects of selected nutraceuticals such as					
		lycopene, isofl	avonoids ; regul	atory issues for nutraceuticals		
		including COD	DEX.		-	
	C	Formulation o	f functional for	ods containing nutraceuticals –		
		stability and a	analytical issues	s, Clinical testing and labeling		
	TT :4 E	issues of nutra	ceuticals and hea	alth foods.		
	Unit 5	Technology of	miscellaneous	food products	000.007	
	А	Gelatin Dishes	-Types availabl	e and uses ; Principles of sugar	CO3,CO6	
	cookery, Crystalline and non-crystalline candies.			_		
	D	B Uses of sugars; Different types of sugar (sugar, Jaggery,				
	C Health risks like dental caries obesity etc			-		
	~	ficatul fisks like delital calles, obesity etc.				
	Mode of	Theory				
	examination		1	1		
	Weightage	CA	MTE	ETE		
	Distribution	30%	20%	50%		
	Text book/s*	1. Manay, N.	S, Shadakshara	swamy, M., Foods- Facts and		
		Principles. New Age International Publishers., New Delhi.,				



	2004.	
Other	2. Srilakshmi, B. Food Science (3rd edition), New Age	
References	International (P) Limited	
	3. Potter, N.N. Food Science (5th edition), CBS publishers and	
	Distributors, New Delhi.	
	4. Prescott and Proctor B.E. Food Technology. MC Graw hill	
	Book Co. New York 1997.	
	5. Kent, J.A.Riegels Handbook of Industrial Chemistry, 7th	
	edition. Van Nostrand Reinhold	
	6. Minifie BW. 1999. Chocolate, Cocoa and Confectionery	
	Technology. 3rd Ed. Aspen Pub	
	7. Banerjee B. 2002. Tea Production and Processing. Oxford	
	Univ. Press.	

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### Food Packaging: BFS 303

Scł	nool: SBSR	Batch : 2019-2022		
Program: B. Sc		Current Academic Year: 2021-22		
Bra	anch: Food	Semester: 5		
Sci	ence and			
Tee	chnology			
1	Course Code	BFS303		
2	Course Title	Food Packaging		
3	Credits	4		
4	Contact Hours	4-0-0		
	(L-T-P)			
	Course Status	Compulsory		
5	Course	1. Understanding about food packaging.		
	Objective	2. Importance and need of packaging in the industrial use.		
		3. Various packaging materials, available for food Products.		
		4. Types of plastics, methodology and technologies involved in		



		packaging.		
		5. Industrial use and ways for packaging material.		
		6.Food labeling and packaging		
		7.Codex Guidelines		
6	Course	After successfully completion of this course students will b	e able to:	
	Outcomes	CO1: Comprehend the basic concept of food and package	ing.	
		CO2: Food packaging methods. Recognize the important	nce and utility	
		packaging material used in food Industry		
		CO3: Treatment and testing of physical, chemical and bi	ological	
		methods applied on packaging materials. Various ha	azards and	
		their control measures during food packaging.		
		CO4: Types, availability and utilization of packaging ma	terial for food	
		processing Industries.		
		CO5: Status and utilization of Industrial Use.		
7	Course	Food packaging is an application for food processing.	The types of	
	Description	treatment applied during processing identification are be	neficial as by	
		product self-life enhancement. In the future packaging fie	ld could offer	
		more depth knowledge with its applicable techniques. I	n this course,	
		students will learn about the different materials requ	ired in food	
0		manufacturing	COM	
8	Outline syllabus		CO Mapping	
	Unit I		COI,	
	A	Introduction to food packaging		
	В	Types of food processing industries & their present	CO1, CO2	
		methods of shelf life enhancement in packaging.	CO1	
		Identification of different packaging materials.		
	Unit 2	Materials for food packaging, types, uses, merits and	C02, C03	
		Grawbacks	CO2	
	A	Properties for packing materials	C02	
	В	Aluminum Plastic Poyos Jars	02	
	D	Aluminum, Flasuc, Boxes, Jais,	CO2	
	D	Aluminum Plastic Boxes Jars:	02	
	C	Tetra packs, aerosol containers	$CO^2$	
	Unit 3	Modern concepts of packaging technology	CO2	
		Physical test for tin and plastic	CO3	
	B	Testing of glass containers	CO3	
	C	Physical and chemical test for plastics	CO3	
	Unit A	Quality Testing Of Packaging Materials	CO4	
		Weighing filling scaling wrapping cartooning	CO4	
	1	labeling marking and tranning.	0.04	
	В	Physical and chemical test for plastics	CO4	
	C C	Shelf life testing of tin plastic Oxygen interactions	CO4	
		moisture interchanges and aroma permeability.		



			· · · · · · · · · · · · · · · · · · ·	beyond boundari	
А	Weighing, fill	ing, scaling, w	rapping, cartooning,	CO5	
В	labeling, mark	CO5			
	purpose,				
С	labeling regu	lation barcode	e; Nutrition labeling, health	CO5	
	claims, and m	andatory label	ing provision.		
Mode of	Theory	Theory			
examination					
Weightage	CA	MTE	ETE		
Distribution	30%	20%	50%		
Text book/s*	Food Packaging Technology by Richard Coles ; © 2003				
	by Blackwell				
Other	Crosby NT.19				
References	and Migration	Contaminants	. App. Sci. Publ.		

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### Food Engineering: BFS304

Sch	ool: SBSR	Batch : 2019-2022
Program: B.Sc.		Current Academic Year: 2021-22
Bra	nch: Food	Semester: 5
Science and		
Tecl	hnology	
1	Course Code	BFS304
2	Course Title	Food Engineering
3	Credits	4
4	Contact Hours	4-0-0
	(L-T-P)	
	Course Status	Compulsory
5	Course	1. To allow students to familiarize themselves with the food
	Objectives	engineering for handling of various food materials during
		processing.



r									
		2. To develop the expertise for various mathematical models used in food industry							
	9		11.1 1.1 .						
6	Course	After successfully completion of this course students wi	CO1 Design the plant layout						
	Outcomes	<b>CO1.</b> Design the plant layout.							
		CO2.Calculate the various engineering units and engine	ering properties						
		of foods.							
		CO3. Design and understand the liquid transport system according to							
		flow behavior of food.							
		CO4. Calculate and understand the conservation of mass	s, law of						
		thermodynamics and energy balance of the system.							
		<b>CO5.</b> Understand the steam generation system, fuel utili	zation system						
		and various laws for electrical energy.							
		<b>CO6.</b> Understand the engineering approach in food indus	stry.						
7	Course	Food Engineering provides the vast knowledge at	oout engineering						
	Description	calculations related to food industry. For developing any machinery for							
		food industry, one should have knowledge for engineering terms.							
		Workings in food industry also require the knowledge about design of							
-		heat exchangers, fluid mechanics and thermodynamics.							
8	Outline syllabus		CO Mapping						
	Unit 1	Design and Layout of food plant	CO1, CO6						
	A	Design and layout of food plants							
	В	Important considerations for designing of food plants;	CO1, CO6						
	~	Construction and design							
	С	Types of layout	CO1, CO6						
	Unit 2	Units and Dimensions	CO2, CO6						
	А	Dimensions – Primary and Secondary ; Engineering	CO2, CO6						
		Units – Base Units, Derived Units and supplementary							
		Units							
	В	System – State of a system, extensive and intensive	CO2, CO6						
		properties							
	C	Density – Solid, Particle and Bulk density; Phase	CO2, CO6						
		diagram of water							
	Unit 3	Fluid flow in food processing	CO3, CO6						
	А	Liquid Transport Systems – Pipes and Pumps;	CO3, CO6						
		PUMPS- Definition, classification, positive							
		displacement and centrifugal pumps, factors affecting							
		choice of a pump							
	В	Properties of liquids - Density, Pressure, Surface	CO3, CO6						
		tension and Viscosity; laminar and turbulent fluid							
-		The Continuity equation; Reynold's number	CO3, CO6						
		i nermodynamics and equilibrium	004,006						
	A	Conservation of mass- conservation of mass for an	CO4, CO6						
		open system and a closed system							
	B Thermodynamics – laws of thermodynamics , CO4, CO6								



Equation of state and Perfect Gas Law						
С	Energy-pote	ential and kine	tic energy, Energy balance	CO4, CO6		
	for a closed s					
	balance					
Unit 5	Energy in U	Energy in Unit processes (				
А	Generation of	f steam – Stear	m Generation System,	CO5, CO6		
	Steam Tables	, Steam Utiliz	ation			
В	Fuel utilization	on –Systems ,N	Mass and energy balance	CO5, CO6		
	analysis ,Bur	ner efficiency;	Electric Power Utilization			
	- Electric Ter	– Electric Terms and Units,				
С	Ohm's Law	CO5, CO6				
	Electric Cont	Electric Controls and Lighting.				
Mode of	Theory					
examination						
Weightage	CA	MTE	ETE			
Distribution	30%	20%	50%			
Text book/s*	1. Heldman, D.R. and Lund, D.B. Handbook of Food					
	Engineering 2nd edition. CRC press, Newyork, 2007.					
Other	1. Singh, R.P	. Introduction	to Food Engineering 3rd			
References	edition. Acad	emic Press, Lo	ondon. 2004			

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### **Technology of Fruits and Vegetables Lab: BFP301**

School: SBSR		Batch: 2019-2022
Program: B. Sc		Current Academic Year: 2021-22
Branch: Food		Semester: 5
Scie	nce and	
Technology		
1 Course Code		BFP301
2	Course Title	Technology of Fruits and Vegetables Lab



3	Credits	2					
4	Contact Hours	0-0-3					
	(L-T-P)						
	Course Status	Compulsory					
5	Course	• To identify the basic techniques of food prep	paration for increasing				
	Objective	the shelf life of fruits and vegetables.					
		• To analyze the use of chemical preservatives	in food.				
		• Identify the impact of certain technological operations and					
		parameters on the success of fruit and vegeta	able processing and on				
		certain properties of final product.					
		• To develop a knowledge of new product de	evelopment and waste				
		reduction.					
6	Course	After finishing the course the students will be able to	):				
	Outcomes	CO1: Demonstrate common post-harvest mana	gement and grading				
		techniques					
		CO2: Explain the importance of various chemicals preservatives in					
		preservation.					
		CO3: Understand basic techniques used in the estimation of lycopene .					
		CO4: Recognize the importance of microbiological analysis in fruits and					
		vegetables.					
		COS: Identify the importance of the chemical composition of different					
		conditions to the composition and properties of the product					
7	Course	The course will introduce students to methods used i	n preparation				
	Description	preservation and microbiological examination of fr	uits and vegetable				
	I I	based processed foods. Students will be exposed to p	practical training on				
		preparation, and analysis of increased shelf life by us	sing preservatives.				
8	Outline syllabus	8	CO Mapping				
	Unit 1	Practical based on post-harvest management	C01,C05				
		and grading of foods.					
	А	General Laboratory Practices					
	В	Principle of commonly equipment's used in food					
		processing					
	С	Commonly used steps in post-harvest management					
		and grading of foods					
	Unit 2	Practical related to preservation of fruits by	CO2,CO5				
		different methods.					
	A	Preservation using osmotic dehydration					
	B	Preservation using low temperature					
		Preservation using high temperature	002.005				
	Unit 3	Practical related to estimation of lycopene.	003,005				
	A	rieparation of solution used for estimation of					
	D	Estimation of lyconone in terrate					
	D	Estimation of lycopene in ony fruit comple other					
		ESTIMATION OF IVCODENE IN ANY ITIM SAMPLE OTHER					



	than tomato			
Unit 4	Practical re	lated to oxid	ative rancidity.	CO2,CO6
А	Estimation of	of oxidative ra	ncidity in cooking oil	
В	Estimation of	of oxidative ra	ncidity in nuts	
С	Estimation of	of oxidative ra	ncidity in seeds s	
Unit 5	Practical re	lated to deve	lopment of value added	CO1,CO3,C04,CO6
	new produc	et.		
А	Developmen	nt of Mixed fro	uit Jam	
В	Developmen	nt of fruit/vege		
	product			
С	Developmen	nt of Mixed fro		
Mode of				
examination				
Weight age	CA	CA MTE ETE		
Distribution	60%	0%	40%	
Text book/s*	Laboratory Manual in Food Preservation by			
	Marion L.	Fields, Avi 1	Publishing Co Inc.; New	
	edition edit	tion (Decembe	er 1983)	

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### **Technology of Spices and Functional Foods Lab: BFP302**

School: SBSR		Batch: 2019-2022		
Program: B.Sc.		Current Academic Year: 2021-22		
Brar	nch: Food	Semester:5		
Science and				
Tech	nology			
1	Course Code	BFP302		
2	Course Title	Technology of Spices and Functional Foods Lab		
3	Credits	2		
4	Contact Hours	0-0-3		
	(L-T-P)			



	Course Status	Compulsory						
5	Course	• To develop a knowledge about spices and functional foods.						
	Objective	To develop	• To develop knowledge of spice adulteration.					
6	Course	After success	After successfully completion of this course students will be able to:					
	Outcomes	CO1: Identify	CO1: Identify the chemical composition of spices.					
		CO2: Extract	the volatile con	mponents of spices.				
		CO3: Prepare	CO3: Prepare the probiotic drink/food.					
		CO4: Prepare	the functional	foods.				
		CO5: Identify	the adulteration	on in spices.				
		CO6: Unders	tand the practic	al approach of spices and fun	ctional			
		foods.						
7	Course	In this cours	se, students w	ill learn about chemistry or	f spices, health			
	Description	benefits of	functional fo	ods, volatile components	of spices and			
		adulteration of	of spices.					
8	Outline syllabus	5			CO Mapping			
	Unit 1	Practical rela	ated to chemic	al analysis of spices	CO1, CO6			
	А	Estimation of	moisture conte	ent in spice				
	В	Estimation of	total phenolic	content in spices				
	С	Estimation of	CHO content i	in spices				
	Unit 2	Practical rela	ated to extract	ion of volatile components	CO2, CO6			
		of spices.						
	А	Extraction of	volatile compo	nents of spices 1.				
	В	Extraction of	volatile compo	nents of spices 2.				
	С	Extraction of	volatile compo	nents of spices 3.				
	Unit 3	Practical rela	ated to prepar	ation of probiotic	CO3, CO6			
		drink/food.						
	А	Preparation o	f probiotic drin	k				
	В	Preparation of	of probiotic food	d				
	С	Preparation o	f probiotic proc	lucts				
	Unit 4	Practical relat	ted to preparation	on functional foods.	CO4, CO6			
	А	Development	t of functional f	food – 1				
	В	Development	t of functional f	ood – 2				
	С	Development	t of functional f	ood – 3				
	Unit 5	Practical rela	ated to adulter	ation of spices.	CO5, CO6			
		Detection of a	adulterant in sp	ice-1				
		Detection of a	adulterant in sp	ice-1				
		Detection of a	adulterant in sp	ice-1				
	Mode of	Practical and	Viva					
	examination							
	Weightage	CA MTE ETE						
	Distribution	60%	0%	40%				
	Text book/s*	1.Manay, N.S.	S, Shadaksharas	wamy, M., Foods- Facts and				
		Principles., N	ew Age Interna	ational Publishers., New				
		Delhi., 2004						
	Other							



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### DAIRY TECHNOLOGY: BFS305

Sch	ool: Basic	Batch : 2019-2022		
Scie	nces &			
Rese	earch			
Prog	gram: B. Sc.	Current Academic Year: 2021-22		
Bra	nch: Food	Semester:6		
Scie	nce and			
Tecl	nnology			
1	Course Code	BFS305		
2	Course Title	Dairy Technology		
3	Credits	4		
4	Contact Hours	4-0-0		
	(L-T-P)			
	Course Status	Compulsory		
5	Course	The course is designed to equip students with a broad understanding of		
Objective		dairy chemistry and processing involved in manufacturing of dairy based		
		products. The course provides a foundation for careers in new product		
		development, dairy industry and quality control laboratories.		
6	Course	After the successful completion of this course students will be able to:		
	Outcomes	CO1.Discuss milk and its nutritional value.		
		CO2 Provide an overview of the major macro and micronutrients		
		relevant to human health available in milk.		
		CO3. Explain the importance of processing and cleaning		
		CO4 Review potential applications and efficiency of various equipment's		
		used in dairy products processing.		
		CO5 Apply Total Quality Management Systems into processes.		
		CO6 Understand processing conditions for different dairy products.		



7	Course	Dairy Tech	Dairy Technology is a course which focuses on dairy products and is a					
	Description	part of the food technology and processing industry. Students pursuing						
	Ĩ	dairy techn	dairy technology learn about milk processing as well the manufacturing					
		process for	r its by-produ	cts. The study includes qualit	ty control at the			
		time of pro	time of processing of products. The course helps in gaining te					
		knowledge	about dairy pr	ocessing equipment.	-			
8	Outline syllab	ous	• ¥ ¥		CO Mapping			
	Unit 1	Technology of	Technology of milk and dairy products					
	А	Milk composit	lilk composition and processing					
	В	In plant cleaning	n plant cleaning system					
	С	Total quality n	nanagement					
	Unit 2	Manufacturin	g of dairy pro	oducts				
	А	Condensed, ev	aporated and p	owdered milk				
	В	Cheese, Ice-cre	eam, Butter and	d Ghee				
	С	Malted produc	ts		CO3,CO6			
	Unit 3	Substitutes for	r milk and mi	lk products				
	Α	Casein and cas	einates; Lactos	se				
	В	Whey protein o	concentrates ar	nd isolates	CO3,CO6			
	С	Milk co precip	Milk co precipitates, and other by-products					
	Unit 4	Fortification a	Fortification and enrichment					
	А	Therapeutic Fo	oods		CO2,CO3.CO6			
	В	Technology of	baby foods					
	С	Fortification an	nd enrichment	of milk products				
	Unit 5	Manufacturin	g of dairy pro	oducts				
	А	Yoghurt, Dahi,	, and srikhand					
	В	Khoa, Burfi, K	alakand					
	С	Gulabjamun, R	Rosogolla, Char	nna, Paneer	CO4,CO6			
	Mode of	Theory						
	examination							
	Weightage	CA	MTE	ETE				
	Distribution	30%	20%	50%				
	Text	1. Dey, S. 1994	4. Outlines of I	Dairy Technology. Oxford				
	book/s*	Univ. Press, New Delhi.						
	Other	2 Welstre et el	1 2006 Daimy	Science and Technology 2nd				
	Duner	Z. waistra et al						
	References	Eq. 1 aylor $\propto r$	Tallels.	logy of Indian Mills Droducts				
		5. Aneja <i>et al.</i>	2002. Technol	logy of Indian Milk Products.				
		Dairy India Pu	$\frac{101}{\sqrt{10}}$ S. Total Q	ive Study on Select Units in				
		Dairy Industry	(A Comparat	Dr. D. Sing Days Drag d**				
		Dairy Industry	) G. Malatni <sup>*</sup> ,	Dr. K. Siva Kam Prasad***				



CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
C05	3	2	2	2	2
CO6	3	2	2	2	2

## Technology of Meat, Poultry and Sea Foods: BFS306

Sche	ool: SBSR	Batch : 2019-2022		
Program: B.Sc		Current Academic Year: 2021-22		
Branch: Food		Semester: 6		
Science and				
Technology				
1	Course Code	BFS-306		
2	Course Title	Technology of Meat, Poultry and Sea Foods		
3	Credits	4		
4	Contact	4-0-0		
	Hours			
	(L-T-P)			
	Course Status	Compulsory		
5	Course	This course shall educate students about the importance of meat and		
	Objective	poultry industry in nation's economy. The students shall gain knowledge		
		of the processing and preservation of meat, poultry and seafoods.		
6	Course	After successful completion of this course, students will be able to:		
	Outcomes	CO1: Understand the current scenario of meat and poultry industry in		
		India.		
		CO2: Learn the glossary of live market terms for animals and birds.		
		CO3: Understand the processing of meat, poultry and seafoods.		
		CO4: Grasp knowledge of factors affecting meat quality and different		
		preservation techniques.		
		CO5: Value-addition to poultry and fish by-products.		
		CO6: To learn the overall objective of meat Industry.		
7	Course	This course has been designed to make student understand the		
	Description	processing and preservation technology for meat, poultry and seafoods.		



8	Outline syllabu	CO Mapping	
	Unit 1 Introduction		
	А	Livestock and poultry population in India	CO1, CO6
	В	Development of meat and poultry industry in India and	
		its need in nation's economy	
	С	Glossary of live market terms for animals and birds	
	Unit 2	Meat preservation and quality	
	А	Effects of feed, breed and environment on production of	
		meat animals and their quality	
	В	Meat Quality-color, flavor, texture, Water-Holding	
		Capacity(WHC)	
	С	Preservation of meat: Refrigeration and freezing, thermal	
		processing- canning of meat, retort pouch, dehydration,	
		irradiation, and RTE meat products, meat curing	
	Unit 3	Slaughtering and Carcass Processing	
	А	Modern abattoirs, typical layout and features, Ante-	CO3, CO4
		mortem handling and design of handling facilities	
	В	Hoisting rail and traveling pulley system; stunning	
		methods; steps in slaughtering and dressing; offal	
		handling and inspection	
	С	operational factors affecting meat quality; effects of	
		processing on meat tenderization; abattoir equipment and	
		utilities	
	Unit 4	Processing of Poultry Products	
	А	Poultry industry in India; measuring the yields and	CO3, CO5
		quality characteristics of poultry products, microbiology	
		of poultry meat, spoilage factors; Lay-out and design of	
		poultry processing plants, Plant sanitation	
	В	Poultry meat processing operations, equipment used-	
		Defeathering, bleeding, scalding etc.; Packaging of	
		poultry products, refrigerated storage of poultry meat	
	C	By products- eggs, egg products, Whole egg powder, Egg	
		yolk products, their manufacture, packaging and storage.	
	Unit 5	Fish and other Marine Products Processing	
	А	Commercially important marine products from India;	CO5, CO6,
		product export and its sustenance; basic biochemistry and	
		microbiology	
	В	Preservation of postharvest fish freshness; transportation	
		in refrigerated vehicles; deodorization of transport	
		systems; design of retrigerated and insulated trucks;	
		grading and preservation of shell fish	
	C	Pickling and preparation of fish protein concentrate, fish	
		oil and other by-products.	
	Mode of	Theory	
	examination		


Weightage	CA	MTE	ETE	
Distribution	30%	20%	50%	
Text book/s*	1. Norman, N	N.P and Joseph	, H.H.(1997). Food	
	Science,Fi	fth edition, CE	S Publication, New Delhi.	
	2. Lawrie, R.	A. (1998). La	wrie's Meat Science (6 <sup>th</sup> ed.):	
	Woodhead	l, Cambridge.		
Other	1. Kerry, J.	, Kerry, J. &	Ledward, D. (2002). Meat	
References	Processing	g Improving Qu	ality: CRC Press, USA.	
	2. Hui, Y. H	H. (2010). Han	dbook of Poultry Science and	
	Technolog	sy .		
	3. Fernandes	, R. (2009). Fish	and Seafood.	

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

#### Food Safety and Regulations: BFS307

Sch	ool: SBSR	Batch : 2019-2022
Prog	gram: B.Sc.	Current Academic Year: 2021-22
Bra	nch: Food	Semester: 6
Scie	nce and	
Tecl	hnology	
1	Course Code	BFS307
2	Course Title	Food Safety and Regulations
3	Credits	4
4	Contact Hours	4-0-0
	(L-T-P)	
	Course Status	Compulsory
5	Course	1. To develop knowledge for food safety and quality assurance.
	Objectives	2. To acquaint students with various national and international laws
		associated with safety.
		3. To train students for food industry.
6	Course	After successfully completion of this course students will be able to:
	Outcomes	<b>CO1.</b> Understand general principles of food safety and hygiene.



		<b>CO2.</b> Apply the food safety regulations.	
		<b>CO3.</b> Recognize the national food laws.	
		CO4.Understand the role of international body	ied dealing in
		standardization.	
		<b>CO5.</b> Recognize current concerns for food safety.	
		CO6.Prepare for working in food industry and other foo	d laws governing
		bodies.	
7	Course	Food Safety is a scientific discipline describing hand	ling, preparation,
	Description	and storage of food in ways that prevent foodborne illne	ess. This includes
		a number of routines that should be followed to avoid	l potential severe
		health hazard. In all countries, food is governed by a co	omplexity of laws
		and regulations which set out the government's require	ements to be met
		by food chain operators to ensure the food is safe	and of adequate
		quality. Generally "food law" is used to apply to l	egislation which
		regulates the production, trade and handling of food and	hence covers the
		regulation of food control, food safety and relevant aspe	ects of food trade.
		Minimum quality requirements are included in the food	law to ensure the
		foods produced are unadulterated and are not subjected	to any fraudulent
		practices intended to deceive the consumer.	
8	Outline syllabus		CO Mapping
	Unit 1	General Principles for Food Safety and Hygiene	CO1,CO6
	А	Principles of food safety and quality -Food Safety-	CO1,CO6
		system - Quality attributes - Management	
	В	Introduction to Risk Analysis, Risk Management, Risk	CO1,CO6
		Assessment, Risk communication, CCP	
	C	Principles and implementation or HACCP.	CO1,CO6
		Traceability and authentication, Certification and	
		quality assurance	
	Unit 2	General principles for Food Safety Regulation	<u>CO2,CO6</u>
	A	The Structure of Food-Law, Food	CO2,CO6
	D	Regulation	<u> </u>
	В	Laws and Regulations to prevent Adulteration and	CO2,CO6
	C	Cross contamination, Microbial contamination	<u> </u>
	C	Contamination East Additives Labelling	02,000
	Imit 2	Notional Standards	<u> </u>
		DEA EDO MMDO MDO ACMADE DIS	C03,C00
	R	Environment and Pollution Control Board Trends in	CO3,CO6
	D	Environment and Fonution Control Board, Trends In Food Standardization	003,000
	C	An overview and structure of 9001 ·2000/2008 clause	CO3 CO6
	C	wise Interpretation of ISO 9001:2000, An overview	003,000
		and Structure of 22000.2005	
	Unit 4	International Bodies Dealing in Standardization	CO4 CO6
	Δ	International Standardization organization (ISO) Joint	C04, C06
	11	FAO/WHO Food Standards program	
		1110/ WITO I Ood Diandards program	



В	Codex Alime	ntarius commi	ission (CAC)	CO4,CO6		
С	Other Intern	ational organ	nizations Active in Food	l CO4,CO6		
	Standard Ha	rmonization.	Advantages of Utilizing	<b>7</b>		
	International	Standards.				
Unit 5	Recent Conc	Recent Concerns				
А	Packaging			CO5, ,CO6		
В	Product label	ling and Nutri	tional labelling, organic	CO5, ,CO6		
	foods	foods				
С	Newer approx	Newer approaches to food safety				
Mode of	Theory					
examination						
Weightage	CA	MTE	ETE			
Distribution	30%	20%	50%			
Text book/s*	1. De Vries.	7				
	York, 1997					
Other	1.Manay, S.	1.Manay, S. & Shadaksharaswami, M., Foods: Facts				
References	and Principle	s, New Age Pi	ublishers, 2004			

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### Waste Management in Food Industries: BFS308

School: SBSR		Batch : 2019-2022
Pro	ogram: B. Sc	Current Academic Year: 2021-22
Bra	anch: Food	Semester: 6
Sci	ence and	
Teo	chnology	
1	Course Code	BFS-308
2	Course Title	Waste Management In Food Industries
3	Credits	4
4	Contact Hours	4-0-0
	(L-T-P)	
	Course Status	Compulsory



5	Course	1. Understanding about food industry waste.				
	Objective	2. Importance and need of management the industrial wa	ste.			
		3. Various treatment methods available for food waste.				
		4. Types, availability and utilization of by-products from	waste.			
		5. Biomethanation and bio composting technology for	organic waste			
		utilization	-			
		6. Industrial waste treatments and ways for waste dispose	l method.			
		7.Food Additives; Food Adulteration				
6	Course	After successfully completion of this course students will b	e able to:			
	Outcomes	CO1: Comprehend the basic concept of waste and types.				
		CO2: Waste Disposal method. Recognize the importance	and utility of			
		waste from food Industry				
		CO3: Treatment of plant waste by physical, chemical and biological				
		methods, Effluent treatment plants, Use of waste and waste	e water.			
		Various hazards and their control measures.				
		CO4: Types, availability and utilization of by-produc	ts of cereals,			
		legumes & oilseeds, Utilization of by-products from fo	od processing			
		Industries.				
		CO5: Status and utilization of dairy by-products. Industrial waste				
		management				
		CO6: Case study.				
7	Course	Food waste management is an application of utilization fo	od waste. The			
	Description	types of treatment applied during processing identification	are beneficial			
		as by product recovery. In the future waste management	nt could offer			
		more depth knowledge with its applicable techniques. I	n this course,			
		students will learn about the different treatments requ	uired in food			
0	0 (1' 11 1	manufacturing	COM :			
8	Outline syllabus		CO Mapping			
	Unit 1	INTRODUCTION	CO1,			
	А	Waste and its consequences in pollution and global	CO1,			
		warming.				
	В	Types of food processing wastes & their present disposal	CO1, CO2			
	~	methods.				
	C	Identification of waste.	CO1			
	Unit 2	Treatment methods for liquid wastes	CO2, CO3			
	А	Treatment of plant waste by physical, chemical and	CO2			
		biological methods.	~~ <b>.</b>			
	B	Solid and liquid waste.	CO2			
	C	Use of waste and waste water.	CO2			
	Unit 3	Treatment methods of solid wastes	<u>CO3</u>			
	A	Types, availability and utilization of by-products	<u>CO3</u>			
	В	Vermin composting	<u>CO3</u>			
	C	Utilization of by-products from sugar and agro based	03			
	<b>T</b> T <b>1</b> / 4	industries, and brewery & distillery waste.				
	Unit 4	Bio filters and bio clarifiers	CO4			



А	Type of Filter	Type of Filters used in Waste Water Treatment.				
В	Drinking Wat	er treatment		CO4		
С	Recovery of u	seful materials	from effluents by different	CO4		
	methods.					
Unit 5	<b>Case Studies</b>			CO5,		
А	Sugar Cane In	Idustry		CO5,CO6		
В	Meat Industry	7		CO5,CO6		
С	Milk Industry	Case studies.		CO5,CO6		
Mode of	Theory					
examination						
Weightage	CA					
Distribution	30%	20%	50%			
Text book/s*	1) Beggs C.	Energy Man	agement and Conservation.			
	Elsevier Publ.	Chaturvedi P.	2000.			
Other	2) Energy (	Conservation	through Waste Utilization.			
References	American Soc					
	Kreit F & Gos					
	3) Energy M					
	CRC Press.					
	4) Murphy W	R & Mckay G	. 1982. Energy Management.			
	BS Publ. Patr	ick DR. 1982.				

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2

### Research Methodology in Food Science: BFS311

Scho	ool: SBSR	Batch : 2019-2022
Program: B.Sc.		Current Academic Year: 2021-2022
Branch: Food		Semester: 6
Science and		
Technology		
1	Course Code	BFS311
2	Course Title	Research Methodology in Food Science



3	Credits	4	·		
4	Contact Hours	4-0-0			
	(L-T-P)				
	Course Status	Compulsory			
5	Course Objectives	<ol> <li>To familiarize participants with basic of research and the research process.</li> <li>To enable the participants in conducting research work and formulating research synopsis and report.</li> <li>To impart knowledge for enabling students to develop data analytics skills and meaningful interpretation to the data sets so as to solve the Research</li> </ol>			
	0	problem.	11 /		
0	Outcomes	<ul> <li>After successfully completion of this course students will be</li> <li>CO1: Familiarization of various research concepts in food So</li> <li>CO2: Knowledge in formulating research design, hypothesis</li> <li>research problem.</li> <li>CO3: Identify and discuss the concepts and procedure collection.</li> <li>CO4: Identify, explain compare and prepare the key eler proposal and report.</li> <li>CO5: Knowledge of data interpretation and data analysis.</li> <li>CO6: Demonstrate the knowledge of research process, recomplete research hypothesis in research methodology.</li> </ul>	of sampling, data ment of a research esearch design and		
7	Course	This course will provide an opportunity for participants to e	stablish or advance		
	Description	their understanding of research through critical explor language, ethics, and approaches. The course introduces research, ethical principles and challenges, and the element process within quantitative, qualitative, and mixed me Participants will use these theoretical underpinnings to review literature relevant to their field or interests and deter findings are useful in forming their understanding of their and global environment.	ration of research s the language of nts of the research ethods approaches. begin to critically mine how research work, social, local		
8	Outline syllabus		CO Mapping		
	Unit 1	Type of Research	CO1, CO6		
	A B	Exploration, Description, Explanation, Scientific method and research Research Design-Experimental and observational,	CO1, CO6 CO1, CO6		
	С	Quantitative and qualitative approaches Conceptualization and measurement, Variables, concept and measurement	CO1, CO6		
	Unit 2	Sampling and Tools	CO2, CO6		
	А	Role of sampling in research, Types of sampling	CO2, CO6		
	В	Research Tools and Techniques, Validity and reliability	CO2, CO6		
	С	Interviewing and observational methods	CO2, CO6		
	Unit 3	Research Process	CO3, CO6		
	A	Defining the problem, research questions, objectives, hypotheses, Review of related literature and originality in writing	CO3, CO6		
	B	Planning the research, Subjects context and ethics,	CO3, CO6		



	Methodology a					
С	Citation forma	Citation formats: in medical science, social sciences.				
Unit 4	Sampling Pro	CO4, CO6				
А	Exercise in sat	CO4, CO6				
	designing tools					
В	Interview and	Interview and Questionnaire method				
С	Data collectio	n Process: Con	nducting interviews, FGDs (	CO4, CO6		
	focus on group	discussion)				
Unit 5	Data Collectio	Data Collection				
А	Levels of meas	surement		CO5, CO6		
В	Units of analys	sis, Case studies	8	CO5, CO6		
С	Result Interpre	etation		CO5, CO6		
Mode of	Theory	Theory				
examination						
Weightage	CA	MTE	ETE			
Distribution	30%	20%	50%			
Text book/s*	1. Kumar, R.	(2005) Resear	ch Methodology: A Step by			
	Step Guide for	Beginners. Sag	ge			
	2. Kothari C.I	R. (2008) Rese	earch Methodology: Methods			
	and Technique	es 2nd Ed Nev	w Age-International Pvt Tld,			
	New Delhi.					
Other	1. Kerlinger I	F.N. and Lee,	H.B. (2000) Foundations of			
References	Behavioural R	esearch 4th Ed.	Harcour College Publishers			
	2. Black J.A.	& Champion, D	D.J. (1976) Methods and Issue			
	in Social Resea	arch. New York	Wiley and Sons.			

CO/PO	PO1	PO2	PO3	PO4	PO5
C01	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2



# Dairy Technology Lab: BFP305

School: SBSR		Batch : 2019-2022					
Program: B.Sc.		Current Academic Year: 2021-22					
Bra	nch: Food	Semester: 6					
Scie	nce and						
Tecl	nnology						
1	Course Code	Dairy Technology Lab					
2	Course Title	BFP 305					
3	Credits	2					
4	Contact Hours	0-0-3					
	(L-T-P)						
	Course Status	Compulsory					
5	Course	The course is designed to equip students with a broad	understanding of				
	Objectives	dairy chemistry and processing involved in manufacturi	ng of dairy based				
		products. The course provides a foundation for careers	s in new product				
6	Cauraa	development, dairy industry and quality control laborato	ries.				
0	Course	After the successful completion of this course students w	viii de adie to:				
	Outcomes	<ul> <li>CO1: Discuss milk and its nutritional value.</li> <li>CO2: Evaluate an everyieve of the major means and</li> </ul>	mioronutrianta				
		• CO2. Evaluate an overview of the major matrix and relevant to human health available in milk	micronuments				
		<ul> <li>CO3: Manufacturing and processing of various milk</li> </ul>	products				
		<ul> <li>CO4: Analysis of milk safety and microbial spoilage</li> </ul>					
		• CO5: Application of Total Quality Management Systems into					
		processes.	5				
		• CO6: Understand processing conditions for different	dairy products.				
7	Course	Dairy Technology is a course which focuses on dairy	products and is a				
	Description	part of the food technology and processing industry. S	Students pursuing				
		dairy technology learn about milk processing as well the	ne manufacturing				
		process for its by-products. The study includes quality control at the time					
		of processing of products. The course helps in gaining techn					
		knowledge about dairy processing equipment					
8	Outline syllabus		CO Mapping				
	Unit 1	Practical related to Plate-form Tests of milk	CO1, CO6				
	A	Determination of COB, MBR Test					
	В	Determination of Alcohol Test, Sediment Test					
	С	Determination of SNF Content in Milk					
	Unit 2	Practical related to determination of nutrient	CO2, CO6				
		constituents					
	А	Determination of milk protein content					
	В	Determination of fat content in milk					
	C Determination of Fat content in milk Products						
	Unit 3	Development of dairy products	CO3, CO6				
	А	Development of Yogurt and cheese					
	В	Development of cheese					



С	Developmen					
Unit 4	Practical rela quality	CO4, CO6				
А	Determinatio	Determination of Titratable Acidity in Milk				
В	Determination	on of Overrun	in Ice-cream			
С	Determination	on of fat conter	nt in milk			
Unit 5	Detection of	CO5,CO6				
А	Analysis of A	dulteration in	Milk and Milk products			
В	Analysis of A					
С	Quality Testi	Quality Testing of Butter oil / Ghee				
Mode of						
 examination						
Weightage	CA	MTE	ETE			
Distribution	60%	0%	40%			
Text book/s*	1. Ramesh	C. Chandan:	Dairy-based Ingredients,			
	Eagan Press,	1997				
	2. Sukumar	De: Outline	es of Dairy Technology,			
	Oxford Univ	ersity Press, 1	980			
	3. Aneja,	Mathur, Cha	ndan & A.K. Bannerji:			
	Technology					
 	Publication	Publication				
Other						
References						

CO/PO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2



### **Technology of Animal Foods Lab: BFP308**

School: SBSR		Batch : 2019-2022					
Program: B.Sc.		Current Academic Year: 2021-22					
Bra	nch: Food	Semester: 6					
Scie	nce and						
Tec	hnology						
1	Course Code	Technology of Animal Foods Lab					
2	Course Title	BFP308					
3	Credits	2					
4	Contact Hours	0-0-3					
	(L-T-P)						
	Course Status	Compulsory					
5	Course	This course shall educate students about the importa	nce of meat and				
	Objectives	poultry industry in nation's economy. The students shal	l gain knowledge				
		of the processing and preservation of meat, poultry and	seafoods.				
6	Course	After the successful completion of this course students	will be able to:				
	Outcomes	CO1: Identify the structure, quality and nutritional prop	erties of egg.				
		CO2: Understand basic techniques to preserve mea	t and meat				
		products.					
		• CO3: Explain the importance of Crude fiber in dail	y life and how to				
		analyse it from animal feed.	analyse it from animal feed.				
		• CO4: Understand how to prepare standard solution and able to					
		explain normality and Molarity.					
		• CO5: Able to analyse fat acidity from different anim	nal source.				
		• CO6: Understand the importance of saponification	value to analyse				
		the food quality.					
7	Course	This course has been designed to make student understa	nd the processing				
	Description	and preservation technology for meat, poultry and seafoods					
8	Outline syllabus		CO Mapping				
	Unit 1	Analysis of nutritional/quality attributes of egg.	CO1				
	А	Analysis of proximate constituents of egg.					
	В	Analysis of mineral content in egg shell					
	С	Evaluation of eggs for quality parameters					
	Unit 2	Formulation of Meat/Egg product formulation	CO2				
		and their shelf life shelf-life					
	А	Formulation of meat product					
	В	Formulation of egg product					
	С	Shelf life evaluation of any meat product					
	Unit 3	Analysis of fiber from animal feed	CO3				
	А	Estimation of fiber in meat product-1					
	В	Estimation of crude fiber in meat product-2					
	С	Estimation of crude fiber in meat product-3					
	Unit 4	Solution preparation/dilution preparation	CO4				
	А	reparation of dilutions					



В	Preparation o				
С	Preparation o	Preparation of normal solutions			
Unit 5	Analysis of value	CO5, CO6			
А	Analysis of fa	at acidity in gi	ven sample		
В	Analysis of s	aponification	value in given sample-1		
С	Analysis of s	aponification v	value in given sample-2		
Mode of examination					
Weightage	CA	MTE	ETE		
Distribution	60%	0%	40%		
Text book/s*	<ol> <li>Lawrie R A, Lawrie's Meat Science, 5th Ed, Woodhead Publisher, England, 1998</li> <li>Parkhurst &amp; Mountney, Poultry Meat and Egg Production, CBS Publication, New Delhi, 1997</li> <li>Pearson &amp; Gillet Processed Meats, 3 Ed, CBS Publication, New Delhi, 1997</li> </ol>			l, g S	
Other References					

CO/PO	PO1	PO2	PO3	PO4	PO5
C01	3	2	3	3	1
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	2	2	2	2
CO6	3	2	2	2	2